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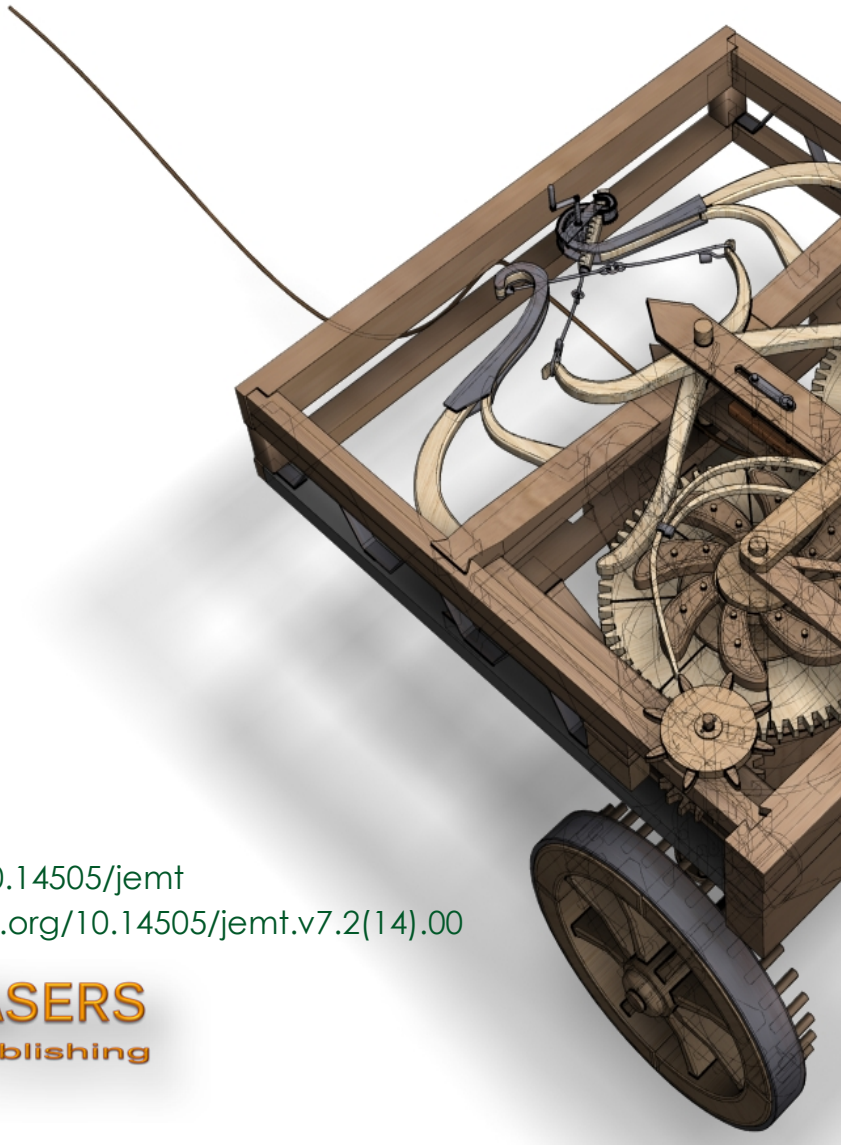

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General Tendencies in Modern Economy: Sustainable Development and Green Economy

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Abstract:

The article overviews general questions on development of two key tendencies in modern economy over the last decades - sustainable development and "green" economy. The paper defines the terms "green" economy, discovers its main characteristics, discusses its concepts and provides its evaluation, as well as predicts its development perspectives.

Keywords: sustainable development, "green" economy, aspects of sustainable development, index of "green" economy.

JEL Classification: Q56, Q57, F64.

1. Introduction

A global threat to environment is caused by negative consequences of technological development and is connected to an intense growth of population in developing countries, which intensifies imbalance between nature and society. By the second half of the 20th century the growing power of economy had been transformed from creative into destructive.

Natural resources are limited due to their finite ability to replenish. A lot of experts characterize the relation between nature and man as anthropogenic destruction, i.e. human destroying natural environment. According to UNESCO, over the course of its existence humankind:

- lost around 2 billion hectares of fertile lands turning them into wastelands;
- aggravated the problem of the World Ocean contamination;
- worsened gradually climatic conditions;

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- reduced the area of rainforests, the main source of oxygen essential for our existence on the planet (ESDN 2015).

As a result of on-going population growth and shrinkage of resources, natural environment can become unfit for further human habitation and development of civilization. One of the consequences of world economy globalization is an obvious dependence of countries on the volume of consumption of various resources which, in turn, leads us to the idea of harmonizing international requirements in the sphere of environmental development.

Currently, economic growth is linked to deterioration of environmental conditions, balance upset of the biosphere. It affects people's health and limits the potential for development of a country.

2. Literature review

The idea of sustainable development of mankind gained popularity during the 1960s-1970s when consequences of a number of environmental and social-economic problems threatened the lives of contemporary and future generations. Special attention has been given to the works of the authors who performed a thorough investigation of the researched problem – Daly and Farley (2010), Erickson (Farley, Erickson and Daly 2005), Speth (2010), Heinberg (2011), Korten (2000), Stobaugh (1969), Prugh (Prugh, Costanza and Daly 1999).

A report "The limits to growth" presented to the Club of Rome's Project in 1972 by American scientists Donnella Meadows, Dennis Meadows and Jorgen Randerswas a starting point for an extensive public debate over the problem of sustainable development. The authors stated that while preserving current global population growth tendencies, followed by an increased environmental pollution and depletion of the natural potential of the planet, the global environmental disaster is inevitable.

In Stockholm the United Nations Conference on the Human Environment was held in 1972 and the UN Environment Programme (UNEP) was developed marking the beginning of global development of environmental policy (ICTSD 2015).

After the World Commission on Environment and Development (WCED) released the report "Our common future" in 1986 at the 42nd Session of the UN General Assembly the term "sustainable development" became widely recognized. The concept of sustainable development is a model of development of civilization basing on the need to provide world balance between solving social-economic problems and preserving the environment.

The term "sustainable development" was introduced in the report "Our common future", presented at the United Nations Conference in 1987. It was understood as a form of development that meets the needs of the present without compromising the ability of future generations to meet their own needs. For the first time the concept of sustainable development of society was accepted at the UN Conference on Environment and Development which took place in June, 1992 in Rio de Janeiro before heads of states and governments.

Transition to sustainable development is connected with elimination of many contradictions between ecological and economic benefits. Such change requires creation of productive methods of effective use of resources which means emergence of new sustainable and environmentally friendly innovations (EEA 2015). The concept of sustainable development includes three main aspects: economic, social and ecological (Table 1)

Table 1 - Main aspects of the sustainable development concept, compiled by the authors

ASPECT	Focus area
Economic	▪ effective use of limited natural resources and introduction of harmless nature, power and material saving technologies; creation of ecologically efficient production; reduction, processing and elimination of waste.
Social	▪ preservation of stability of the developed cultural and social systems, reduction of the number of destructive conflicts between people.
Ecological	▪ ensuring integrity and viability of biological and physical natural systems, preservation of possibility of their change and replenishment.

In 2012 at the next UN Conference on sustainable development the focus was on the need for transition to the concept of "green economy".

The basic principle of modern economy, characterized by meeting the growing needs of the population while minimizing deterioration of the natural capital, was named "decoupling". Decoupling is a strategic basis for transition to an ecologically sustainable economy allowing disassociation of welfare growth rates, on the one

hand, and natural resource consumption and environmental pressure, on the other hand (Bobylev and Zakharov 2012a). In recent years the concept of sustainable development has been closely linked to the concept of green economy, for which the priority focus areas are: high power efficiency and minimal negative impact on environment. The world community, moving in the direction of increasing the qualitative level of social development, puts forward the new concept of development when the increase in society welfare is possible while having an environmentally focused growth, an increase in social safety and a decrease in the risk of economic and financial crises. Further development of countries is undoubtedly connected with a number of technological innovations in the constituents of economic growth in areas of power efficiency and resource intensity of productions.

3. The research objective

Over the last decades a new focus area has been actively developing called “green economy”, “ecological economy”, “low-carbon economy”. The simultaneous solution of global environmental problems and obtaining the income using clean, “green” technologies are put at the heart of this focus area.

The question of development tendencies, benefits and risks of “green economy” remains disputable. Discussing the concept of “green economy” or “green growth” now takes one of the central places in political debates. This subject is widely discussed at such significant international forums as “Life ecology: integration and development for future generations”, “Earth Summit”, “Nature without borders”, "Rio+10", "Rio+20", the participants being the Asia-Pacific Economic Cooperation (APEC); the United Nations (UN); "G8"; a group of five countries: Brazil, Russia, India, China, South Africa (BRICS); Organization for Economic Cooperation and Development (OECD).

In 1989 the program text concerning sustainable development was published in which context the term “Green economy” was used for the first time. In 2008, the project of the United Nations under the name GEI was launched, soon there appeared a large number of definitions of “green economy” and other terms related to it, for example: “green” growth, “green” initiatives, and others with an adjective "green".

The term “green economy” has no standard unified definition, which is connected with an incomplete development of the concept. The following notions are widespread:

- these are branches which create and increase natural capital of the Earth or reduce environmental threats and risks (UNEP);
- it is economy which results in the improved welfare and social equality, thus considerably decreasing economic risks and deficiency of natural resources (UN);
- it is a new area of research dealing with relations between natural ecosystems and social-economic systems in the widest sense; key relations for many present problems of mankind, as well as for creation of sustainable future (Costanza, R.);
- it is a version of the concept of sustainable development, aimed at solving the problem of preventing catastrophic consequences of global climate change this century (Gritsevich 2011);
- it is a new socio-economic and technological system aimed at reducing emissions of greenhouse gases (in comparison with traditional economy) without a drop in the rate of social-economic development (Gritsevich 2011).

The main goal of transition to a green economy is a global improvement in standards of living while minimizing the depletion of natural resources and preserving nature for future generations (Bobylev and Zakharov 2012a, Rudneva and Gureva 2014).

A range of tools for transition to “green economy” are: relevant pricing, growth of state investments into infrastructure, reforming systems of “environment” taxation, encouraging eco-friendly production, target state support of a number of research and development, etc.

Principles of “green economy” developed within the concept of sustainable development more than 20 years ago continue to develop and advance, as it was noted at the recent Rio+20 Conference, despite numerous failures and crises, in particular as a result of aggravation of energy agenda caused by shortage of fossil energy resources and global climatic changes. Many countries of the world turn to a new economic course of development of “green” or “low-carbon” economy for the purpose of changing the structure of world fuel consumption, developing renewable power industry and high-technology sectors of economy, maintaining sustainable agriculture and water resources management. Development of "green" economy should not only

promote prevention of depletion of non-renewable natural resources, but also provide decrease in environmental pollution risks, increase welfare and guarantee environmental safety and social justice for the population of the planet (Bobylev, Zakharov 2012b).

The concept of green economy includes ideas from various areas of economics and philosophy, such as postmodernism, feminist economics, resource-focused economy, ecological economy, environment economy, anti-globalism, green anarchism, green politics, theory of international relations (Bobylev 2011).

The main preconditions of green economy development are:

- in limited space it is impossible to infinitely expand the sphere of influence;
- under conditions of resource limit, it is impossible to demand satisfaction of infinitely growing needs;
- everything on the Earth's surface is interconnected.

"Green economy" can also be considered a system of principles, purposes and actions. As a rule, among the basic principles of "green economy" are the following (ECLAC 2010; EEA 2010; UNEP 2011; OECD 2011a).

- equality and justice both within one generation and between generations;
- compliance with principles of sustainable development;
- application of a principle of precaution concerning potential impacts on society and environment;
- adequate accounting of natural and social capital, for example, by means of internalization of outer social and environmental effects, "green" accounting, accounting of expenses throughout all life cycle, as well as management improvement with participation of interested parties;
- sustainable and effective use of resources, consumption and production;
- contribution to achieving the existing macroeconomic goals by creating "green" workplaces, fighting poverty, increasing competitiveness and ensuring growth in primary branches of economy (EEA 2015).

Priority research focus areas of "green economy" are presented in Figure 1.

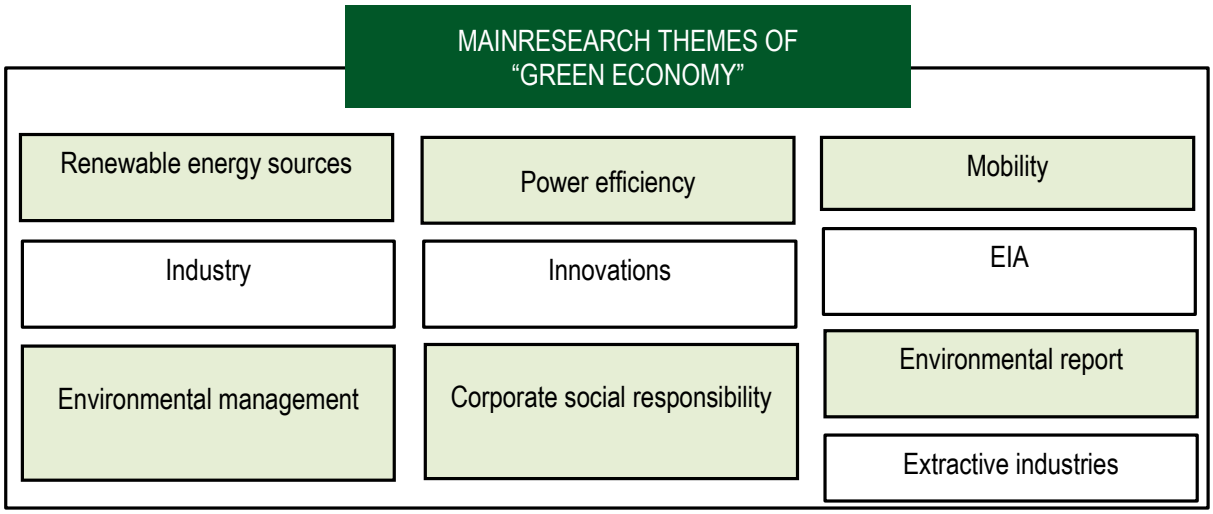

Figure 1 - Priority research focus areas of "green economy", compiled by the authors

To form "green economy", transition of economy to a trajectory of a sustainable, resource efficient development, a new frame of reference, new methodology is necessary. UNEP formulated a number of general recommendations addressed to national governments and persons responsible for development of conditions and policy of transition to green economy. Among such conditions are:

- creating effective statutory bases of transition;
- priority of state investments and expenses in areas stimulating transformation of economy sectors into "green";
- restricting expenses in the areas, where natural resources are diminished;
- applying taxes and market tools to change preferences of consumers and stimulate "green" investments and innovations;
- investing in competence improvement, training and education;
- strengthening international cooperation and management (EEA 2015).

From the sustainability point of view future economy should possess the following important features:

- conceptually, economic strategy/programs/plans include focus areas formulated in the UN and OECD documents on "green" economy and growth, low-carbon economy;
- ecological living conditions of the population and providing them is of great importance;
- knowledge-intensive, hi-tech, processing and infrastructure industry sectors with the minimum impact on environment get priority in development;
- specific weight of the primary sector of the economy decreases;
- efficiency of natural resources usage and conservation considerably improves which is reflected in a sharp decrease in natural resources consumption and pollution (decrease in indicators of resource intensity and pollution intensity);
- environmental pollution decreases (Bobylev, Zakharov 2012b).

Table 2 - Manifestation of tendencies of green economy development in the world, compiled by the authors

Country	Use of green economy	Environmental projects
Sweden	By 2020 refusal of oil, coal, gas, transition to energy from renewable sources.	16 environmental goals: decrease in influence on climate, clean air, healthy marine environment and live lakes, nontoxic surrounding nature etc.
Japan	"Action program of low-carbon society".	Technologies on environment control– "pollutant pays".
USA	National program on energy saving.	The concept of "wise use" and the concept of "counterbalancing action".
Netherlands	The concept of "system innovations", offering a complex solution of environmental problems.	Russian-Dutch project "Strengthening of influence of environmental non-governmental organizations (NGO) on society by creating their regional networks".
South Korea	Implementation of the concept of "green growth" as a national strategy.	The non-polluting natural reserve Ecorium consisting of beautiful eco domes of the science and research center.
China	Low-carbon economy – a strategic goal of the country.	Transfer of waters from the river Huang He to the lake Baiyangdian; the project on reduction of greenhouse gases emission.
Poland	Over the last 17 years it became possible to reduce harmful emissions by a third.	Decrease in the index of water usage.
Denmark	Since 1980 GDP grew by 78% at a minimum increase in power consumption.	"Education in the field of environment in Scandinavia", "Clean rivers", "Acid rains", "The green flag".
Germany	Meeting the most part of electricity needs from energy produced by solar batteries.	"Voluntary Ecological Year in Germany".
Brazil	Transition of 80% of transport to biofuel produced from sugar cane.	Turning the river San Francisco, it is planned to change its course and direct two man-made river arms to arid areas.

The above-mentioned conditions cause the need to strengthen the role of the state when transitioning to "green economy", to improve the state policy. Table 2 gives some tendencies of green economy development in the world. "Green" economy means developing ecological education and awareness, forming ecological culture in society, promoting a "green" course of economic development.

4. Methods

Nowadays the research area of developing universal methodological tools for assessing "green economy" development is of current interest.

In 2013 a group of scientists suggested the index of "green" economy which is based on the design procedure of indexes of quality of life by V.V. Bushuyev, V.S. Golubev and A.M. Tarko:

$$I_{зз} = \frac{1}{4}\frac{(a_{max}-a)}{(a_{max}-a_{min})} + \frac{(b_{max}-b)}{(b_{max}-b_{min})} + \frac{(c_{max}-c)}{(c_{max}-c_{min})} + \frac{(d_{max}-d)}{(d_{max}-d_{min})}, \quad (1)$$

where: a – the value of a GRP power consumption indicator; a_{max}– the maximum value of a power consumption indicator among all subjects; b– the emissions of greenhouse gases; b_{max}– the maximum value of emissions; c, d – the values of indicators of pollutant emissions in the atmosphere, from stationary sources, and dumping polluted sewage in the surface water; c_{max}, d_{max}– the maximum values of indicators of pollutant emissions in the atmosphere, from stationary sources, and greenhouse gases among all subjects.

Key research findings

This indicator provides a rather accurate assessment of the real situation of development taking into account a triad of factors (economic, ecological and social). It can be applied both at a level of separate regions and a country as a whole. It is confirmed by the results of calculating the index of "green" economy, executed by V.P. Anufriev, A.I. Yachmeneva and A.A. Panchenko for the Ural Federal District and regions within it (Figure 2).

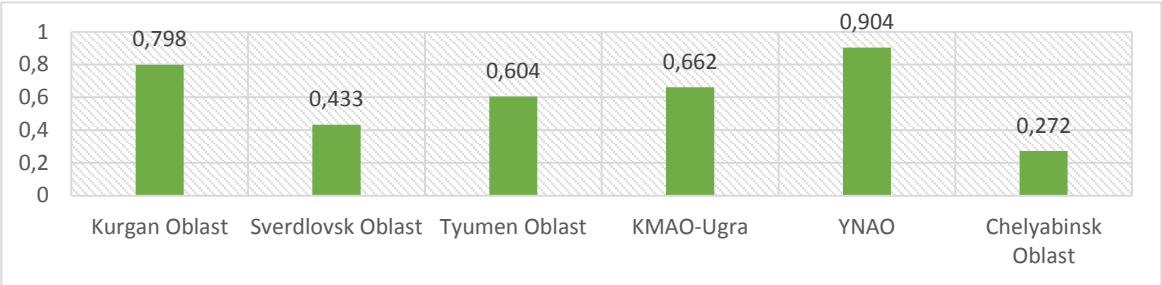

Figure 2 - The value of the "green" economy index for regions of the Ural Federal District, according to calculations (Anufriev, Yachmeneva and Panchenko 2013)

The expected prospect of development and support of green changes upon transition to "green economy" is presented in Table 3.

Table 3 - Main prospects of development of "green economy", the table is made by authors by analyzing source Official site of United Nations Environment Programme environment for development

No.	Focus area of development	Prospects of development	Results of development
1	Transition to "green economy" in general	Provides a gain of the natural capital; higher growth of gross domestic product and gross domestic product per capita.	▪ 40 % less need for energy; ▪ the ratio of emissions to biological capacity will decrease to 1; ▪ CO2emissions will decrease by 1/3.
2	It is necessary to allocate 0.5 % of GDP to forest, agricultural, water and fish management.	Active investment in the natural capital.	▪ productivity and quality of the soil will raise by 10 %; ▪ the added cost of forestry will increase by 20 %; ▪ the need for water will decrease by 20%.
3	Poverty fighting	Active investment in the natural capital.	▪ poor segments of the population directly win from the increase in the natural capital
4	Creation of new work places	Fight against unemployment in sectors as: agricultural and housing and utilities services, power, forest industry and transport.	
5	Reforming the system of granting subsidies that are costly and harmful to environment		▪ annual saving of 1-2 % of the world GDP.

Conclusions

The defining factor of success of "green" economy development is interest of the population, authorities and business. A great role in reorientation of society towards sustainable development is played by environmental consciousness, education and culture which should become initiators of mass awareness of the need for transition to and development of "green economy".

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