Handling biotech production's management during crisis in Ukraine

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Abstract. The paper discusses biotech economy issues and challenges for Ukrainian producers. Some of the most critical problems in Ukraine (within the biotechnology sector) are identified, as well as possible ways to solve them.

The modern challenges facing the Ukrainian economy are both old and new: industrial development does not offer an easy choice. From now on, the introduction of new technologies (especially biotechnological ones) is a natural part of the overall strategy for overcoming the current global economic-ecological crisis, which could be caused by the discrepancy between the traditional technologies of the third and fourth technological order and economic-ecological conditions in general. Biotechnology, as the content center of the sixth technological order, resolves most of the existing ecological and economic contradictions by accelerating the evolution of nature in accordance with the development of society's needs.

In the article, the proposed method of measuring changes in the production of high-tech manufacturers (market sectors), in particular, the mentioned trigonometric function, can become the main indicator of innovativeness both in theoretical and applied research, and in real entrepreneurial activity.

Thus, the authors set a task in this study to analyze the management of the development of modern high technologies on the example of manufacturers of biotechnological products on the market of Ukraine.

In the article, the authors considered a new method of evaluating the effectiveness of the innovative activity of producers (enterprises, clusters, economic sectors) to determine its value for use by real producers of the biotechnological sector and considered the conditions for applying this method.

In this context, some of the most critical problems in Ukrainian economy (within biotech) were defined, some probable solutions were suggested.

Keywords: biotechnology; innovations; innovative development; biotechnological product.

Управління біотехнологічним виробництвом в кризових умовах в Україні

Анотація. В статті розглядаються проблеми економіки та виклики для біотехнологічних організацій в Україні. Визначено деякі найбільш критичні проблеми в Україні (в межах біотехнологічного сектору), а також можливі шляхи їх вирішення.

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Сучасні виклики, які постають перед українською економікою, є як старими, так і новими: промисловий розвиток не пропонує легкого вибору. Відтепер впровадження нових технологій (особливо біотехнологічних) природним чином входить у загальну стратегію подолання сучасної глобальної економіко-екологічної кризи, яка могла бути спричинена невідповідністю між традиційними технологіями третього і четвертого технологічного укладу та економічно-екологічними умовами в цілому. Біотехнологія, як змістовий центр шостого технологічного укладу, вирішує більшість наявних еколого-економічних суперечностей шляхом прискорення еволюції природи відповідно до розвитку потреб суспільства.

В статті запропонований метод вимірювання зміни виробництва високотехнологічних виробників (секторів ринку), зокрема згадана тригонометрична функція, може стати основним показником інноваційності як у теоретичних та прикладних дослідженнях, так і в реальній підприємницькій діяльності.

Таким чином автори поставили завдання у цьому дослідженні проаналізувати управління розвитком сучасних високих технологій на прикладі виробників біотехнологічної продукції на ринку України.

У статті автори розглянули новий спосіб оцінки ефективності інноваційної діяльності виробників (підприємств, кластерів, галузей економіки) для визначення її цінності для застосування реальними виробниками біотехнологічного сектору та розглянули умови застосування даного методу.

У цьому контексті визначено деякі найбільш критичні проблеми в Україні (в межах біотехнологічного сектору), а також можливі шляхи їх вирішення.

Ключові слова: біотехнології, інновації, інноваційний розвиток, біотехнологічний продукт.

Introduction

Effective management innovative development provides its stable progress in competitive environment. Current economic situation in Ukraine demands search and generation of managerial innovations on biotechnological industrial objects. Traditional economic indices do not provide complete picture of mentioned processes due to specific features of high-tech products.

This problem was recently researched by foreign scientists: V. Ivanter, R. Lipsey, O. Golichenko, M. Tacero, H. Garcia, as well as Ukrainian scientists: P. Y. Belenkiy, N. P. Goncharova, O. I. Volkov, V. M. Heiets, M. M. Yermoshenko, O. Y. Kuzmin, V. P. Semynozhenko, A. A. Chukhno, M. G. Chumachenko, I. B. Shvets, G. K. Yalovyi. Some important aspects, such as innovativeness level monitoring of high-tech enterprises and markets, management of innovation processes are not sufficiently described in professional literature.

Analyze the management of modern high-tech development using biotechnological manufacturers and biotech products in Ukrainian market as an example. Consider new method of biotechnological production

manufacturers' innovative activity efficiency estimation (enterprises, clusters, economic sectors) to define its value for application by real manufacturers of biotechnological sector; to consider conditions for applications of the given method.

Main results

Modern technological revolution is based on scientific research which is not a simple expansion of the previous industrial technologies, it is their synergetic interaction and interaction with other technological structures, for example, nanotechnologies are utilized by information tech products and technologies, in order to create biotech products, medical materials, etc. There is also, by the international estimations, a number of spearheading

technologies which head the list of modern complex system technologies, which integrate hundreds and thousands of technologies. Such technologies are: biotech, information technology, nanotech [1]. These technologies are used in all key groups of technologies which are important for global problems solving. As it is noted in the American Research Group RAND Corporation report, leading technologies from approximately 15-16 basic directions of their application or «cluster» technologies [2], which define an economic level of development as a whole and competitiveness of the state in the global market both in the long term and nowadays.

The quantity of the enterprises, which manufactured innovative products in 2000, according to the official data of «The Statistical Yearbook of Ukraine», was 1352 units, in year 2008 – 993 units, i.e. has decreased for 27%. This tendency carried on in 2009-2012: this time 15 to 20% of domestic manufacturers have stopped innovative biotech production. Things have not improved in 2020: less than 10% of producers were still engaged in manufacturing of innovative products.

Today the situation on the domestic market of biotechnological products, as well as in the majority of countries, is conditioned acterised by fierce competition between domestic and foreign manufacturers. For example, enterprises of different kinds of ownership are engaged in manufacturing of biotech products on Ukrainian veterinary medicine market. Among them both manufacturers of veterinary products, as well as large pharmaceutical companies which produce, first of all, humanitarian medicine. In 2010-2012 651 companies and 1740 small businesses in all areas of Ukraine were engaged in manufacturing of veterinary drugs (based on biotech) and wholesale and retail trade. In 2020, this figure decreased significantly: less than 250 companies, which can be mentioned as engaged in the business.

Biotechnological production is concentrated (in general) around Kyiv, Kharkiv and Zhytomyr. It is feasible to assert that there are economic-geographical preconditions for creation of such new organizational forms as biotechnological clusters there [4].

As a result of performed analysis, the structure of veterinary preparations domestic market has been defined by principle of pharmacy therapeutic groups: chemotherapeutics, stimulators and vitamins make 57,1% (723 subjects in total; domestic: 426; imported: 297), biological preparations accordingly 42,9% (total 543; domestic: 327; imported: 216). Nevertheless, number of enterprises, which are actually engaged in manufacturing of veterinary preparations, decreases. Share of such manufacturers is 30-40% out of the total number of those which acquired license [5].

We consider production update dynamics as the most basic indicator of innovativeness level of manufacture and market, but it is problematic to measure it via traditional indicators such as profitability, efficiency, etc. Let us consider applying a trigonometric function for innovative activity dynamics' measurement of a manufacturer (cluster or market sector), which allows us to formalize innovativeness dynamics indicator via marking the exactmoment of various kinds of innovative products to the market and to reduce innovations, which are not comparable by other means, to one denominator: $tg0x=sin0x/cos0x$.

For example, successes of manufacture in management of innovative activity could be displayed on a graph, which displays life cycle of three innovative products, where we would consider tangent of an angle between straight line and "x" axle, which starts in «0» mark and passes through points which represent the beginning of life cycle of the new innovative goods on the market – the higher the tangent's value, the more dynamical is manufacturer's (market sector) innovative policy (see Figure 1).

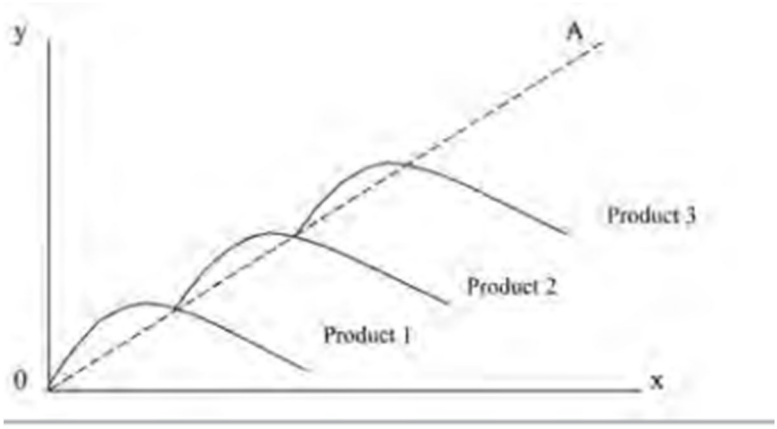

Figure 1. Life cycle of three innovative products

Conclusion

Modern challenges that arise in front of Ukrainian economy are both old and new: industrial development does not offer easy choices. Henceforth, introduction of new technologies (especially biotech), is included naturally into the general strategy of overcoming modern global economic-ecologic crisis, which could have been caused by disagreements between traditional technologies of third and fourth technological mode and economics and ecology conditions in general. Biotechnology as semantic centre of the sixth technological mode, solves the majority of available ecologic-economic disagreements via acceleration of nature's evolution according to development of society's needs. Method for measurement of highly technological manufacturers production (market sectors) change, which has been suggested, in particular, the mentioned trigonometric function, could become the basic indicator of innovativeness in theoretic and applied research, as well in real-life business activity.

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