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THE DEVELOPMENT OF KNOWLEDGE BASED BIOECONOMY

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Introduction

According to the conclusion of United Nations Organization, in the XXI century biotechnologies will define the humankind development in all areas of activities, first of all in acquisition of food, medicine, agriculture, ecology, and energy.

In order to involve innovative transformation of entities of economic activities (agricultural production, processing plants, energy production and distribution, building, transport, medical care, science and education) in the process, it requires a wide range of active mechanisms which allow not only observe the situation but also influence it.

Material and methods

It is the program-targeted method which provides simultaneous realization of three types of integration: spatial (covers all regions of Ukraine); temporal (observance of accurate phase succession and unity of phase measures); object-oriented (realization of the policy in the areas of standards and regulations, agrarian and social sector development, stimulation of small business and entrepreneurship, investment and taxation policy, interregional and foreign affairs policy, higher education and fundamental researches support).

Application of the program-targeted method is required for: integrated achievement of the mission, goals and objectives of transition of Ukraine to bioeconomics; basic development of intellectual potential and human resources of the bioeconomics.

Forming on the territory of Ukraine high-tech sectors of innovative economics oriented at application of the biotechnologies in all areas.

Integration of the resources and organizational structures available in Ukraine, their concentration on priority directions of the biotechnologies development. Industrial and innovative bioeconomics infrastructure development, including the initiation of scientific and technological, informational, human, and marketing systems support.

Review of the main points focused in the program

Training of bioeconomics specialists in Ukraine. In 2012 in Ukraine the number of higher education establishments of various property forms reached almost one thousand with approximately 2.5 million students of 77 specialties. In particular, training for the specialties of "Biotechnology" and "Biomedical Engineering" is performed in 15 higher educational establishments. Potential training capability in these establishments is approximately 900 graduates per year. At the same time the governmental demand for the abovementioned specialists is approximately 270 graduates. The existence of such potential makes possible to predict future development of the bioeconomics in Ukraine.

Scientific basis (lack of financing for biotechnology products development).In 2011 in the biology field 2616 scientific and scientific-technical works were issued, and they gave basis for 839 new kinds of products and 220 new technologies, 118 of which are resource efficient. In 2011 as a result of the activities of scientific organizations the Ukrainian Patent Office received 8849 requests for protection documents for the objects of intellectual property rights (OIPR), 3667 of them were from natural sciences which include biological, medical, pharmaceutical, agrarian, technical sciences etc. Patent offices of other countries received 68 requests which is by 39.3% less than in 2010, including 42 requests for inventions and 1 – for a kind of plants. In the same period they received by 13% more of protection documents from Ukraine (inclusive of inventions – by 37.8%), in other countries – by 14.3% less. Within the ORPR protection documents 30.4% are the patents for inventions and 3.4% – for kinds of plants.

Main source of financing for innovative activities in 2011 were companies' own funds the volume of which numbered UAH 7.6 billion (in comparison with UAH 5.8 billion in 2010). Bank loans in amount of UAH 5489.5 billion (UAH 626.1 million) were used by 50 companies. Foreign investment financing of UAH 56.9 million (UAH 2411.4 million) was used by 11 companies; domestic investment financing of UAH 45.4 million (UAH 31.0 million) was used by 14 companies. 51 companies received governmental support funds in amount of UAH 161.4 million (UAH 92.7 million).

However these growth rates are not sufficient for qualitative breakthrough in the steady raising of intellectual potential and provision of the base for the development of nano- and biotechnological industry in our country.

Slow development of integration processes between business and educational establishments. Student potential in higher education establishments of our country is involved insufficiently. Students are hardly involved into research processes and often they don't understand real needs and issues of the industry, and the in-field practice provided for them usually turns into mere writing of standard reports.

Desynchronization between the labor market and education market has led to the phenomenon of 5-8 years time gap between appearance of need for specialists of innovative economics and ability of educational establishments to provide them.

Absence of needed knowledge and skills lead to reduction of labor resources cost. Thus according to the State Statistics Service of Ukraine, the percentage of labor cost in the structure of Ukrainian GDP is just 47.7% (in developed countries this rate is 75%). Together with it cheap labor is underproductive; it's suppressive for initiative, preserves a low level of organization and working conditions and in the end stipulated low quality of life.

Low innovative activity of companies and organizations. According to the international agency Abercade, the global biotechnology products marked estimates USD 163 billion.

Annual increase of the global biotechnologies industry market is about 7%. The USA is the leader of bioethanol production with its share of 48.9% of the global production. The biotechnology production markets in China and India estimate USD 3.8 billion.

On the other countries' background the biotechnological achievements of Ukraine look rather modest: its production volume doesn't exceed USD 20 million (the numbers are approximate because the Ukrainian marked is poorly structured and there is little statistics on biotechnological products).

Within bioeconomics globalization Ukraine is involved in consuming global bioindustry products, and the consumption is increasing. That's why the implementation of biotechnologies by Ukrainian companies is critical for increase of competitiveness of our production and provision of our own raw materials base. The main areas of most intensive global biotechnologies development can be realized by Ukrainian enterprises as well.

Innovational stagnation of the local bodies. Opportunities for innovational development of municipal establishments depend directly on activeness and effectiveness of local governing bodies. However the efficient leverages of the local bodies in this area are limited. Under such conditions a positive moment in realization of the innovative strategy of territorial development as a key direction could be extension of modern forms of interaction between local administration, business community and education establishments (introduction of technoparks, business-incubators, agencies on technologies sharing etc.)

Absence of essential elements in the bioeconomics infrastructure. An integral part of successful development of modern bioeconomics which enables progress, integration and specialization of its participants is high level of advance of its infrastructural elements starting with the biotechnology products trade area and concluding with research centers and biotechnological platforms. Availability of the infrastructure increases investment attractiveness of the projects.

Imperfection of mechanisms for product development commercialization and intellectual property management. Lags and disproportion in the area of

inventing and implementing of advanced production technologies together with traditional backwardness of commercialization mechanisms of intellectual property objects considerably hamper the innovative development of Ukraine.

In this juncture it's greatly needed to widen the spectrum of tools for investment and innovative activities support both in stimulating the demand of the industry for new technological solutions, as well as in supply – stimulating applied scientific, researching, engineering and technological works.

Legal regulation and governmental stimulation of the bioeconomics development. The main problem is still the absence of effective economical mechanisms which stimulate investment in innovative areas, biotechnologies development, as well as in its commercialization. The most important condition for the development of such mechanisms in Ukraine is availability of legal and normative base in Ukraine.

Absence of a complex approach and resources in the bioeconomics development. Achievement of good results in the area of new technologies implementation, approaches to nature management, forming "ecological thinking" is impossible within disconnection of legal entities. Availability of processing plants requires appropriate raw materials base, infrastructure, regulating legislation. Integrated and systematic interaction of enterprises which use biotechnology but represent different industries is possible to provide only by forming an agrobiotechnological cluster. Advantages which become available for business-structures are connected with considerable decrease of obstacles for entry to production trade markets and distribution of raw materials, products, labor, decrease of costs because of the multiplication effect which appears within cooperation of producers and consumers.

The system of the Program measures is integrity of measures grouped according to the phases and areas of realization, coordinated by their terms and executors and provides an integrated approach and coordination of activities of all participants of the Program in order to achieve the assigned results.

The main phase of the Program realization aims at commercialization and implementation of the biotechnologies on the whole territory of Ukraine for increase in agrarian production, and reflects priority directions of the bioeconomics development on the basis of available resource potential and possible directions of clustering.

The final phase of the Program aims at acceleration of biotechnologies diffusion process, formation of "green nature usage" and implementation of ecological imperatives into practice.

Within the framework of each phase of the Program it is foreseen to perform some definite measures on the basis of project-oriented method (Table 1).

Table 1. Structural scheme of the system of the Program measures and purpose of the phases

No	Title of the phase	Purpose of the phase
Stage 1. Formation of scientific and resource base.		
1.	Forming and/or improving of specialist training system for biotechnological companies, and also for conducting scientific and researching works.	Forming and developing effective mechanisms of preparation of specialists and scientists in the biotechnology, forming integrated educational environment of the biotechnological orientation.
2.	Forming mechanisms which contribute into acceleration of bioeconomics development (governmental support and improvement of the legislative basis).	Forming of stimulating mechanisms of the governmental support for formation and development of a new high-tech sector – bioeconomics; improvement of the normative legislative base which regulates the production and turnover of the biotechnological companies' production .
3.	Stimulating the industrial usage of the technologies based on renewable resources.	Creation and realization of prospective scientific-researching, engineering and technological works; realization of the integration of science, industry, small and medium entrepreneurship based on market mechanisms of commercialization of intellectual property objects and transfer of technologies.
4.	Forming the system of measures aiming at the support of the agrarian sector as the main resource base of the bioeconomics.	Formation of the environment which helps intensify the development of the bioeconomics.
Stage 2. Formation of competitive sector of researches and product developments in biotechnology.		
5.	Commercialization and implementation of biotechnologies.	Formation of a new highly technological branch – bioindustry, and positioning of Ukraine on the hi-tech market: development of renewable energy.
6.	Endorsement of the needs of science and production.	Narrowing the gap between researches and market
7.	Helping to form a positive image of our biotechnological production.	Forming on the territory of Ukraine favorable environment for expanding the fields of biotechnologies application and growth of the bioeconomics.
8.	Promotion and popularization of the biotechnologies among users as well as consumers.	
9.	Forming of "green thinking".	
10.	Development of the measures which can facilitate smooth entry of bioproducts on the market.	
Stage 3. Formation of agrobioclusters on the territory of Ukraine.		
11.	Development of the measures system within the framework of social partnership which stimulate creation of agrobioclusters.	Formation of territorial agrobiotechnological clusters which unite the development and production of hi-tech bioproducts.
12.	Analysis of the existing industrial and technological chains for rational usage of bioresources as a basis for creation and further development of territorial agrobioclusters.	Development of alternative energy; rational usage of bioresources and increase of life quality.

Conclusions

The effectiveness of the realization of the National Program of the bioeconomics development in Ukraine will be evident by the following indicators:

- In the area of the innovative development of the bioeconomics – the number of organizations which use biotechnologies; the area sown with biotechnological crops; the number of patents in biotechnologies; the number of educational establishments which train bioeconomics specialists;
- In the area of the institutional development – the number of the bioeconomics infrastructure objects; the number of agrobioclusters, business incubators;
- In the area of the social development – the number of new working places with the companies in the area of bioeconomics; the amount of waste recycled with the help of biotechnologies.

Phased realization of the Program of the bioeconomics development will enable the achievement of the following results:

- formation in Ukraine the bioeconomics as such an economical system which helps increase the life quality, improve the environment, the development of agrarian business within the principles of sustainability;
- integration of science, industry and entrepreneurship using the mechanisms of innovative biotechnologies commercialization;
- increase of economical effectiveness and competitiveness of the agrarian sector, forestry and fishery;
- formation of alternative raw materials base for processing industry;
- decrease of import dependence in the energy sector (by developing bioenergetics);
- formation and development of the bioeconomical infrastructure as a result of creating agrobioclusters;
- increase of involvement by creating additional working places, especially in rural areas;
- improvement of the environment as a result of recycling biomass, as well as industrial, agrarian and domestic waste.

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