

Comparative analysis of countries in the peer-group based on economic potential and components of sustainable development

Sergii VOITKO*, Irina GRINKO**

Abstract

The authors study levels of sustainable development potential and determine the positions of Ukraine and other countries in the peer-groups [4], based on individual macroeconomic indicators. The research includes a comparative analysis of absolute and relative terms of GDP, industrial production and the index of competitiveness for the countries included to the peer-groups. The authors analyse the position of countries based on the GDP per capita and components of sustainable development (Quality of Life Index and Security of Life Index). In the article, the authors suggest the methodical approach of performing the comparative analysis of peer-group countries based on their indicators values. This approach gives the possibility to investigate the country's potential in the limits of the chosen peer-group and propose the recommendations for increase of economic potential in purpose of sustainable development achievement.

Keywords: sustainable development, GDP, peer-group, GDP per capita, comparative analysis.

Introduction

Sustainable functioning of national economies in the European region is primarily connected to integration, cooperation and specialization processes of neighbouring countries. Anderson (Anderson, 1979, pp. 106-116) by gravitation model proved that the neighbouring countries has higher level of economic relations. Thus, it is necessary to take into attention both: the European Union countries and former Soviet countries because of their territorial closeness.

For decades, the new production and commercial relations have been formed in the countries, which less than 30 years ago belonged to the socialist camp. During this period, the economic situation and internal relations were changed: some countries significantly lost their economic

*Sergii VOITKO holds a PhD in Economics and is professor at the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”, Kyiv, Ukraine; e-mail: s.voytko@kpi.ua.

**Irina GRINKO is a PhD, assistant professor of the department of international economy, National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”, Kyiv, Ukraine, e-mail: grinko.irina.kpi@gmail.com.

⁴ Peer-group in this research is determined as a group of countries where the ratio of GDP per capita in 1990 can be compared to the similar indicator in Ukraine.

potential after the collapse of the USSR. For example, in 1990, economy of Ukraine occupied 0.36% of the world economy, in 2014 – 0.17%, and in 2015 this value was equal to 0.12%.

To return to the previous position in the world economies list (we will take as an indicator the potential of the economy in 1990) it is required to take considerable efforts and proper scientific substantiation of development strategies at the state level that include the experience of the European countries. Moreover, this difficult way requires a political will at the country's level that will guarantee the transformation of economy. These steps include the choosing of the development's goal.

A significant number of the Eastern European countries were able to create a model of the economy based on competition, implementation of high-tech and science-intensive technologies and usage of the provisions within the sustainable development concept.

We believe that development of modern approaches to increase the economic potential and sustainable development on the basis of the analysis of peer-group countries and certain regions can create a basis of fundamental changes implementation in the economy.

The main purpose of the article is to offer a methodical approach to the analysis of peer-group countries on the basis of macroeconomic indicators and components of sustainable development and define the conditions for realization conceptual states of sustainable development and economic potential of peer-group countries and, especially, Ukraine.

The methodological approach of this research is based on comparative analysis and monitoring of indices dynamics for peer-group at the long-term period. The set of Index of Sustainable Development (that includes indices of Quality and Security of Life), Index of Innovations, Index of the Hi-Tech Production gives the possibility to determine the place of the country among others as an integrate estimation. Thus, the forecast of its development and the current analysis begin to be less subjective. It is necessary to mention, that for now, the methodology of choosing the optimal set of indices for integrated value or hierarchical models doesn't exist. Therefore, for the proposed set of indices we used these methods: checking data (data horizon, trustful sources) and the statistical parameters (mainly correlation to be sure that the values are independent), and the ex-post forecast and expert estimation for analyse the results.

1. Literature Review

A great number of scientific research is dedicated to investigate the issues related to sustainable economic development of countries, including the works of G. Brown (Brown, 2011, pp. 30-40),

S. Imran, K. Alam, N. Beaumont (Imran, Alam and Beaumont, 2014, pp. 134-144), L. Chen, L. Lu, M. Tai, S. Hu and V. Wang (Chen, Lu, Tai, Hu and Wang, 2014, pp. 203-210), and others. Such scientists as K. Prettnner (Prettnner, 2013, pp. 811-834), N. Reimers (Reimers, 1994, pp. 366), K. Lee, B. Kim, Y. Park, E. Sanidas (Lee, Kim, Park and Sanidas, 2013, pp. 561-582), work on economic development and economic potential of countries. However, there are still a lot of relevant and not sufficiently studied issues in this field including the increase of economic potential level, especially for developing countries, and for Ukraine particularly. Therefore, we conducted a comparative analysis of key macroeconomic indicators and components of sustainable development of Ukraine with peer group countries with purpose to detect a negative impact on the rate of expanded reproduction of economic potential of peer group countries and Ukraine and gradual transfer of national economies into a sustainable development mode.

Before analysing indicators of the country in accordance with economic potential and components of sustainable development, we should consider the essence of concepts such as «sustainable development», «sustainability» and «potential» and their interconnection; the nature, classification, types and principles of sustainability; levels of potential expression and potential types of sustainable development. This necessity is caused by variety of the research in this field and the diversity of the definitions that were changed with time and with countries. To the purpose of this research, we are going to use the following terminological base.

The initial meaning of sustainable development of any country, according to G. H. Brundland (Brundland, 1988, p. 50) is «ecological sustainability, where conditions and limits of restoration for natural systems are not violated owing to their operation». To achieve the mentioned environmental (ecological) sustainability of the country it is important to maintain its firmness and stability regularly. This can be achieved by detecting external factors of influence on the ecosystem and solving problems of stability and sustainability in social and economic systems. After revealing factors and solving the relevant problems it is worth considering a number of tasks, classifying and ranking the problems by their value. The power of impact and its critical importance for every factor are separately determined by researchers. For the first time, P. Samuelson (Edited by R. Merton, 1991, p. 199-201) suggested a similar approach to stability analysis, he came up with the idea of it as an «attraction» to a certain point and defined it as a property of the system to back to an equilibrium trajectory after changing the initial conditions.

At the same time, we outlined two main approach for sustainability research in scientific works: it is divided into strong and weak. There are a lot of definitions of “sustainable development” at the research of the following scientists: Bellesi (Bellesi, Lehrer and Tal, 2005, pp. 9-39), Curran (Curran,

2004, pp. 277-283), Efremova (Efremova, 2008, pp. 8-90), Filipenko (Filipenko, 2007, p. 670), Jovane and Yoshikawa (Jovane and Yoshikawa, 2008, pp. 641-659), Shumpeter (Shumpeter, 1982, p. 436), that reflect the complexity of the category and the interests of its investigation. They describe this concept as a result of establishment of the market equilibrium. In general, the scientists determine the following types of stability (or sustainability, or balance): resident stability (steadiness) is an ability to remain in stable (equilibrium) condition under load, and elastic resistance (actual resistance) is an ability to recover with flexibility when the load is removed. Thus, the natural capital, within the strong sustainability, cannot be replaced by an artificial one, and weak sustainability allows substitution of natural capital by the artificial one.

One of the stages of development of economic stability concept is associated with the works of J. Keynes (Keynes, 1926), who believed that the unbalanced market system needed a strict state regulation. His idea was based on the fact that was necessary to influence on the expansion of production and on the supply of goods and services by aggregate demand, and stimulation through regulation of money supply, interest rates and direct public funding.

We share the opinion of scientists who define the sustainable development as «structural and dynamic upheavals that meet current needs, but do not endanger the ability of future generations to meet their own needs» (National Academy of Sciences of Ukraine, 2014). This approach allows to determine the sustainable development as more complex and finalized category.

As noted in the scientific works of A. Zgurovsky (Zgurovsky, 2010, pp. 112-122), the concept of sustainable development is based on five basic principles:

- Principle 1. Mankind is able to provide sustainable and long-term nature of development, in order to satisfy the needs of people today without depriving future generations of the ability to satisfy their needs.
- Principle 2. The restrictions that exist in the exploitation of natural resources are relative. They are associated with the current level of technology and social organization, as well as the ability of the biosphere to heal itself.
- Principle 3. It is necessary to satisfy basic needs of people and enable everyone to realize their expectations for a more prosperous life. Without the above sustainable and long-term development is simply impossible.
- Principle 4. It is necessary to reconcile the needs of those who use excessive means (cash and material) with environmental capacity of the planet, the energy use, in particular.
- Principle 5. Size and rate of growth of the population should be agreed with the production capacity of global ecosystems of Earth, which is changing.

Sustainable development has both qualitative and quantitative criteria related to production methods and caused by the emergence of global processes in the world economy. It is worth mentioning the following essential criteria of sustainable development: knowledge, namely the emergence and strengthening of global economic thinking and its occupation of the meaningful place in the productive forces; creation of global mechanism, and therefore development of national interests into global; analysis and assessment of global risks and their monitoring; growth of equal distribution of income and property; increase the number of renewable resources and reduce of non-renewable; the emergence of interdisciplinary knowledge, new education models for its integration into production; dependence of economic growth on population growth in the world; restructuration of all industries by creating new products and services, including the services of a social nature and others. The above criteria will contribute to global institutionalization of confidence among the population that will enable to ensure monitoring of the planet without interfering in the internal affairs of nations, particularly with regard to security issues and create global coordination mechanism. This will develop scientific and methodological approaches of understanding and creating models of sustainable development and define the vector of economic development, which should be chosen to increase the economic potential and to provide sustainable development and will lead the world economy to a competitive harmonious economic development.

As for the term “potential” (from the Latin “potentia”, which means power, strength, capabilities), the scientists interpreted it differently. It origins from the philosophical interpretations of Aristotle. According to studies, being separated into potential and actual, and formation (development) is seen as a transition from one state to another. In scientific studies, scientists use the term “potential” as a synonym to resources. Accordingly, investigating interpretation of this concept should also identify the nature of reserves and capabilities concepts and the relationship between them. In this regard, we believe that categories such as resources, reserves, possibilities characterize individual manifestations of potential. A correlation between these categories characterizes the magnitude and direction. The above gives reason to believe that the category potential has several levels of manifestation (National Academy of Sciences of Ukraine, 2014):

First level: potential defines the past in terms of reflection of properties, accumulated by a human, which contribute to the human ability to participate in certain activities (potential becomes important resource).

Second level: potential reflects the nowadays in terms of practical use and human use of the available capacity (within the meaning of provision).

Third level: potential is focused on the development (future) (combines such values as "opportunities" and "prospects", and also "capacity" and "ability" in conjunction with the existing set of resources in the state).

Some scientists consider that potential is a complex of various resources required for the operation and development of any system (for example: Zgurovsky, 2007). We believe that a clearer interpretation of the concept potential should be considered from the perspective of achieving the goals. Thus, nature can be represented as a system of factors (environment components) that achieve goals.

For the purpose of this research, we believe it is necessary to agree with the interpretation of this concept stated in scientific work (Socio-economic potential of sustainable development of Ukraine and its regions: national report, 2014): the economic potential of sustainable development, on the one hand, as an economic category, is the result of the interaction of prior (in a particular period) socio-economic relations between man and nature which may be not obvious, but still can occur. On the other hand, it is the basis, the real force (material and energy) of sustainable development, characterized by a system of indicators that reflect not only the resources available, but their reserves, which can be used under certain conditions and opportunities.

It should be noted that the concept of regional and global ecological and economic potential (EEP) is well-detailed by Reimers (Reimers, 1994, pp. 272). In a process of studying it on a global scale, the scientist points out that "the maximum allowable value of anthropogenic impact on all self-organized set of natural systems is the one that does not lead to irreversible destruction of the structure of the population, significant disruptions in the detection of systemic laws and sharp deterioration of the dynamic characteristics of systems". Moreover, he believes "it helps to keep operating reliability of natural systems at local, regional and global levels".

Since we are going to carry out a comparative analysis of the economic potential and the components of sustainable development of the peer-groups of countries, it should be noted that the scientists also use other scientific and methodological approaches to the analysis and evaluation of different types of capacity for sustainable development, that more connected to the environmental, social, institutional aspects.

We are going to analyse one of the major indicators – gross domestic product (GDP) per capita. In terms of "GDP per capita", Ukraine occupied 94th place out of 183 countries in 1990 (The World Bank Data & Research, 2016). After 25 years (in 2014), this indicator decreased to position 129 out of 188 countries. According to the absolute value of GDP in 2014 Ukraine occupied the 60th position out of 187 countries. This is 400 times smaller than in highly developed countries all together

(High income countries). Ukraine's GDP is more than 140 times smaller than the GDP of all EU countries and more than 100 times less than countries of the Eurozone.

Ukraine's contribution to industrial goods production in 1991 was 0.57% and 0.20% in 2013 in the global market. During this period China was marked by quite significant growth - from 2.1% to 19.2%. Countries of «G7» lowered their share over this period, Germany from 8.4% to 4.8%, France from 4.1% to 2.1%, Italy from 4.5% to 2.1%, Japan from 17.8% to 6.0%.

From 1990 to 2014 in terms of "GDP at market prices" Ukraine's growth was only 1.6 times. By the indicator of "GDP at market prices", the economy of the world has increased in 3.5 times. Ukraine in 1990 occupied 0.36% of the world economy, and in 2014 - 0.17%.

But at the same time, it should be noted that Ukraine is one from 9 countries with a complete cycle of aircraft (Gorbachova, 2015, p. 427). The country has considerable resources of the black soil available (23% of European and 3% of the world's black soil) (Stefankiv and Maksymovych, 2012, p. 159). During 1989-1995 Ukraine was at the 1st place in terms of "The scientific human resource potential» (Razumkov Center, 2004). Moreover, out of 120 minerals used by mankind, industry volume of minerals in Ukraine includes 94 species, which are accounted by the State balance of reserves (Pivniak, Beshta and Tabachenko, 2013, p. 8).

Ukraine at the time of getting independence had high economic potential, but have lost it with the time. Economic system began to transform from high-tech to resource. The base of industry bases on 3rd or 4th technological mode. The other countries that are going to be investigate had approximately the same level of development in 1990. The similarity of economic development is a base for defining of the level of sustainability for economic systems for such long period of time. Analysis of the peer group with the usage of Indices of Sustainable Development make the research complete. This type of comparison can give an opportunity to find the ways of development for Ukraine. The complexity of this research is connected to the research subject: Ukraine has 83 from 120 types of natural resources, but doesn't use its potential and scientific base. It is necessary to mention the lack of strategic planning, but it is possible to take the best practices of the similar countries and implement them in Ukraine. These can help in realizing the sustainable economic development and will provide the social effect from the implementation of the sustainable development concept for Ukraine, and simplify its euro integration.

2. Features of the modern weary of economic development

The methodology of the research includes the following stages:

1. Selection of data that characterize the subject:
 - a. search of the open sources with the reliable data;
 - b. check of the existence of the necessary quantity of data (including the data horizon and the availability of data for various countries);
 - c. data analysis for presence of the linear connections.
2. Selection of the peer groups of countries for the analysis:
 - a. specification of the criteria for the countries' selection;
 - b. verification of the necessary data' existence;
 - c. expert evaluation of the obtained set for the peer group.
3. Calculations and analysis of the received results.
4. Conclusions and recommendations for the decision-makers.

The Global Competitiveness Index (GCI) is a global research that evaluates the economic competitiveness of countries and ranks them by the results. The choose of this index for analysis is based on its well-developed and verified methodology and usage of the open-data for its calculations. In addition, this index includes qualitative and quantitative parts that as results can give information that is more objective about countries. From the first presentation of the index in 1979, the method of its calculation had been changed twice. The current approach was implemented in practice by American economist Sala-i-Martin Xavier (World Economic Forum, 2017). It consists of a combination of public statistics and the results of a global survey of CEOs. The survey is conducted by the World Economic Forum together with leading research institutes and organizations in the countries that are analysed. Experts of the World Economic Forum make annual report called the "The global competitiveness" since 1979. This report describes the results of the evaluation of more than 100 countries on indicators: the index of potential growth and competitiveness index. Competitiveness Index c includes 113 variables through which any country of the world can be described at different levels of economic development. It should be noted that two-thirds of variables are the results of survey of leading companies' CEOs (for the analysis of factors affecting the business climate countries). All 113 variables are grouped into 12 sets of indicators by which competitiveness of the national state can be defined. These twelve indicators include such indices as quality of institutions, infrastructure, macroeconomic stability, health and primary education, higher education and training, efficiency of goods and services, labour market efficiency, financial market

completeness, technological development, size of the domestic market, the competitiveness of companies and innovation potential. Thus, the Global Competitiveness Index reflects in direct or indirect way different aspects of country economy. Table 1 illustrates the positions in the ranking for a definite peer group of countries in 2014-2015 and 2015-2016 years based on The Global Competitiveness Index (World Economic Forum, 2016).

Table 1. Positions of countries in the ranking of The Global Competitiveness Index (World Economic Forum) for the peer-group in 2014-2015 and 2015-2016 years

Ranking during 2015-2016	Country	Value (score)	Ranking during 2014-2015
28	China	4.89	28
31	Czech Republic	4.69	37
40	Azerbaijan	4.50	38
41	Poland	4.49	43
42	Kazakhstan	4.49	50
45	Russian Federation	4.44	53
51	Turkey	4.37	45
53	Romania	4.32	59
54	Bulgaria	4.32	54
60	Macedonia	4.28	63
65	Cyprus	4.23	58
66	Georgia	4.22	69
67	Slovakia	4.22	75
79	Ukraine	4.03	76
81	Greece	4.02	81
82	Armenia	4.01	85
84	Moldova	4.00	82
93	Albania	3.93	97
102	Kyrgyz Republic	3.83	108

Source: own representation based on the data retrieved from World Economic Forum

For 25 years, the countries from the list above were dispersed from 3.83 to 4.89 by the index of competitiveness of economies. Ukraine has taken a middle value (average value is 4.41 and Ukraine is 4.03). Thus, even during the war that occupied the Donbas region and the annexation of the Crimea by the Russian Federation this position has been decent. So, we have a slight decrease according to the ranking of Ukraine during 2015-2016 (79 position) in comparison to 2014-2015 years (76 position). According to the table, except Ukraine the lowest value of the analyzed indicator was estimated in such countries as Greece, Armenia, Moldova, Albania, and the Kyrgyz Republic. The highest value of the studied parameter is in China with a number of 4.89, which is 0.86 higher than

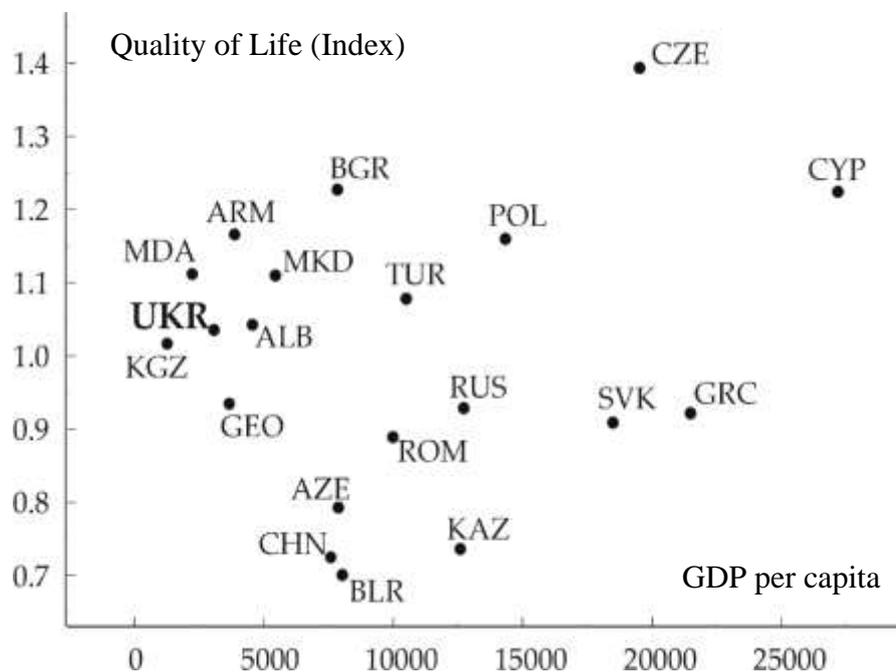
in Ukraine (4.03). In addition, by the results of this indicator an important place is occupied by Czech Republic, its global competitiveness index was – 4.69, which is 0.66 more than in Ukraine.

For a more qualitative comparison let us consider the visualization of countries placement in the coordinates system of GDP per capita and Quality of Life Index (Figure 1). The methodology of calculating the Quality of Life Index was developed by «Economist Intelligence Unit» and is based on the relationship of the results of research on subjective assessment of quality of life in the countries with the objective determinants of quality of life in these countries. For the first time, the index was calculated in 2005, and included data of 111 countries (Economist Intelligence Unit, 2005, 2013). A large number of countries have not been included in this ranking in 2005 because of the lack of data for evaluation. Such indicators as health, divorce rate, public life, material prosperity, political stability and security, climate and geography guarantee of political freedom and gender equality were taken into account. In 2013, the Organization of Economic Cooperation and Development (OECD) published the Quality of Life Index that includes such parameters as housing, the difference in income, employment, education, environment, health, safety, satisfaction with life and others. Each parameter was scored, with the maximum score of 10. First place according to rating in 2013 was occupied by Australia, the last – by Turkey. Though, the compilers of the rating had marked one country positively – Israel, which has taken the 24th place at that time. According to the rating of quality of life index in 2013 life satisfaction in that country was – 7.9 points, security – 7.3 points, and the rate of health care, outlined by researchers, was - 8.9 points (Economist Intelligence Unit, 2005, 2013). The Russian Federation received the highest score (8.5) in terms of "value of work and leisure" in calculation of the quality of life index in 2013. Israel received only 5.5 points for the same indicator. However, in terms of "life satisfaction" Russian Federation received only 3 points, and 0.5 points for "health care" (Economist Intelligence Unit, 2013). The values of the Index of Quality of Life for the 2014-2015 are presented in figure 1.

Most of the countries, that are investigated, have the average level of the Index of Quality of Life and have the average GDP per capita near \$5000-1000. But it is necessary to mention, that for example, China as a country with strong economy has low level of development in the peer group.

The position of Ukraine is quite similar to the positions of Moldova, Kyrgyzstan and Albania. The countries rank lower places by the competitiveness index: the position of the countries in the coordinates system gives a base of state the interrelation between of GDP per capita, the quality of life in the country and the competitiveness of countries.

Figure 1. Visualization of the placement of countries in the coordinates system of GDP per capita and quality of life index



Source: authors representation based on the data retrieved from World Data Center for Geoinformatics and Sustainable Development

The position of Cyprus in the coordinates system deserves the attention of scientists. It is an island country, which has a developed banking system. Significant financial assets of Ukrainian business owners are included to the financial system of Cyprus. That financial sector largely contributes to high positions of Index of Quality of Life and GDP per capita. Czech Republic and Bulgaria illustrate high level of life quality in this peer group.

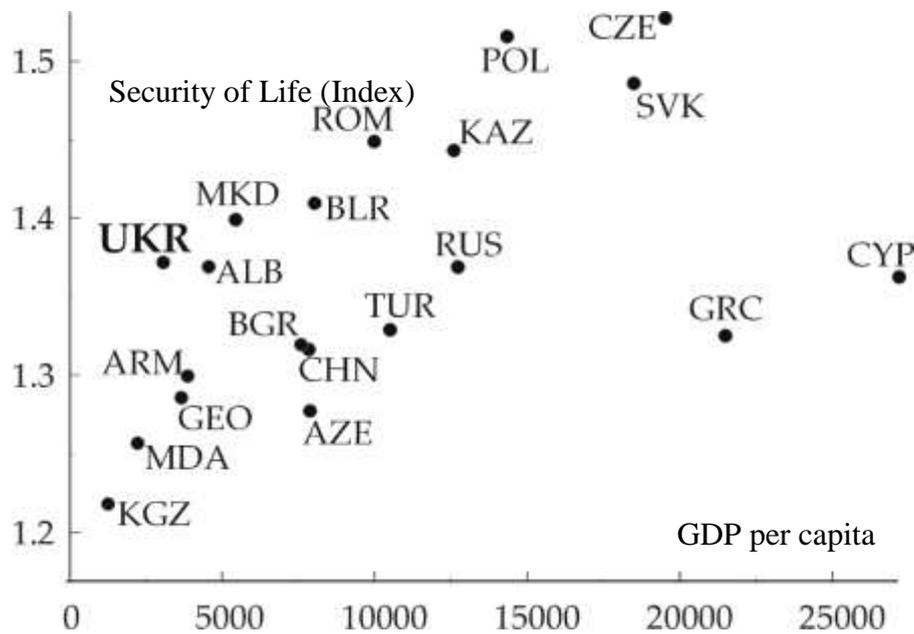
Another component of sustainable development is the Index of Security of Life. Figure 2 illustrates the visualization of rank of countries in coordinates of GDP per capita and the Index of Security of Life.

The main part of the countries in these coordinates has equal distribution of the level of life security. In general, the level of countries in accordance to this index is high. Therefore, the group of countries that are investigated has a close level of development in the field of the life security during previous 25 years.

In Figure 2 coordinate system, Ukraine is close to Macedonia and Albania. Unfortunately, the situation in the Donbass region has certainly influenced to the position of Ukraine.

Countries of the former Soviet Union have the worst values of life security and GDP per capita. Among a core group of countries, Greece and Cyprus have the average values of life security and high values of GDP per capita.

Figure 2. Visualization of countries placement in coordinates of GDP per capita and the security of life index



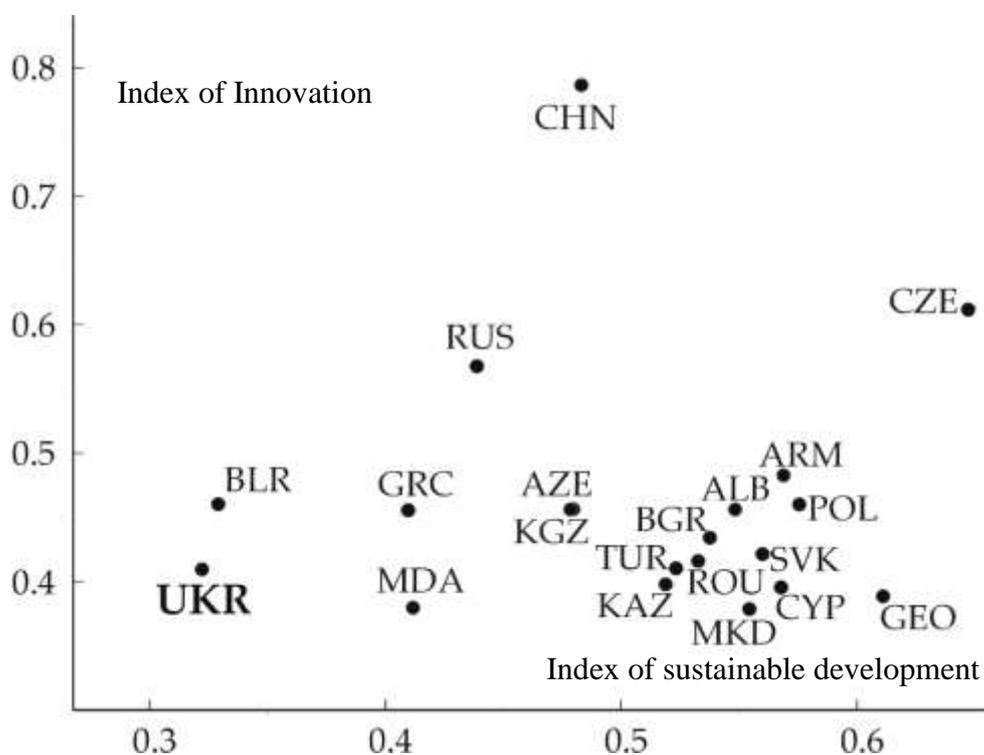
Source: authors representation based on the data retrieved from World Data Center for Geoinformatics and Sustainable Development (World Data Center, 2016)

Summarizing the analysis of these dimensions of sustainable development, it should be noted that the important component of economic development of the European countries is and will be an applying of the concept of knowledge economy, where application of intellectual potential of a person occupies a significant place. The realization of this potential is reflected in the high-tech, knowledge-intensive, innovative developments.

For peer group analysis in Figure 3, the visualization of the rank of the countries in the coordinates system of Index of Sustainable Development and Innovation Index is presented.

The different picture for Innovation Index appears in the coordinates of sustainable development. In this case, it is difficult to determine the dispersion clouds, but it is necessary to mention that most of the countries from the peer group are *i* the zone of high level of sustainable development and low level of innovations.

Figure 3. Visualization of countries ranks in the coordinate system of Index of Sustainable Development and Innovation Index

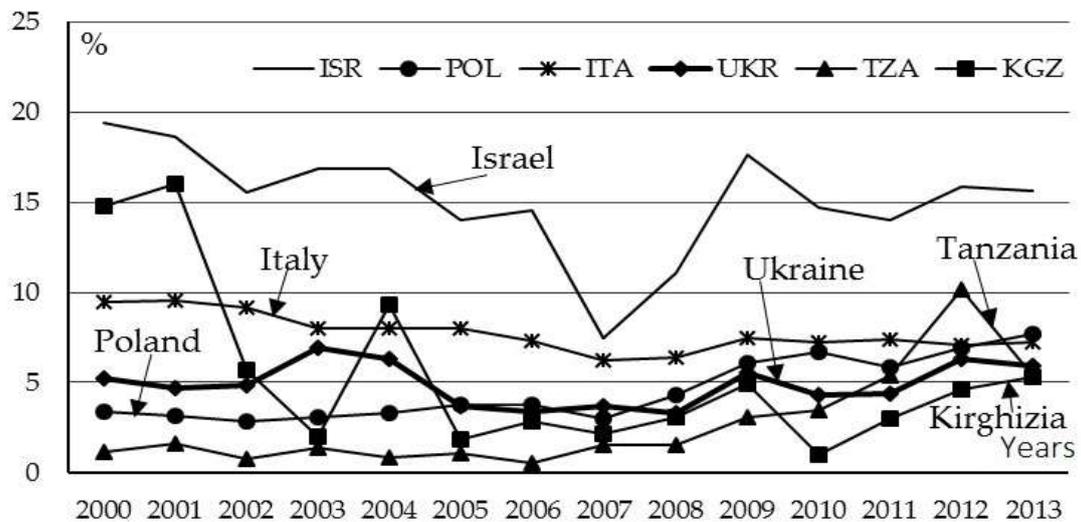


Source: authors representation based on the data retrieved from World Data Center for Geoinformatics and Sustainable Development (World Data Center, 2016)

As we can see on this coordinate system, Ukraine is near Bulgaria and is quite far from China that is the leader in export of goods with a significant part of the high-tech ones. The values of Innovation Index are significant for the Czech Republic and the Russian Federation. Most of the peer group countries have the values less than 0.5 for this index. This shows the low development level of these countries in the high technology field. It should be noted that there is a rather low position of Ukraine in this coordinate system. The value corresponds to values of Moldova, Kazakhstan, Macedonia, Cyprus, Georgia. The dynamics of high-tech export of Ukraine is shown in Figure 4.

Figure 4 shows the place of Ukraine in the export of high-tech production. Unfortunately, even the success of Tanzania and Kirgizia has more attention.

Figure 4. The dynamics of high-tech products as compared to the total export of individual countries



Source: authors representation based on the data retrieved from The World Bank Data & Research (World Bank, 2016)

This production is generated on the basis of high technology knowledge: its exports fluctuates between a maximum value of 6.9% (in 2012) to a minimum value of 3.3% (2008) since 2000. By the way, the limits for China ranged from 30.8% to 19.0%. We should also mention Philippines, where the high-tech export within a maximum of 74.2% and a minimum of 46.4% (The World Bank Data & Research, 2016). Table 2 illustrates the ratings and there is a relative importance of high-tech products in the total exports in the countries in the peer group for 2000 and 2013 for a more thorough analysis. 2013 is the year before the beginning of the war for Ukraine.

Table 2. Ratings and relative importance of exports of high-tech products to total exports of peer-group

Countries	2000	Countries	2013
1. China	19.0	1. Kazakhstan	36.9
2. The Russian Federation	16.1	2. China	27.0
3. Kyrgyzstan	14.8	3. Czech Republic	14.7
4. Greece	13.7	4. Azerbaijan	13.4
5. Georgia	10.9	5. Slovakia	10.3
6. Czech Republic	8.5	6. Russian Federation	10.0
7. Romania	5.9	7. Bulgaria	8.0
8. Ukraine	5.2	8. Poland	7.7
9. Turkmenistan	5.0	9. Greece	7.5
10. Turkey	4.8	10. Cyprus	7.2
11. Armenia	4.7	11. Ukraine	5.9
12. Azerbaijan	4.6	12. Romania	5.7
13. Belarus	3.8	13. Kyrgyzstan	5.3
14. Slovakia	3.6	14. Belarus	4.4

15. Kazakhstan	3.6	15. Macedonia	3.7
16. Poland	3.4	16. Armenia	2.9
17. Moldova	3.1	17. Georgia	2.6
18. Bulgaria	2.9	18. Moldova	2.4
19. Cyprus	1.7	19. Turkey	1.9
20. Macedonia	1.2	20. Albania	0.5
21. Albania	0.7	21. Turkmenistan	..
22. Uzbekistan	..	22. Uzbekistan	..

Source: authors representation based on The World Bank Data & Research (World Bank, 2016)

The analysis of the table shows that in the period of 2000-2013 the volume of high-tech exports increased slightly, but in the ranking of peer group Ukraine lost 3 positions because of the fact that significant number of countries improved their performance. Industrial production in Ukraine's GDP decreased from 50.9% in 1992 to 25.4% in 2014. At the same time, the «Big Seven» had a growth of 19.4% to 38.1% for the period from 1997 to 2014. The military aggression of the Russian Federation in 2014-2016 years decreased both Index of Quality of Life and Index of Security of Life.

The countries with similar start positions in 1990 significantly changed their economic systems during 25 years. According to the given data, the most possible models for development of Ukraine, especially the innovative development, should be focused on the Chinese model. Today Ukraine's economy equals to 1/830 of the world economy in comparison to 1990, when such ratio amounted to 1/280 (World Bank, 2016).

The conducted analysis of the indicators suggests that the global economic crisis of 2008 affected negatively the rate of expanded reproduction of the economic potential of Ukraine, which resulted in the gradual transfer of the domestic economy to the sustainable development mode. The predominance of raw orientation branches and those focusing on low value-added production influenced negatively to the structure of the national economy. In particular, the balance of payments deficit was affected, which is related to the decrease in demand for products of domestic exporters.

It should be noted that a negative factor of economic potential and sustainable development of Ukraine is the lack of systematic policy aimed at decreasing the dependence of national economy on the energy import and introduction of energy-saving technologies. It should be also mentioned that the resistance to the aggression of the Russian Federation and imperfection of state financial system do not result in the opportunities to effectively use internal reserves of economic development of some regions of the country. Therefore, there is a need to reconsider strategic priorities for increasing the economic potential of the state, which will be an urgent review of its sustainable development.

In order to provide the economic potential and sustainability, countries should develop a specific set of activities and tools which would be aimed at quantitative and qualitative changes in

the energy efficiency indicators; selection of the most significant regressors that affect the formation of economic potential for sustainable development; raising the level of the economic security of peer group. The above-mentioned measures cause a significant increase in prior potentials of countries surveyed, namely: industrial, natural resources, innovation, information, economic security, energy performance and potential of structural changes in economy.

The analysis gives the possibility to determine the strong sides of the countries strategies and cumulate them to one set of the recommendations. Thus, the countries of peer group should pay attention to the following:

- usage the eco-friendly technologies for economic development that will enable the achievement of higher levels of welfare and facilitate the solution of resource, ecological and social issues at the same time;
- reproduction and rational usage of all kinds of resources, including the introduction of effective natural resources management system and environmental protection, maintaining the ecological balance, etc.
- ecological and economic restructuring of industry, agriculture, services, and also coordination of purposes and activities aimed at the development of branches and regions, individual enterprises and their associations that are part of the social-ecological-economic system of the peer group country;
- cooperation with international organizations on issues of sustainable development and the resource and environmental problems based on innovative economic development;
- introduction of the best experience to the practice of management, implementation of advanced scientific, technical and social-economic achievements;
- establishment of the principles of social justice, overcoming social problems and, thus, stabilization of the demographic situation in the country, reducing mortality and prolongation of life etc.;
- usage the conceptual provisions of sustainable development for the purpose of energy-saving, development of the knowledge economy.

The above will contribute to acceleration of economic potential and achieving the sustainable development of peer-group countries, including Ukraine.

Conclusions

The offered methodical approach to analysing countries in the peer-group during a significant time period is based on macroeconomic indicators and components of sustainable development, allows us to detect a position and capacity of the country within the selected peer-group.

The above analysis allows to define the following terms for implementing conceptual provisions of sustainable development by countries of peer-group.

Thus, the comparative analysis based on data of 1990 and 2015 for peer-group of countries for economic potential and the components of sustainable development gives the possibility to make the following conclusions:

First of all, the analysis of literature, gives the possibility to approve that there are a lot of research from the current problematic, that were hold during the long time period.

Second, the economy of Ukraine had a high potential in 1990. There are still some possibilities to use this potential nowadays that is proved by high level of the Index of Competitiveness. The same we can see for the Quality of Life Index and others components of sustainable development.

Third, the proposed methodology gives the possibility to find the regularities in the development of the similar from the view of the economic development countries for long term periods.

Fourth, the monitoring of the export dynamics for hi-tech products for the peer-group gives the information that the significant development for hi-tech fields in long term perspective is complicated.

Fifth, the next research could be done in the direction of the forecast of the development of the economic system, taking into account the governmental activities that can influence the dynamics of sustainable development indices.

References

- Anderson, J. E. (1979), *A theoretical foundation for the gravity equation*, 69 (1), p. 106-116.
- Bellesi, F., Lehrer, D. and Tal A. (2005), Comparative Advantage: The Impact of ISO 14001 Environmental Certification on Exports, *Environmental Science & Technology*, 39(7), p. 9-39.
- Brown, G. (2011), The Conditions for High and Stable Growth and Employment, *The Economic Journal*, 471(111), pp. 30-44.

- Brundtland, G. H. (1988), *Our common future*, The report of the UNO Commission on environment and development, p. 50, Moscow: Progress.
- Chen, L. J., Lu, L. J., Tai, M. Y., Hu, S.W. and Wang, V. (2014), Energy structure, energy policy, and economic sustainable development, *International Review of Economics & Finance*, 34, pp. 203-210.
- Curran, M. (2004), The status of life-cycle assessment as an environmental management tool, *Environmental Progress & Sustainable Energy*, 23(4), pp. 277-283.
- Economist Intelligence Unit (2005, 2013), *The quality of life index*, retrieved from http://www.wikiwand.com/en/where-to-be-born_Index
- Efremova, A. (2008), Sustainable or harmonious development – what to prefer? *The Economy of Ukraine*, 2, pp. 8-90.
- Filipenko, A. (2007), *Global forms of economic development history and modernity*, Kyiv: Publisher «Knowledge», p. 670.
- Gorbachova, O. M. (2015), The analysis of efficiency of activity of the enterprises of aircraft industry of Ukraine at modern stage, *Global and national problems of Economics*, 4, pp. 427-430, retrieved from <http://www.global-national.in.ua/archive/4-2015/90.pdf>
- Imran, S., Alam, K. and Beaumont, N. (2014), Reinterpreting the Definition of Sustainable Development for a More Ecocentric Reorientation, *Sustainable Development*, 22(2), pp. 134-144.
- Jovane, F. and Yoshikawa, H. (2008), *The incoming global technological and industrial revolution towards competitive sustainable manufacturing*, CIRP Annals – Manufacturing Technology, 57(2), pp. 641–659.
- Keynes, J. (1926) *The end of laissez-faire*, L. & Virginia Woolf, p. 53.
- Lee, K., Kim, B. Y, Park, Y. Y. and Sanidas, E. (2013), Big businesses and economic growth: Identifying a binding constraint for growth with country panel analysis, *Journal of Comparative Economics*, 41(2), pp. 561-582.
- Merton, R. (1991), *The collected scientific papers of Paul A. Samuelson*, III, p. 209.
- National Academy of Sciences of Ukraine (2015), *Socio-economic potential of sustainable development of Ukraine and its regions: national report*, National Academy of Sciences of Ukraine, p. 776, retrieved from http://www.nbuv.gov.ua/sites/default/files/nas_dop_2015.pdf

- Pivniak, G. G., Beshta, O. S. and Tabachenko, M. M. (2013), *Traditional and non-traditional energy supply systems of urbanized and industrial territories of Ukraine*, Monograph, National mining University, p. 333.
- Prettner, K. J. (2013), Population aging and endogenous economic growth, *Journal of Population Economics*, 26(2), pp. 811-834.
- Razumkov Center (2004), *Innovation potential of Ukraine: state, tendencies and problems of development: the analytical report*, National security and defense: journal of the Razumkov Center, No. 7, 2004, pp. 25.
- Reimers, N. F. (1994), *Ecology: theories, laws, rules, principles and hypotheses*, Monograph, Moscow: Russia young, p. 366
- Schumpeter, I. (1982), *The theory of economic development*, Moscow: Progress, p. 436.
- Stefankiv, O. M. and Maksymovych, O. M. (2012), *Streamlining environmental management in agriculture and the formation of ecological consciousness of the population*, Monograph, Ivano-Frankivsk: SIMYK, p.180.
- The World Bank Data & Research (2016), *World Bank Statistics Database*, retrieved from <http://data.worldbank.org>
- World Data Center for Geoinformatics and Sustainable Development (2016), *World Data Center Statistics Database*, retrieved from <http://wdc.org.ua/uk/data>
- World Economic Forum (2017), *The Global Competitiveness Index*, retrieved from <http://www.uaeconomic.com/ulens-313-1.html>
- Zgurovskii, A. M. (2010), Study the intermittent nature of globalization in the context of social development and security of countries in the world, *System research and information technologies*, 3, pp. 112–122.
- Zgurovsky, M. Z. (2007), *Sustainable Development Global Simulation: Quality of Life and Security of the World Population* (Based on data of 2005-2006), p. 214.