



Visnyk of Dnipro University. Ser. World Economy and International Economic Relations

Visnyk Dniprovskogo Universytetu. Ser. Svitove Gospodarstvo i Mizhnarodni Ekonomichni Vidnosy'ny'

Вестник Днепропетровского университета. Сер. Мировое хозяйство и международные экономические отношения

Visn. Dnipro. Univer. Ser. Svitove Gospodarstvo i Mizhnarodni Ekonomichni Vidnosy'ny'. 2018, 10 (26), S. 3–16

doi 10.15421/181801

ISSN 2617-7722 (print)

www.dnu-wej.dp.ua

UDC 330.3:338.2:339.9

JEL: F01; F04; F06; O1; O3.

Received 14.11.2017

Received in revised form 12.12.2017

Accepted

05.01.2018

L. S. Golovko*

INNOVATIONS FOR THE SUSTAINABLE DEVELOPMENT OF COUNTRIES IN THE CONTEXT OF GLOBALIZATION

The paper describes the main ideas surrounding the topic of innovation for sustainability. The model of the structural transformation on the basis of the empirical analysis and innovation approach has been shown. The focus is not only on methods of promoting sustainable development and structural change, but also on improving the potential for the population, for example, through health and education, human capital, innovation, ecological sustainability and others structure-building factors and processes, whether through public or private channels. Innovation is a crucial element to foster sustainability as well as an economical development. Investigation is the peculiarities of structural changes for sustainable development. The purpose of the study is to determine the economic and institutional mechanisms of sustainable development of Ukraine taking into account innovative factors. The challenges of social, economic and environmental development of the countries have systemized, the main principles of the state sustainable development policy in context of globalization are set. The author used theoretical and empirical methods, such as literature review, retrospective analysis, logical and system analysis and graphical-analytical methods, used the methodology of integrated analysis of indicators.

Keywords: sustainable development, innovation system, ecological sustainability, globalization, innovation, developing countries.

Л. С. Головко

ІННОВАЦІЇ ДЛЯ СТАЛОГО РОЗВИТКУ КРАЇН В КОНТЕКСТІ ГЛОБАЛІЗАЦІЇ

У статті описуються основні ідеї, що стосуються теми інновацій для сталого розвитку. Показано модель структурного перетворення на основі емпіричного аналізу. Основна увага приділяється не лише способам сприяння сталого розвитку та структурних змін, але й поліпшенню потенціалу для населення, наприклад, через здоров'я та освіту, людський капітал, інновації, екологічну стійкість та інші структурні фактори та процеси, через державні або приватні канали. Інновації є найважливішим елементом для підтримки стійкості, а також економічного розвитку. Результатом досліджень є виявлення деяких особливостей країн, що розвиваються, та країн з економічними перетвореннями. Досліджено особливості структурних змін для сталого розвитку.

Ключові слова: сталий розвиток, інноваційна система, екологічна стійкість, глобалізація, інновації.

Л. С. Головко

ИННОВАЦИИ ДЛЯ УСТОЙЧИВОГО РАЗВИТИЯ СТРАН В КОНТЕКСТЕ ГЛОБАЛИЗАЦИИ

В статье описываются основные идеи, касающиеся темы инноваций для обеспечения устойчивого развития стран. Показана модель структурного преобразования на основе эмпирического анализа. Основное внимание сосредоточено не только на методах содействия устойчивому развитию и структурным изменениям, но и на повышении потенциала для населения, например, посредством здравоохранения, образования, человеческого капитала, инноваций, экологической устойчивости, другие структурные факторы и процессы, через государственные

* Дніпровський національний університет імені Олеся Гончара, м. Дніпро, Україна;

E-mail: golovko@fme.dnulive.dp.ua

или частные каналы. Инновации являются важным элементом, способствующим устойчивому развитию стран, а также экономическому развитию. Результатом исследований является выявление некоторых особенностей развивающихся стран и стран с экономическими преобразованиями. Исследованы особенности структурных изменений для устойчивого развития стран.

Ключевые слова: устойчивое развитие, инновационная система, экологическая устойчивость, глобализация, инновации.

Introduction

In the process of the transformation of Ukrainian economical system the structural aspect of economical development is becoming very important. It is shown by changes in quantity and quality in economy. There were actual and competitive theories of the economical development and growth: linear stages theory, growth theory and development economics, structural-change theory, international dependency theory, neoclassical theory. The usage of the main points of these theories and practical experience can transform the researches of economical systems into the new multi-science level.

Structural-change theory deals with policies focused on changing the economic structures of developing countries from being composed primarily of subsistence agricultural practices to being a "more modern, more urbanized, and more industrially diverse manufacturing and service economy" (Chenery, 1960). There are two major forms of structural-change theory; W. Lewis' two-sector surplus model, which views agrarian societies as consisting of large amounts of surplus labor which can be utilized to spur the development of an urbanized industrial sector, and Hollis Chenery's patterns of development approach, which holds that different countries become wealthy via different trajectories. The pattern that a particular country will follow, in this framework, depends on its size and resources, and potentially other factors including its current income level and comparative advantages relative to other nations (Chenery et al., 1968).

Innovation plays a remarkable role in driving economic growth and lead to an improvement in the standard of living in many countries. Growth theory insists on the role of innovation in stimulating economic growth along with other factors like capital and human resources. Innovation driven economic growth experience of developed countries can become the valuable lesson for many countries that have been looking for a new driver of economic development (Goliuk, 2017).

Analysis of recent research and publications

The study has been concentrated on innovative economy development factors for sustainable development in the conditions of globalization.

It has been widely studied in recent years because of interest in the trends and approaches are realized at both the international and the national levels and contributing to the sustainable development. A consideration of the main challenges in the area of social, economic and environmental development, as well as structuring of public policies for "green economy" is a particular concern. Many countries are developing and implementing special measures of public policies for sustainable development to level undesirable effects.

The problem has been investigated by several scientists, like M. Pansera, M. Bonaiuti, P. Raskin, V. Goliuk, I. Piurenko, I. Banyeva, O. Garkusha and others.

The problem associated with forming of innovation system for sustainable development are far from being solved and require further theoretical and practice efforts. The systematization of knowledge and the priorities factors, its organization in order to achieve coordinated actions to trigger the sustainable development processes is still a missing piece, probably, is the most important one. In the process of the globalization of economical system the innovation aspect of economical development is becoming very important.

It is the purpose of the present investigation to study is to measure and to analyze the key factors for increasing the efficiency of the economical system development in context of innovations for the sustainable development of countries in the conditions of globalization.

The statement of purpose

The main goal of this article is to systematize the main challenges in the area of social, economic, innovation and environmental development taking into account their

specific features and provide recommendations relevant to the guidelines for public policies related to the impact of economic activity for sustainable development in context of globalization. The system of dependencies is set for the factors and indicators in the selection of key points in increasing the efficiency of the countries economic development.

Theoretical and empirical methods such as literature review, retrospective analysis, logical and system analysis, and graphic-analytical methods are used in this research. Such methods include: method of knowledge, comparison method, the method of deduction and integral ratios, analysis and synthesis, system method, structural-activity approach, method of expert evaluations, factor analysis, method of implication scales, content analysis.

**Research results
and discussion**

Modern society is facing an epochal crisis in terms of sustainability. Raskin (Raskin, 2008) calls the Human Ecological System (HES) that involves all the relation between humans and the eco-systems that nurture them (Bonaiuti, 2009). This view includes, in addition to the economic dimension, at least three other dimensions: the biophysical dimension (the whole of the interactions with the natural environment), the social dimension (where economic relations are only a part of the total), and a cultural dimension (institutions and values) (Pansera, 2011).

Resource scarcity is one of the key megatrends shaping our world today and in the years to come, so meeting the needs of the world's people in a sustainable way will require renewed focus on innovation in a variety of fields and from a variety of stakeholders. In this case, addressing global food insecurity involves technological innovation, including leading-edge advances in data analytics; global distribution and supply chain management; risk assessment; economic flexibility; a deeper understanding of climate and weather conditions; and sustainability practices. It's clear that no company, government, or any other institution can solve the food crisis on its own. The developing world, characterized by gross economic and social inequalities coupled with inequitable access to safe, nutritional food and quality healthcare, requires innovation to meet the ever-rising demand for food and to sustain its agricultural growth (Dutta et al., 2017).

Innovative approaches and a culture conducive to collaboration from all parties involved are needed to make global innovation work. These capabilities are the key to unlocking the leverage inherent in complementary resources. Innovation is now a critical factor in the growth of dynamic clusters of nations that support policies that empower people beyond national boundaries with the ability to solve problems at all levels – individual, societal, regional, and global. This growing trend of increasing global connectivity necessitates a standardized way of measuring and analyzing innovation data through key indicators (Dutta et al., 2016).

Innovation is believed to be the fundamental source of significant wealth generation within an economy. The two ways to increase economic output within an economy are to increase the number of inputs in the productive process, or think of new ways to get more output from the same number of inputs. The latter is the essence of what is broadly meant by innovation, which is defined as the introduction of new or significantly improved products (goods or services), processes, organizational methods, and marketing methods in internal business practices or the marketplace.

Sustainable development is a branch of economics which deals with economic aspects of the development process in low-income countries. Its focus is not only on methods of promoting economic growth and structural change but also on improving the potential for the mass of the population, for example, through health and education and workplace conditions, whether through public or private channels (Centre for Human Technologies). Development economics involves the creation of theories and methods that aid in the determination of policies and practices and can be implemented at either the domestic or international level (Bell, 1987). This may involve restructuring market incentives or using mathematical methods like inter-temporal optimization for project analysis, or it may involve a mixture of quantitative and qualitative methods (The World Bank).

Indicators of sustainable development of Ukraine are demonstrated in Table 1.

Table 1. Indicators of sustainable development of Ukraine, 2010 – 2016

Indexes	Dimensions				
	2010	2012	2014	2015	2016
Environmental Performance Index (EPI)	58,2	46,3	49,01	79,69	52,87
Human Development Index (HDI)	0,710	0,740	0,734	0,747	0,743
Index of Economic Freedom (EFI)	46,4	46,1	49,3	46,9	48,1
The Global Competitiveness Index (GCI)	3,9	4,14	4,1	4,41	4,00
Corruption Perceptions Index (CPI)	24,0	26,0	26,0	27,0	29,0
Global Innovation Index (GII)	35,01	36,1	36,26	36,3	35,72

Based on: World health statistics 2016: monitoring health for the SDGs, sustainable development goals; Index of Economic Freedom, 2014; WEF, 2015

Over the years the Global Innovation Index (GII) has measured the innovation capacity of nations across the world and presented a comparative analysis to help in understanding the variation in national competencies. The GII 2017 notes a continued gap in innovative capacity between developed and developing nations and lackluster growth rates for research and development (R&D) activities, both at the government and corporate levels (Table 2).

Table 2. Movement in the top 10 of the Global Innovation Index (GII), 2012-2017

Ranking	2012	2013	2014	2015	2016	2017
1	Switzerland	Switzerland	Switzerland	Switzerland	Switzerland	Switzerland
2	Sweden	Sweden	United Kingdom	United Kingdom	Sweden	Sweden
3	Singapore	United Kingdom	Sweden	Sweden	United Kingdom	Netherlands
4	Finland	Netherlands	Finland	Netherlands	United States of America	United States of America
5	United Kingdom	United States of America	Netherlands	United States of America	Finland	United Kingdom
6	Netherlands	Finland	United States of America	Finland	Singapore	Denmark
7	Denmark	Hong Kong (China)	Singapore	Singapore	Ireland	Singapore
8	Hong Kong (China)	Singapore	Denmark	Ireland	Denmark	Finland
9	Ireland	Denmark	Luxembourg	Luxembourg	Netherlands	Germany
10	United States of America	Ireland	Hong Kong (China)	Denmark	Germany	Ireland

Based on: Dutta, 2016; Dutta, 2017

The key findings of the GII 2017 are: creating new sources of innovation driven growth is now vital to transforming the current economic upswing into the possibility of longer term growth; smart and digital agricultural innovation and better diffusion to developing countries are required to help overcome serious food challenges; more innovation convergence is needed globally, as low- and middle income countries put more emphasis on their innovation systems; the prospect of regional Asian innovation networks will also benefit from the rise of new Asian Innovation Tigers and India's high potential; preserving the momentum of innovation in Sub-Saharan Africa and tapping the innovation potential in Latin America and the Caribbean must be priorities; regional clusters of inventive activity are essential to national innovation performance (Table 3); improved innovation metrics (Dutta, 2017).

Two Northern American countries – USA (4th overall) and Canada (18th globally) – show particularly sophisticated financial markets and intensity of venture capital activity, which help stimulate private-sector economic activity. The U.S. strengths also include the presence of high-quality universities and firms conducting global R&D, quality of scientific publications, software spending, and the state of its innovation clusters. Canada excels in ease of starting a business and quality of scientific publications, while it's politi-

Table 3. Regional Innovation Leaders in GII 2017 Global Ranking (Dutta, 2017)

Region / Rank	Country	GII 2017 Global Rank
Northern America		
1	United States of America	4
2	Canada	18
Sub-Saharan Africa		
1	South Africa	57
2	Mauritius	64
3	Kenya	80
Latin America and the Caribbean		
1	Chile	46
2	Costa Rica	53
3	Mexico	58
Central and Southern Asia		
1	India	60
2	Iran, Islamic Republic of	75
3	Kazakhstan	78
Northern Africa and Western Asia		
1	Israel	17
2	Cyprus	30
3	United Arab Emirates	35
South East Asia, East Asia, and Oceania		
1	Singapore	7
2	Republic of Korea	11
3	Japan	14
Europe		
1	Switzerland	1
2	Sweden	2
3	The Netherlands	3

cal, regulatory and business environment draw top marks. Canada has logged improvement in its education system.

Sub-Saharan Africa: Sub-Saharan Africa draws its highest scores in institutions and market sophistication, where economies such as Mauritius, Botswana, South Africa, Namibia, Rwanda, and Burkina Faso perform on par or better than some of their development-level peers in Europe and South East Asia, East Asia and Oceania. Since 2012, Sub-Saharan Africa has counted more “innovation achiever” countries than any other region. Kenya, Rwanda, Mozambique, Uganda, Malawi, Madagascar and Senegal stand out for being innovation achievers this year, and several times in the previous years. Preserving and building upon this innovation momentum in Sub-Saharan Africa is now key.

Latin America and the Caribbean: The largest economies in Latin America and the Caribbean (Chile, Mexico, Brazil, and Argentina) show particular strengths in institutions, infrastructure, and business sophistication. Chile, Mexico, Brazil, and Argentina perform well in areas of human capital and research such as the quality of universities, tertiary education enrollment, and presence of global R&D companies, as well as in information and communications technology, thanks to their high scores in government’s online services and online participation.

Central and Southern Asia: India, 60th globally, is the top-ranked economy in Central and Southern Asia and has now outperformed on innovation relative to its GDP per capita for seven years in a row. India has shown improvement in most areas, including in infrastructure, business sophistication, knowledge and technology and creative outputs. India ranks 14th overall in the presence of global R&D companies, considerably better than comparable groups of lower- and upper-middle-income economies. India also surpasses most other middle-income economies in science and engineering graduates, gross capital formation, GERD performed by business, research talent, on the input side; quality of scientific publications, growth rate of GDP per worker, high-tech and ICT services

exports, creative goods exports, high-tech manufactures, and IP receipts on the output side. The Islamic Republic of Iran (75th overall) excels in tertiary education, ranking second in the world in number of graduates in science and engineering. Tajikistan (94th) is first in the world in microfinance loans, while Kazakhstan (78th) ranks first globally in pupil and teacher ratio and third in ease of protecting minority investors.

Northern Africa and Western Asia: Israel (17th overall) and Cyprus (30th overall) achieve the top two spots in the region for the fifth consecutive year. Israel has shown improvement in gross expenditure on R&D and ICT services exports, while keeping its top spots worldwide in researchers, venture capital deals, GERD performed by business, and research talent in business enterprise. Third in the region is the United Arab Emirates (35th globally), which benefits from increased data availability and shows strengths in tertiary inbound mobility, innovation clusters and ICT-driven business model innovation. Sixteen of the 19 economies in the Northern Africa and Western Asia region are in the top 100 globally, including Turkey (43rd), Qatar (49th), Saudi Arabia (55th), Kuwait (56th), Armenia (59th), Bahrain (66th), Georgia (68th), Morocco (72nd), Tunisia (74th), Oman (77th), Lebanon (81st), Azerbaijan (82nd), and Jordan (83rd).

South East Asia, East Asia, and Oceania: The Republic of Korea maintains its top overall rankings in patenting and other IP-related indicators, while ranking second in human capital and research, with its business sector contributing significantly to R&D efforts. Japan, ranked third in the region, is in the top 10 global economies for research and development, information and communication technologies, trade, competition, market scale, knowledge absorption, creation, and diffusion. China continues moving ahead in the overall GII ranking (22nd overall this year), reflecting high scores in business sophistication and knowledge and technology outputs. China this year displays a strong performance in several indicators, including the presence of global R&D companies, research talent in business enterprise, patent applications and other IP related variables. Within the Association of East Asian Nations (ASEAN) grouping, Singapore is the top performer in most of the indicators, with a few notable exceptions: ICT services exports, where the Philippines leads, and expenditure on education, where Viet Nam leads. Thailand's strengths include creative goods exports and gross domestic expenditure on R&D (GERD) financed by business, where it places 5th and 6th globally.

Europe: 15 of the top 25 global economies are in Europe. Europe is particularly strong in human capital and research, infrastructure, business sophistication. European economies rank first in almost half the indicators composing the GII, and include knowledge-intensive employment, university/industry research collaboration, patent applications, scientific and technical articles, and quality of scientific publications (WIPO, 2017).

Two high profile examples of focused ecosystems are the Department of Energy's Innovation Ecosystem Development Initiative which is focused on speeding up the adoption of energy innovations and the European Innovation Initiative's Digital Ecosystem technologies. These national level strategic initiatives are just two examples; clearly innovation ecosystems can be structured around almost any subject matter. The Engineering Research Centers (ERC) program at the National Science Foundation is an example of smaller scale innovation ecosystems developed to push selected technology niches which are centered on transformative engineering systems. This program, originated more than 25 years ago within the NSF's Engineering Directorate has been very effective at initiating and maturing ecosystems that are stable enough for the Engineering Research Centers to continue operating after NSF funding sunsets at the end of 10 years. The current success rate for graduated Engineering Research Centers is 82% (Deborah et al., 2011).

The rise of "micro-multinationals" – start-ups which operate across high- and low-cost locations, delivering to an international customer base – exemplifies the opportunities wrought by globalization, digital communications and the internet. The challenges for business leaders and policymakers are to empower such opportunities for entrepreneurs and to foster domestic and international innovation ecosystems, while mitigating an increasingly dysfunctional global labor market (Lawlor, 2014).

The global labor market is undergoing massive structural changes that will have potentially far-reaching implications for the workforces of the future. However, as the International Labor Organization (ILO) considers a person to be employed if they have worked at least one hour in 'gainful' employment in the most recent week, such figures could considerably underestimate the underemployment rate in many countries. The Bloomberg Innovation Index scores countries using seven criteria, including research and development spending and concentration of high-tech public companies (Table 4).

Table 4. Bloomberg 2017 Innovation Index: Rank and Change in 2016-2017 (Bloomberg, 2017)

2017 /Rank	2016 /Rank	Change	Economy
1	1	0	S. Korea
2	3	+1	Sweden
3	2	-1	Germany
4	5	+1	Switzerland
5	7	+2	Finland
6	6	0	Singapore
7	4	-3	Japan
8	9	+1	Denmark
9	8	-1	U.S.
10	11	+1	Israel
42	41	-1	Ukraine
43	44	+1	Serbia
44	47	+3	Thailand
45	46	+1	Tunisia
50	48	-2	Morocco

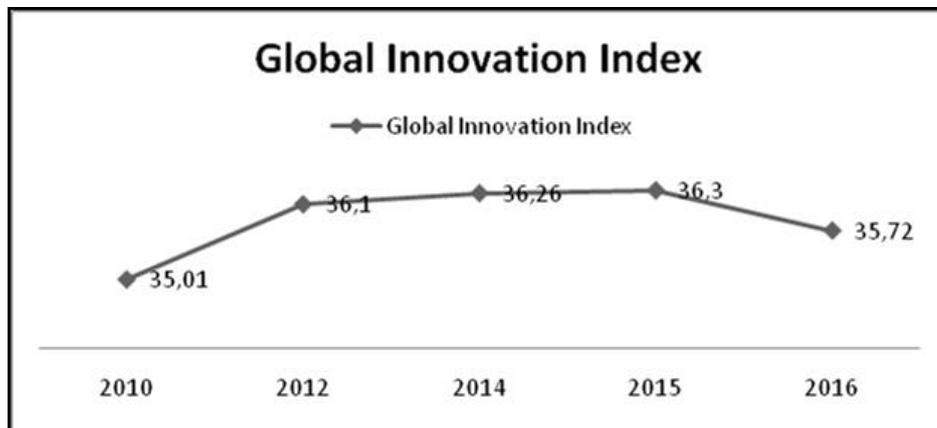
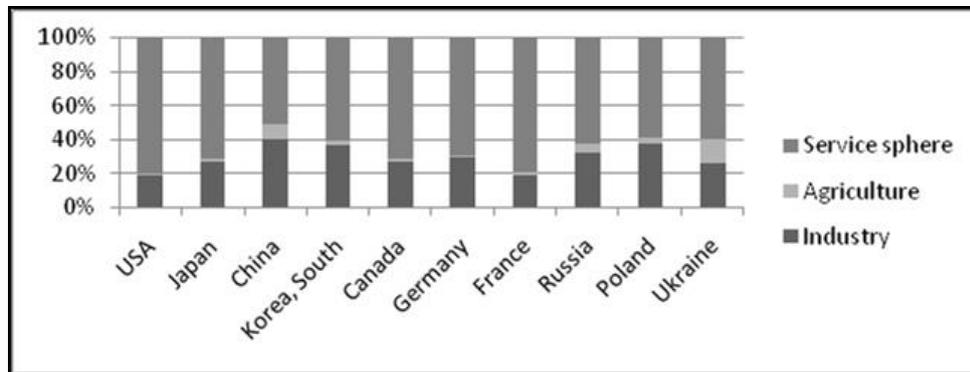


Fig. 1. The trend of dimensions of Global Innovation Index in Ukraine, 2010-2016 (Bloomberg, 2017)

The structure of the economy can be analyzed according to the production and according to the dividing, exchange and consuming of the product from the point of view of the enterprises, branches, regions and others agricultural elements; separate structure-building factors and processes. In such conditions the industrial structure of the economy characterizes the comparativeness of investments from different industries in the creation of the GDP (Table 5); the restrictive structure – is the turnover of the production factors; technological – comparativeness functionalized different technologies etc. The researches of the branch structure of the economy of different countries of the world in 2013 shows that the main sphere in the developed countries is the sphere of services, which provides the growth of the economy because of the growth of the workforce and the economy of the natural resources.

Table 5. Structure of GDP by sectors of origin by countries, 2009-2016, % (World Bank, Central Intelligence Agency)

Country	2009			2011			2013			2016		
	Industry	Agriculture	Service sphere									
USA	20,2	1	78,8	20,8	1,4	77,8	21	1	78	19,4	1,1	79,5
Japan	26	1,2	72,8	26,1	1,2	72,7	25,6	1	73,4	27,7	1,2	71,1
China	46,2	10,3	43,5	46,6	10	43,4	43,9	10	46,1	40,7	8,6	50,7
Korea, South	36,7	2,6	60,7	38,4	2,5	59,1	38,6	2	59,4	37,6	2,3	60,2
Canada	26,4	1,6	72	27,7	1,5	70,8	27,7	2	70,3	27,7	1,6	70,7
Germany	27,7	0,8	71,5	30,5	0,8	68,7	30,7	1	68,3	30,3	0,6	68,1
France	20	1,5	78,5	19,8	1,8	78,4	19,8	2	78,2	19,4	1,7	78,8
Russia	33,6	4,7	61,7	37,4	4,4	58,2	36,3	4	59,7	33,1	4,7	62,2
Poland	33,1	2,9	64	33,7	3,3	63	33,2	3	63,8	38,5	2,7	58,9
Ukraine	29,6	8,3	62,1	30	9,9	60,1	26,9	10	63,1	26,3	14,4	59,3

**Fig. 2. Structure of GDP by sectors of origin by countries in 2016, % (World Bank, Central Intelligence Agency)**

Mechanization and technological adaptation by companies are speeding up processes and increasing unemployment and under-employment – something the US writer and “futurist” Alvin Toffler has described as a post-industrial “third wave” of socio-economic organization. The type of work people across the world are doing is shifting. While agriculture still dominates in emerging markets such as India and Nigeria and manufacturing has taken hold in slightly more advanced economies such as China, the proliferation of the service sectors in developed economies such as the US, the UK and France (accounting for almost 80% of GDP in each) stands in stark contrast (Lawlor, 2014). The nature of institutional change appears to be even more complex when we consider that it involves a wider sphere of humans’ affairs than the mere economic dimension (Pansera, 2011). Mature economies where economic growth has been less robust are also dealing with growing ageing populations – making them top-heavy and producing fewer young people to replace the generations who are approaching retirement or are already retired. France and the UK have the highest proportion of over-65s in their population (of the eight countries examined), whereas in fast-growing countries such as Nigeria and Brazil those aged over 65 account for a significantly smaller share – less than half that of France and the UK. This poses a problem, and identifies a potential opportunity for fast-growing countries; their economies are not maximizing the young and dynamic population available to the workforce, as demonstrated by the low labor participation rates (Sudersan, 2013). Foreign Direct Investment Confidence Index, which assesses likely foreign investment decisions by global business leaders, finds that investors are readily looking past emerging countries that boast low labor costs in favor of developed countries that are

committed to – and can demonstrably show – continuous innovation. In fact, three-quarters of the top investment destinations are still developed economies. Although multiple factors are involved in this superior innovation performance, policy presents a major differentiating factor in the majority of cases (Dutta et al., 2015).

The global statistical community laid the groundwork for successful monitoring and realization of the 2030 Agenda, with the UN Statistical Commission's inter-agency and expert group agreeing on 230 individual indicators to monitor the Agenda's numerous goals and targets. Covering the economic, demographic, social, trade, environment and energy areas – is facing an enormous task of responding to an unprecedented demand for high quality, timely and disaggregated data (United Nations, 2017).

The GII 2017 is calculated as the average of two sub-indices. The Innovation Input Sub-Index gauges elements of the national economy which embody innovative activities grouped in five pillars: Institutions, Human capital and research, Infrastructure, Market sophistication, and Business sophistication (Table 6). The Innovation Output Sub-Index captures actual evidence of innovation results, divided in two pillars: Knowledge and technology outputs and Creative outputs (WIPO, 2017). The findings of the last five years of GII rankings in its innovation input and output pillars demonstrate that certain countries are consistently doing better than their peers in the same income and region categories (Dutta et al., 2015).

Table 6. Statistical coherence and correlations between sub-index in the Global Innovation Index (Dutta et al., 2015)

Input	
Political environment	Institutions
Regulatory environment	
Business environment	
Education	Human capital and research
Tertiary education	
R&D	
ICTs	Infrastructure
General infrastructure	
Ecological sustainability	
Credit	Market sophistication
Investment	
Trade and competition	
Knowledge workers	Business sophistication
Innovation linkages	
Output	
Knowledge creation	Knowledge and technology outputs
Knowledge impact	
Knowledge diffusion	
Intangible assets	Creative outputs
Creative goods and services	
Online creativity	

That leads us to the conclusion concerning low impact of innovations on economic development of Ukraine that is consistent with the studies mentioned above. Analysis of the technologically advanced countries' experience lets us to suggest the following measures of innovation policy to be taken by Ukrainian authorities to drive economic growth: designing and implementing institutional changes to support technical learning and innovation; government support to private sector R&D including R&D subsidies and R&D tax incentives; encouraging information and technology communication; government support to the knowledge-based industries and services; state promotion of innovation and technology transfer from scientific to industrial sector of Ukrainian economy; import of modern technologies, foreign direct investment promotion; improvement of foreign

technologies using national R&D capabilities; effective intellectual property protection (Goliuk, 2017).

The mechanism of the economical growth in the agriculture is motivated now. These two types of the economical development comply with two different functions of the investments. Development economics involves the creation of theories and methods that aid in the determination of policies and practices and can be implemented at either the domestic or international level. This may involve restructuring market incentives or using mathematical methods like inter-temporal optimization for project analysis, or it may involve a mixture of quantitative and qualitative methods (The World Bank). The process of the structural transformation according to this model is the self-based growth in employment, which is going on till all extra workforces in agriculture will transform into the production industry. On this stage there is a balance between the industry and agriculture, the structural economical transformation ends, the main resource of the local national product creates in production, the other factors of economical growth start working. They are connected with the scientific and technological, modern management, marketing, IT achievements.

In M. Pansera opinion, "Eco-innovations are all measures of relevant actors (firms, politicians, unions, associations, churches, private households) which develop new ideas, behavior, products and processes, apply or introduce them; which contribute to a reduction of environmental burdens or to ecologically specified sustainability targets" (Pansera, 2011). The research showed clearly that in Ukraine an innovative approach to "green economy" has been adopted. This approach is particularly interesting because it is focused on the social use of resources in rural zones and degraded urban areas (Pansera, 2011). The impact of the innovative approach on each one of the described indicators in Ukraine is in the chart of Table 7.

Table 7. The impact of the innovative approach on each one of the described dimensions in Ukraine (Pansera, 2011)

Dimension (qualitative indicators)	Score (in points) and Description
Inclusion and Equality	3. Important effects have been found and it is possible to quantify them.
Ecosystem preservation	0. No specific effects have been found.
Sustainability	2. Slight effects have been found and it is possible to quantify them.
Environmental well-being	2. Slight effects have been found and it is possible to quantify them.
Local Economic growth	3. Important effects have been found and it is possible to quantify them.
Competitiveness	2. Slight effects have been found and it is possible to quantify them.
Capabilities building	4. Great impact easily verifiable.
Poverty reduction	1. Slight effects have been found. However it is not possible to quantify them.

The results of multidimensional analysis are summarized in the chart of Figure 3.

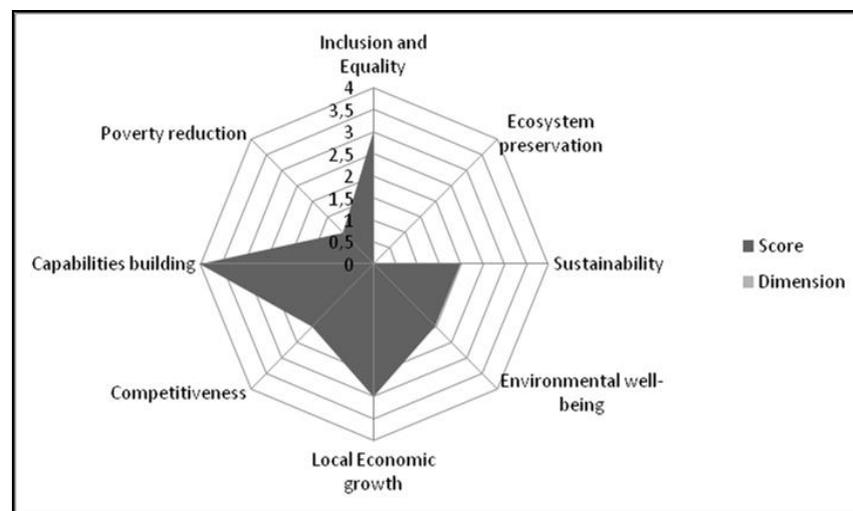


Fig. 3. The impact of the innovative approach on each one of the described dimensions in Ukraine

That means that, although a special effort has been dedicated to improve social dimension and environmental impact, a lot of work is still needed to make the system work efficiently in all dimensions. Furthermore, the impact of energy on rural economy is not so clear is. It would be interesting to investigate the impact of those programs on the income of the people in rural areas and try to extrapolate a model for further improvements. Furthermore, it would be interesting to investigate how the sector will be able to deal with the sustainability installed in the future.

It is scientifically proved that the following items should be attributed to the list of urgent measures of the state innovative policy (Figure 4): fighting corruption intensification, political stabilization, increasing the intellectual property protection level and copyright up to international standards, increasing targeted state financing of scientific institutions, which produce innovative developments, demanded by the real economy sector, state development and private pilot projects of high-tech industrial parks based on leading domestic scientific institutions of respective profile (Vertakova et al., 2017).

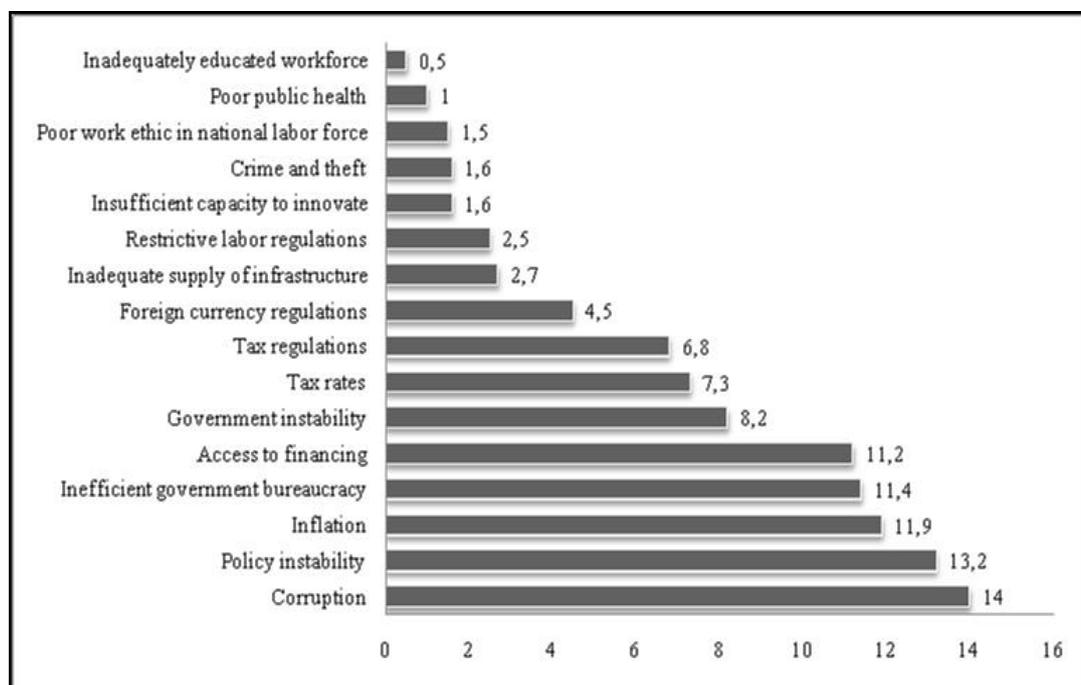


Fig. 4. Most problematic factors in Ukraine for doing business, 2016 (WEF, 2016)

In many areas, inclusive development strategies are the commonly accepted paradigm. Examples include drinking water, electricity and other basic services, where ensuring universal access is often an overarching objective and is now reflected in the Sustainable Development Goals (SDGs). However, whether strategies succeed in reaching those left behind depend on many factors, from country-specific circumstances to their design, targeting methods and practical implementation. Available evaluations from different SDG areas all suggest that there are significant practical challenges in effectively reaching those left behind. Many criteria can be used to identify those left behind, whether within a country or between countries. Many SDG goals and targets directly relate to leaving no one behind and refer to specific objectives and actions as well as groups (of countries or people) that should be the object of sustained attention in this regard. This is particularly the case with goals that were within the scope of the Millennium Development Goals (MDGs), including poverty, gender, education, health, and means of implementation (Figure 5). In those areas, considerations of inclusiveness in a broad sense have long been part of the main development discourse and practice, and actions and policies to address this dimension have become part of the standard development apparatus (United Nations, 2016).

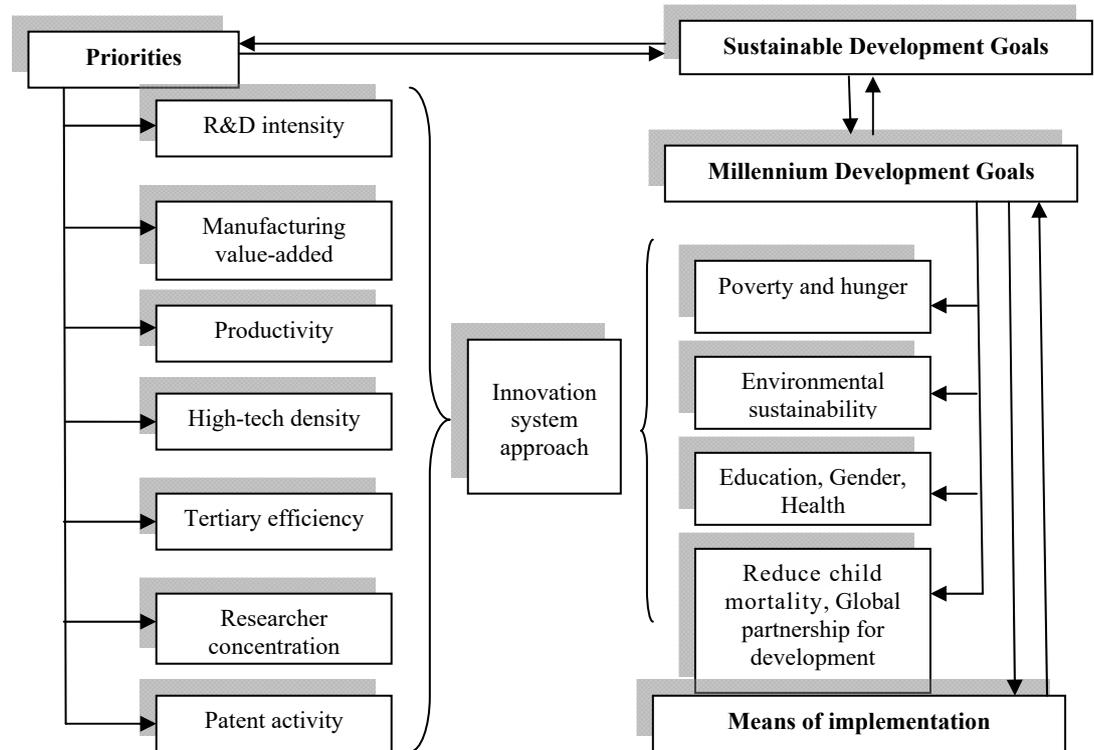


Fig. 5. Priorities and Basic activity by Innovation system approach for Sustainability for developing countries (United Nations, 2017)

So, the choice of the ways of the innovation systems development in Ukraine needs the researches in the domestic practice of the systemic economical transformations, detailed study of the way of world development, generalization of the world experience in the adaptation in the industrially developed countries to the reality of the modern world market. The main hypothesis of the structural transformations theory is the development is followed by the growth and different changes that are equal to all countries. But there are some differences between the countries in the speed and forms of the development connected with several specific factors: the natural resources, the area of the country, the aims, the ways of the governmental politics, access to the foreign investments and technologies, the external condition of the country.

The mechanism of the sustainable development in the agriculture is motivated now. These two types of the economical development comply with two different functions of the investments. Ending hunger, achieve food security and improved nutrition and promote sustainable agriculture – addresses a fundamental human need – access to nutritious, healthy food, and the means by which it can be sustainably secured for everyone. Tackling hunger cannot be addressed by increasing food production alone. Well-functioning markets, increased incomes for smallholder farmers, equal access to technology and land, and additional investments all play a role in creating a vibrant and productive agricultural sector that builds food security. Sustainable agriculture along with investments to improve agricultural productivity and enhance food security, are key to ending hunger and lifting millions of people, including small-scale farmers, out of extreme poverty. Improving farm productivity, increasing the value added in agriculture, and integrating markets are all important strategies. The role of infrastructure and technology in this regard cannot be overstated. Transportation infrastructure, for instance, can connect farmers with existing markets and create new ones. Where poverty rates are still very high air travel and freight transportation are very limited. Information and communication technologies can help farmers connect with buyers, transfer money and acquire valuable information, including about weather conditions and market prices (United Nations, 2017).

On this stage there is a balance between the industry and agriculture, the structural economical transformation ends, the main resource of the local national product creates in production, the other factors of economical growth start working. They are connected with the scientific and technological, modern management, marketing, IT achievements. Development economics involves the creation of theories and methods that aid in the determination of policies and practices and can be implemented at either of the domestic or international level, which also aims to create partnerships and initiatives that harness for the public good and for the implementation of the new global development goals.

Conclusions

The result of researches is the identifying of some points of innovation for sustainable development of the developing countries and of the countries with economical transformations.

Innovation is believed to be the fundamental source of significant wealth generation within an economy. An important feature of an innovation ecosystem is that the resources available to the knowledge economy are coupled to the resources generated by the commercial economy.

So, the choice of the ways of the innovation systems development in countries needs the researches in the domestic practice of the systemic economical transformations, detailed study of the way of world development, generalization of the world experience in the adaptation in the industrially developed countries to the reality of the modern world market. The main hypothesis of the structural transformations theory is the innovation development is followed by the growth and different changes that are to all countries. But there are some differences between the countries in the speed and forms of the development connected with several specific factors: the natural resources, the area of the country, the aims, the ways of the governmental politics, access to the foreign investments and technologies, the external condition of the country.

The choice of the ways of the innovative economical system is: firstly, it is the fundamental research of the structure including the general economy, industrial economy and institutional; secondly, the growing innovation-investment economy is seen as a necessary but not only condition of the economical growth and development.

References

- Bell, Clive, (1987). Development Economics. The New Palgrave: A Dictionary of Economics, 1, 818-825.
- Bloomberg (2017). These Are the World's Most Innovative Economies [online] Available at: <https://www.bloomberg.com/news/articles/2017-01-17/sweden-gains-south-korea-reigns-as-world-s-most-innovative-economies>.
- Bonaiuti, M. (2009). Decrescita o collasso: Appunti per un'analisi sistemica della crisi Biodiversità e beni comuni [Degrowth or collapse: Notes for a systemic analysis of the crisis Biodiversity and common goods]. Milan: Jaca Books (in Italian).
- Central Intelligence Agency, (2012). [online] Available at: <https://www.cia.gov/library/publications/the-world-factbook/fields/2012.html>
- Centre for Human Technologies. [online] Available at: <http://gtmarket.ru/>
- Chenery, H. B. (1960). Patterns of Industrial Growth. The American Economic Review, 50(4), 624-654.
- Chenery, H.B., Taylor, L. (1968). Development Patterns: Among Countries and Over Time. The Review of Economics and Statistics, 50(4), 391-416.
- Deborah, J. Jackson (2011). What is an Innovation Ecosystem? By National Science Foundation, Arlington. [online] Available at: http://ercassoc.org/sites/default/files/topics/policy_studies/DJackson_Innovation%20Ecosystem_03-15-11.pdf
- Dutta, S., Lanvin, B., Wunsch-Vincent, S. (2015) The Global Innovation Index. Effective innovation policies for development. [online] Available at: http://www.wipo.int/edocs/pubdocs/en/wipo_gii_2015.pdf
- Dutta, S., Lanvin, B., Wunsch-Vincent, S. (2016) The Global Innovation Index. Winning with global innovation. [online] Available at: <https://www.globalinnovationindex.org/userfiles/file/reportpdf/gii-full-report-2016-v1.pdf>

- Dutta, S., Lanvin, B., Wunsch-Vincent, S. (2017) The Global Innovation Index. Innovation Feeding the World, Tenth Edition. [online] Available at: www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2017.pdf
- Global Innovation Index 2017: Switzerland, Sweden, Netherlands, USA, UK Top Annual Ranking. [online] Available at: http://www.wipo.int/pressroom/en/articles/2017/article_0006.html#top
- Global Metrics for Environmental, (2016). [online] Available at: <http://epi2016.yale.edu/>
- Goliuk, V. (2017). Impact of innovations on GDP dynamics. *Marketing and Management of Innovations*, 2, 151-159.
- Index of Economic Freedom, (2014). [online] Available at: <http://infolight.org.ua/content/indeks-ekonomichnih-svobod-2014-misce-ukrayini>.
- Kendiukhov, I., Tvaronavičienė, M. (2017). Managing innovations in sustainable economic growth. *Marketing and Management of Innovations*, 3, 33-42.
- Lawlor, A. (2014) *Innovation Ecosystems: Empowering Entrepreneurs and Powering Economies* (London: The Economist Intelligence Unit [for Barclays]). [online] Available at: http://www.economistinsights.com/sites/default/files/barclays_1.pdf
- Pansera, Mario. *Innovation System for Sustainability in Developing Countries. The Renewable Energy Sector in Bolivia.* [online] Available at: https://ore.exeter.ac.uk/repository/bitstream/handle/10871/15803/Pansera_Innovation.pdf?sequence=1
- Piurenko, I., Banyeva, I., Garkusha, O. (2017). Dynamics factors of Ukrainian economy innovative transformation: main points and specifics of influence. *Marketing and Management of Innovations*, 4, 272-282.
- Raskin, P. (2008). World lines: A framework for exploring global pathways. *Ecological Economics*, 65(3), 461-470.
- Schwab, K. (2017). *The Global Competitiveness Report 2016–2017*. World Economic Forum. [online] Available at: http://www3.weforum.org/docs/GCR2016-017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf
- Sudersan, S. (2013) *An Ecosystem of Innovation: Creating Cognitive Applications Powered by Watson.* [online] Available at: <https://developer.ibm.com/watson/wp-content/uploads/sites/19/2013/11/An+Ecosystem+Of+Innovation+-+Creating+Cognitive+Applications+Powered+By+Watson.pdf>
- Sustainable Development. [online] Available at: <http://www.un.org/sustainabledevelopment/sustainable-development-goals/#prettyPhoto>
- The World Bank, (2017). [online] Available at: <http://www.worldbank.org/>
- United Nation development program. *Millennium Development Goals.* [online] Available at: http://www.undp.org/content/undp/en/home/sdgooverview/mdg_goals.html.
- United Nations (2016). *Global Sustainable Development Report 2016.* [online] Available at: [https://sustainabledevelopment.un.org/content/documents/2328Global%20Sustainable%20development%20report%202016%20\(final\).pdf](https://sustainabledevelopment.un.org/content/documents/2328Global%20Sustainable%20development%20report%202016%20(final).pdf)
- United Nations (2017). *The Sustainable Development Report 2017.* [online] Available at: <https://unstats.un.org/sdgs/files/report/2017/TheSustainableDevelopmentGoalsReport2017.pdf>
- Vertakova, Yu., Plotnikov, V. (2017). Problems of sustainable development worldwide and public policies for green economy. *Economic Annals-XXI*, 166(7-8), 4-10.
- WIPO (2017). *Global Innovation Index 2017: Switzerland, Sweden, Netherlands, USA, UK Top Annual Ranking*, Geneva, June 15, 2017. [online] Available at: http://www.wipo.int/pressroom/en/articles/2017/article_0006.html
- World Economic Forum (2015). *The Global Competitiveness Report 2014–2015.* [online] Available at: <http://www.weforum.org/site/homepublic.nsf/Content/Global+Com>
- World Economic Forum (2016). *Executive Opinion Survey 2016.* [online] Available at: http://www3.weforum.org/docs/gcr/2015-2016/GCR_Chapter1.3_2015-16.pdf
- World health statistics 2016: monitoring health for the SDGs, sustainable development goals, (2016). [online] Available at: http://www.who.int/gho/publications/world_health_statistics/2016/en/
- Zhylyns'ka, O.I., Balan, V.G., Andrusjak, I.V. (2017). *Komparatyvne ocinjuvannja rivnja innovacijnogo zabezpechennja stalogo rozvytku ekonomiky [A comparative assessment of the level of innovative provision of sustainable economic development].* *Marketing and Management of Innovations*, 3, 355-365 (in Ukrainian).