Improvement of innovation systems in sustainable economic development

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Abstract. This topic of sustainable development and maintenance and development of innovations contributes to the improvement of the ecosystem as a whole. The development and application of global sustainable development goals in the economy of each country contributes to improving the quality of life of the population, conservation of nature, etc. Globalization of economic development contributes to new trends in the future. Within the framework of this direction, various problems related to the SDGs (Sustainable Development Goals) issues are investigated. Sustainable development in general contributes to the accelerated growth of new trends in economic and environmental aspects in many developed and developing countries. The main goal of sustainable development is to create a single basic framework for the unification, renewal and rational use of natural and energy resources, human capital and other energy sources. Innovative technologies contribute to the development of these areas at an accelerated pace, for example, the use of solar energy will help to reduce energy and fuel costs, which will have a significant impact on the health of people and all living organisms.

1 Introduction

Social networks and related developments in information and communication technologies can play a role in the process of creating environmental projects and innovation. Continued large-scale transformations, such as in information technology, biotechnology and energy systems, can significantly improve our lives in a sustainable manner, but only if we include knowledge of socio-environmental systems and planetary boundaries in risk assessments and development strategies. Most modern economic and technological solutions are ecologically illiterate, too linear and problem-oriented. Financial and political support is needed for safe failure experiments in communities around the world using a variety of technologies, organizations and ideas, such as "policy labs" or "change labs". By highlighting and promoting the major environmental problems of our society, we can come up with a trend towards sustainable consumption or the creation of new sources of raw materials, such as the use of secondary raw materials, and put them on an equal footing with primary raw materials. The aim of this study is to identify latent factors in the

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formation of an innovative approach to solving environmental problems of sustainable development. The main objectives of the study are: 1) forming the basis for determining the factors of the concept of socio-ecological innovations; 2) introduction of new innovative approaches to improve and implement the program of sustainable development; 3) conducting a systematic analysis to identify new levels of SDGs. The method of statistical data & SWOT analysis was used as a basis for the analysis.

2 Literature review

G. Azzone, G. Noci point out that in the last few years, the growing importance of the environmental issue has led many leaders to change their business policies. The integration of green issues into the strategy process has significant financial, managerial and organizational implications for the corporate system, requiring firms to restructure their operations and processes in the value chain. This article aims to: analyze current environmental behavior patterns adopted by firms; discuss whether the environmental problem should be considered as a major source of change and thus identify the specific implications for the corporate environmental business system; and present the main triggers that can contribute to the implementation of innovative environmental programs.

B. Blättel-Mink says in his article that environmental innovation includes the development and implementation of new products, new technologies, new production processes, new resources, new markets and new systems that integrate economy and ecology, i.e. bring environmental aspects into economic strategies. Environmental innovations are part of a continuous process of improvement and learning for the company, and innovative companies create their own relevant environments and use them for their own purposes. Communication is an absolute imperative for sustainable development. Finally, it is necessary to discuss some of the critical issues that may hinder the ongoing process towards a sustainable economy.

E. B. Kabashova [1] says that a characteristic feature of modern society is the transition from an economic orientation to innovation, which is now a key element of sustainable development in the country as a whole. Innovation activity implies a whole complex of scientific, technological, organizational, financial and commercial measures, which together lead to innovation. One type of innovation is environmental innovation, which is an innovation implemented in the framework of technological, organizational or marketing innovation and aimed at improving environmental safety both in the production process and as a result of the use of innovative products.

Kazakhstan researchers, including Sayabek Ziyadin, Galiya Dauliyeva, Zhanna Kalymbekova, and Asel Turlybekova, also distinguished themselves. They investigated the problem of sustainability of a particular direction, namely, tourism, in their work they wrote that an important goal of tourism development in the Republic of Kazakhstan is the formation of a socially and environmentally friendly, profitable and competitive tourism industry that can meet the needs of tourists with various tourist services that bring income to the country and newly created jobs, including those determined by tourism in the sectors of the economy.

Other scientists, such as S. Ziyadin, A. Borodin, E. Streltsova, S. Suieubayeva, D. Pshembayeva have studied the concepts of strategic management of sustainable tourism development and ending with the creation of economic and mathematical models of decision support.

Kazakhstan scientists G. Mutanov, S. Ziyadin, together with professor from Finland-A. Shaikh, studied in their work eco-innovations, which, in their opinion, mean the creation of new and competitive goods, processes, systems, services, policies and procedures that

meet human needs and improve the quality of life while ensuring sustainable development with minimal use of natural resources and minimum emissions of toxic substances.

3 The main part

Innovation activities are activities related to the transformation of ideas (usually the results of research and development or other scientific and technical achievements):
in technologically new or improved products or services available on the market;
in new or improved technological processes or methods of production (transfer) of services used in practice.

Innovation activities include a range of scientific, technological, organizational, financial and commercial activities, which together lead to innovation [1].

The perspective should not be too gloomy. Continuing large-scale transformations, for example, in the field of information technologies, biotechnologies and energy systems, have great potential for significant improvement of our lives on a sustainable basis. However, this can only happen if we start working with nature, not against it. This idea lies at the heart of a new concept of socio-environmental innovation, which has been defined as "social innovation, including new technologies, strategies, concepts, ideas, institutions and organizations that increase the ability of ecosystems to generate services and help evade multiple thresholds of the earth system. However, in order to increase our ability to innovate in this way, support and incentives are needed, especially in the private sector. The necessary transformation must include creativity and user ingenuity, the X Prize Foundation, an American not-for-profit organization once known for its spaceflight innovation competitions, is one example that has focused on ocean health. In 2013, he announced a \$2 million competition for devices that can track changes in the chemical composition of the oceans as a result of climate change - for the first time, the X Prize decided to focus on a specific area of research.

The UN Conference on Sustainable Development, held in Rio de Janeiro in June 2012, focused on the green economy. One of the key tools of the green economy is environmental innovation. Since 2008, the concept of "green growth" has been included in the concept papers and terminology of international organizations as a key term for the further development of society and individual countries. International documents actively use terms with the adjective "green": "green" economy, "green" industry, "green" markets, "green" employment, etc. In the interpretation of the "green" growth of Professor E. S., Ilyushkin V. Y. Konyukhov distinguish two approaches [2] :

1. Within the framework of a broad approach, the necessity of greening virtually the entire economy and socio-economic development is considered;

2. A narrow approach implies the development of only those industries and activities that are directly related to the greening of the economy, the development of "green" markets at the global and national levels. The term "green economy" has not been clearly defined at the present stage, as the relevant concept is under development. According to UNEP (United Nations Environment Program), a green economy is one that provides for the long-term improvement of human well-being and reduction of inequality, allowing future generations to avoid significant risks to the environment and its impoverishment [3].

One of the main roles of ecology in the 21st century will be the sustainable management of ecosystems. Despite decades of calls for change, there is still no clear understanding of the mechanisms and models under which global change can take place. Growing concern about this has led to increased attention to the role of innovation, but the question remains: Can we innovate fast and wisely enough to move our socio-economic system out of the current paradigm into a more sustainable one?

Historically, humankind has believed in technological innovation to help transform society and improve the quality of life. The most obvious example is the industrial revolution, and the most recent example is the rapidly changing way we communicate around the world. There are good reasons why we believe in our ability to innovate, because it is traditionally associated with a better quality of life. So the question of innovation runs counter to the prevailing world view and the governance structures that govern our lives, but we cannot deny that the last five decades of high innovation have also severely damaged the planet. Environmental innovation and nature-based solutions, which are key to supporting the transition to a more sustainable economy, cannot be based solely on research results. They require "open ecology"[4]. Open ecology, or open science in general, is not only about sharing data, but also about making it publicly available. Open science reflects a new way in which many researchers, particularly young researchers, conduct science. They share their research ideas on social media; they upload, use, improve and download methods, models and software code for statistical analysis of data, all supported by free software such as R or QGIS; and they quickly transfer research results through platforms such as Research Gate [4].

Open science provides better transparency and reproducibility of results. For ecology and earth sciences, it provides the baseline against which future environmental change can be assessed. Open data and open science are a source of innovation. Innovation is high on the economic policy agenda, as it drives economic growth, which is the main objective of governments at various levels. Therefore, it is not surprising that the EU strongly supports open data policies. Examples are geographical information, statistics, environmental monitoring, research, cultural heritage and tourism-all of which are the focus of one ecosystem. Such information has a significant and currently underutilized potential for reuse in new products and services, for informing citizens, for improving governance and for sustainable development [5].

It has long been no secret that significant changes are needed if we are to preserve our planet. People are increasingly influencing the Earth, and we see the consequences around us every day.

The challenges we face are so complex that some claim that we are in a "breakthrough of ingenuity," when the world's problems have become so difficult to solve that we lack the ingenuity necessary to solve them.

In the same vein, the argument that the 'technosphere', the innovative engine that has driven our modern economy, is organized around principles that are very different, if not directly contradictory, to the functioning of the world's ecosystems. Ecosystems are based on non-linear mutual independence, and one part cannot be separated from the other, while the techno sphere, whether in terms of machines or structures, is based on the linear logic of means by the end. To put it bluntly, most of today's economic and technological solutions are ecologically illiterate, too linear and problem-oriented. There is a need for a change in thinking.

The private sector is in many ways one of the main providers of innovative thinking and therefore plays a key role in finding new directions for more sustainable innovation. Business can be of great importance, and there is a growing global movement of aspiring social entrepreneurs with new ideas that want to contribute to a sustainable society, and they are building companies based on strategies such as "Widespread concern about income later". This movement is based on the idea that entrepreneurship is a way to achieve social change. Interest in social innovation and social entrepreneurship has literally increased in recent years, thanks to training programs, conferences, contests and awards, as well as special funds for entrepreneurs who take on social responsibility and place social benefits at the centre of their businesses.

Sea level is rising and global temperatures are rising steadily. The oceans are getting warmer and warmer. The ice sheets around the world are shrinking. Glaciers are retreating, extreme weather events are becoming too frequent and the level of water pollution is reaching a critical level. The main cause of these events is global warming.

However, the problem is that the population is also growing. The total population grows by about 1.1% annually, increasing by 80 million people [6].

Fortunately, one of the features of the media is the popularization of environmental projects, which are solutions to various problems, such as the use and production of non-biodegradable plastic. Let's focus on some of them.

1 . 3D-print

Surely you've heard of 3D printing, which is used in a huge number of ways. It's been used for everything from limb making, building houses and printing clothes. 3D printers are also becoming widely available to the public, allowing them to create simple but elegant projects.

Each 3D-printer builds details on the basis of the same basic principle: the digital model turns to physical 3D-object, adding a material layer by layer at a time. Hence the alternative term "Additive production". The 3D-press is essentially other way of manufacturing of details in comparison with traditional technologies of subtractive (ЧИТ) or forming (moulding under pressure) manufacture. In the 3D-press any special tools are not required (for example, the cutting tool with certain geometry or a mould). Instead, the part is made directly on the built in platform layer by layer that leads to a unique set of advantages and restrictions.

But 3D printing is also used to preserve the environment. Plastic currently accounts for about 13% of U.S. municipal waste and is often in landfills. One such company, Perpetual Plastic Project, aims to convert recycled plastic products into 3D plastic printing materials. If we talk about domestic companies engaged in the processing of plastic, we can note Kazakhstan Waste Recycling. The application for downloading on Google Play, Apple Store platforms gives you the opportunity to find out which products you use are suitable for recycling and will show the nearest delivery points for your waste.

On the other hand, Pembient uses 3D printing to create artificial rhinoceros horns and ivory, which are then used to save animals' lives. They hope that the artificial products will make the work of poachers difficult, eventually pushing them out of business.

2. Vertical agriculture

Vertical farming is the practice of producing food on vertically inclined surfaces. Instead of growing vegetables and other products on the same level, such as in a field or greenhouse, this method produces products in vertically stacked layers, usually integrated into other structures such as a skyscraper, transport container or multipurpose warehouse.

This modern idea, using Controlled Environment Agriculture (CEA) technology, uses household management techniques. Artificial control of temperature, light, humidity and gases makes it possible to produce food and medicines indoors. Vertical farming is much like greenhouses, where metal reflectors and artificial lighting enhance natural sunlight. The main goal of vertical farming is to maximize yields in a limited space.

In addition, these vertical greenhouses protect plants from weather conditions, allowing them to grow in areas where this is not normally possible. As cities and towns continue to expand, this unique and small solution is becoming more relevant [7].

3. cars with non-toxic emissions

As noted earlier, vehicles are the largest source of harmful emissions. Their worldwide prevalence and heavy reliance on fossil fuels is a lethal combination. If we can solve or at least minimize this problem, it will be a big step towards preserving the environment.

Inventors such as Ilon Mask are leading the way in this field, and the Tesla Model S is a vehicle with zero exhaust gas toxicity. Unfortunately, few people can afford Tesla today, so

it is encouraging that other carmakers, such as Toyota and Honda, with more affordable models, are also paying attention to this aspect.

Every year, an estimated 7 million people around the world die from air pollution due to fine dust particles that cause serious diseases such as increased risk of cardiovascular disease, heart disease, stroke, lung cancer, chronic obstructive pulmonary disease (COPD), asthma and respiratory tract infections, including pneumonia. The WHO report suggested that 9 out of 10 people breathe high-contaminant air as a result of the anniversary of the death of 4.2 million people from ambient air pollution.

In general, economic and technological solutions must become more environmentally sound and see numerous opportunities to invest in the sustainable use of ecosystems and their services. This requires us to organize innovation and technological development in new ways that are more networked, open and inclusive, while working more directly for social justice, poverty reduction and environmental sustainability. The planetary risks we face are so great that conventional business is not an option.

Emerging social innovations and technological transformations offer tremendous opportunities with great potential for sustainable improvement in our lives. But creating a good anthropocene means moving beyond solutions that simply reduce negative impacts and develop thinking that recognizes that we are part of this planet, not its conquerors.

There are many examples of significant social and technological advances that have improved human life. The downside is that too many of them have degraded the life-supporting ecosystems on which human well-being ultimately depends. We need innovations that can improve people's well-being and at the same time increase the ability of ecosystems to deliver services.

4 Methodology

It is based on systematic and theoretical analysis. This study is based on both primary and secondary data.

The primary source is the source from which we collect firsthand information or background data on a topic. Interviews for primary data collection were conducted using a structured questionnaire methodology.

The secondary source is the source from which we collect data that has already been collected by someone. We collected secondary data from published financial statements of companies, newspapers and articles.

We took the green growth statistics from the official website of the United Nations Economic Commission for Europe (UNECE).

In addition, we decided to make a SWOT-analysis showing the main aspects such as possible risks, opportunities, pluses and minuses of innovation in the environment, which is one of the weighty analyses.

5 Discussion

International financing for development is, and is likely to remain, one of the most important sources of financing for green growth in the region. However, private financing needs to be scaled up, as international and domestic public funding alone will not be sufficient to meet the climate change and green growth goals of EECCA. (Fig.1)

Fig. 1 Climate-related development financing provided to EECCA countries (in millions of US dollars in 2016 prices)

Exploring these problems we have compiled a summary analysis. (Tab.1)

Table 1. SWOT-analysis.

Weaknesses	Strengths
<div>1. Absence of the use of waste from one production as a raw material for another production;</div> <div>2. The development of a strategy and plan takes a long time;</div> <div>3. not all waste and products are biodegradable;</div>	<div>1. Innovations and projects save natural resources;</div> <div>2. Influence on people's thinking and behavioral patterns;</div> <div>3. inspire people to make and develop new ideas;</div> <div>4. as one of the sources of income, as it is a kind of business;</div>
Risks	Opportunities
<div>1. ignorance of their consumers, lack of appropriate rights to consumers may affect the sales and implementation of your project;</div> <div>2. If the pricing of this project or innovation is not carefully considered, it can lead to risks as a negative financial flow.</div>	<div>1. will provide an opportunity to improve the quality of life in many cities and countries. As the environmental problems are very acute;</div> <div>2. The level of consumption of disposable items will be reduced due to secondary raw materials;</div> <div>3. Secondary raw materials and their use as a source of income;</div>

If we consider the index of innovation development in the region, how it affects the standard of living of the population, the following was analyzed. The internationalization of enterprises, the development of trade, as well as the attraction of foreign direct investment (FDI) and skilled labour are the main drivers of innovation and competition in the modern economy, ensuring the exchange of knowledge and creating a competitive environment conducive to the development of innovation. The figure shows the close relationship between innovation and globalization, and therefore the processes that are rapidly taking place in our world.

Fig. 2. The indices of innovation (The source: INSEAD Switzerland Institute).

In terms of analysis, three countries can be considered as examples of innovative project expenditures for further development of sustainable development in the regions.

Table 2. Expenditure on innovation projects in Kazakhstan, Belarus and Russia (by category, percentage ratio). **Source:** Statistical Agency of the Republic of Kazakhstan; SCST, Science, Innovation and Technology in Belarus, Minsk; Innovation Activity Indicators, Higher School of Economics, Moscow.

	Kazakhstan	Belarus	Russia
R&D	10,9	21,3	27,3
Purchase of machinery and equipment	26,6	65,1	52,5
Acquisition of new technologies	6,9	0,4	1,5
Other expenditures	64,6	13,2	18,7
Total	100	100	100

Conclusion

Summarizing all of the above, we would like to note that the introduction of innovative environmental investments into the domestic practice is one of the starting points for solving the current economic and environmental problems in the country. In-depth study and development of theoretical approaches to typology and systemology of the process of ecologization of innovation and investment systems will allow to provide more purposeful and meaningful solution of applied tasks of economy and ecology of the country, thus contributing to sustainable development of domestic economy. Proceeding from this, I believe that the primary task of the state should be to support academic and higher education science, engaged in research in the direction of ecologization of innovative activity.

In general, economic and technological solutions should become more ecologically literate and see numerous opportunities to invest in sustainable use of ecosystems and their services. This requires us to organize innovation and technological development in new ways that are more networked, open and inclusive, while working more directly on social justice, poverty alleviation and environmental sustainability. From our analysis, we can see that, in any case, environmental innovation is a very sensitive topic and a very flexible niche for producing and opening up new sources of income, as the target audience for such projects is almost the entire population of the world.

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