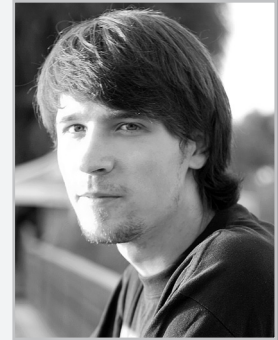


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UKRAINE'S BIOTECHNOLOGICAL PRODUCTION MANAGEMENT ORGANIZING

Abstract. *The paper reveals problems of activity organizing and monitoring of biotechnological economy sector and Ukrainian market of biotechnological production producers. The method for innovative activity level estimation of producers and biotechnological production market as a whole is proposed. Some of the most critical problems in Ukrainian economy (in biotechnological production) are defined; and ways to solve them are shown.*

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

JEL Classification: *O10, O14, O31*

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ОРГАНІЗАЦІЯ УПРАВЛІННЯ БІОТЕХНОЛОГІЧНИМ ВИРОБНИЦТВОМ УКРАЇНИ

Анотація. У статті розглянуто проблеми організації діяльності та моніторингу біотехнологічного сектору економіки і ринку виробників біотехнологічної продукції України. Запропоновано метод оцінки рівня інноваційної активності виробників та ринку біотехнологічної продукції. Визначено деякі найбільш значущі проблеми в українській економіці, що стосуються біотехнологічного виробництва, і показано можливі шляхи їх розв'язання.

Ключові слова: біотехнологія, інновації, інноваційний розвиток, моніторинг, біотехнологічний продукт.

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ОРГАНИЗАЦИЯ УПРАВЛЕНИЯ БИОТЕХНОЛОГИЧЕСКИМ ПРОИЗВОДСТВОМ УКРАИНЫ

Аннотация. В статье рассмотрены проблемы организации деятельности и мониторинга биотехнологического сектора экономики и рынка производителей биотехнологической продукции Украины. Предложен метод оценки уровня инновационной активности производителей и рынка биотехнологической продукции. Определены некоторые наиболее значимые проблемы в украинской экономике, касающиеся биотехнологического производства, и показаны возможные пути их решения.

Ключевые слова: биотехнология, инновации, инновационное развитие, мониторинг, биотехнологический продукт.

Introduction. Effective management of 's innovative development provides its stable progress in competitive environment. Modern economy situation in Ukraine demands searching and generating of new methods (ways) of managing innovations at biotechnological industrial objects. The most actual is innovation activity dynamics measuring of producers of biotechnological products, because traditional economical indexes do not provide complete picture of mentioned processes due to specific features of high-technology products.

Brief Literature Review. This problem was studied lately by foreign scientists: V. Ivanter, R. Lipsey, O. Golichenko, M. Tacero, H. Garcia, also by Ukrainian scientists: P. Y. Belenkiy, N. P. Goncharova, O. I. Volkov, V. M. Heiets, S. A. Yerokhin, M. M. Yermoshenko, O. Y. Kuzmin, V. P. Semynozhenko, A. A. Chukhno, M. G. Chumachenko, I. B. Shvets, G. K. Yalovy. Some important aspects, such as innovativeness level monitoring of high-technology enterprises and markets, organizing of innovation developments providing are not sufficiently described in professional literature.

Purpose. To analyse a situation concerning management of modern highly technological manufactures development on an example of biotechnological manufacture and the market of biotechnological products in Ukraine, as well as to feature its functioning. To prove a number of offers concerning the state innovative policy that will help to develop the biotechnologies market. To offer a new method of biotechnological production manufacturers' innovative activity efficiency estimation (the enterprises, clusters, economic sectors) to define its value for application by real manufacturers of biotechnological sector; to consider conditions in which the given method will be applied.

Basic results. New technologies of the sixth technological way are realisation of possibilities of mankind for solving essential problems of development. Modern technological revolution is based on scientific researches which are not a simple function of the previous craft or industrial technologies of the third-fourth technological modes, thus feature of these technologies is their synergetic interaction and interaction with other techno-

logical structures, for example, nanotechnologies are used by working out of information technologies, in creation of biotechnological products, medical materials, in pharmaceuticals. There is also, by the international estimations, a number of leading technologies which head the list of modern complex system technologies which integrate in itself hundreds and thousand technologies simple and known. Such technologies are: biotechnologies, information technologies, effective and reproduced systems of power supply, nanotechnologies and management of complex systems [1]. These technologies are used in all key groups of technologies which are important for global problems solving. As it is noted in the report of the American Research Group RAND Corporation, leading technologies form 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 today, and in the long term.

Accordingly, in the developed countries defence, public health services, space researches, power, biotechnology are priorities of the state and corporate sectors of scientific researches and to providing of their results. For last decade 95% of expenses on scientific researches in the United States of America are mostly carried out by five corresponding ministries and departments, namely the Ministry of Defence, the National Institute of Health, NASA, the Department of Energy and the National Scientific Fund. Annual growth of volumes of financing makes about 3,5% and even has increased in crisis 2008 [3].

Due to the researchers from the National Academy of Sciences promulgated in the report «The Science and innovations in maintenance of development of economy of Ukraine» (2010) Corporate sector innovatively active only in the limited quantity narrow markets: on the average industrial enterprises spend for research less than 1% from cost of production; in general the share of the industrial enterprises in sector of researches and workings out makes in Ukraine about 5%, in Russia – 6%, while in the USA, Japan, the EU countries and in China – around 60%. In addition, low demand for results of scientific

activity and innovations for introduction on enterprises really strengthens isolation process of science from manufacturing. The quantity of the enterprises which realised innovative production in 2000, according to official data of «The Statistical year-book of Ukraine», made 1352 units, and in 2008 – 993 units, i.e. has decreased for 27%. In 2009-2012 this tendency has remained: this time manufacturing of innovative biotechnological production from 15 to 20% of domestic manufacturers have stopped. The volume of realised innovative production in 2000 made 12148,3 million UAH (1 USD = 5 UAH), including essentially new 3813,6 million UAH, and in 2008 – 45830,2 million UAH, including essentially new – 14688,7 million UAH, i.e. has increased in 3,85 times. But increase of the price index of industrial production manufacturers is not considered here, and according to our calculations, it was 3,37 in 2008 comparing to 2000. If to correct volumes of realized production, essentially new innovative production on price index increase, we will receive increase in this volume only in 1,14 for 2008. Accordingly, the volume of all realised innovative production for this period has increased in 1,12. If to count statistical data for concerning volumes of innovative production for 2008-2012 in appropriate way, increase in volumes of its output is not observed.

Biotechnological manufacture of Ukraine is in embryo. Principal views of biotechnological production which are issued by the domestic enterprises are displayed on Figure 1. Total amount of production of this manufacture does not exceed 20 mln USD dollars and market volume is not less than 300 mln USD (according to agency Abercade which considers, that these estimations are rough as the Ukrainian market only starts to develop and official statistics concerning biotechnological

market of Russia which produces it's own biotechnological production approximately on 300 million USD and has a potential market capacity about 1 bln USD, it is necessary to notice, that the Ukrainian enterprises considerably lag behind level of satisfaction domestic market demand.

Today the situation on the domestic market of biotechnological products, as well as in the majority of countries, is characterised by high level of competition from domestic and foreign manufacturers. For example, in Ukrainian veterinary medicine market enterprises of different kinds of ownership and submission are engaged in manufacture of biological products. Among them both manufacturers of especially veterinary production, and big pharmaceutical companies which produce, first of all, production for humanitarian medicine. In 2010-2012, were engaged in manufacture of veterinary medicines and preparations (based on biotechnologies), and also wholesale and retail trade 651 companies and 1740 small businesses in all areas of Ukraine and Crimea.

Manufacture of biotechnological production with concentration in following areas (see Figure 2). So it is possible to assert, that there are economic-geographical preconditions for creation of such new organizational forms, as biotechnological clusters [4] in Kyiv, Kharkiv, Zhytomyr areas.

As a result of performed analysis, the structure of veterinary preparations domestic market has been defined by principle of pharmacy therapeutic groups: Chemotherapeutic preparations, stimulators and vitamins make 57,1% (total 723 subjects; domestic: 426; imported: 297), biological preparations accordingly 42,9% (total 543; domestic: 327; imported: 216). Nevertheless, number of enterprises which are really engaged in manufacturing of veterinary preparations, decreases. The share of such manufacturers is 30-40% from the general number of that have received licence [5] (see Table 1).

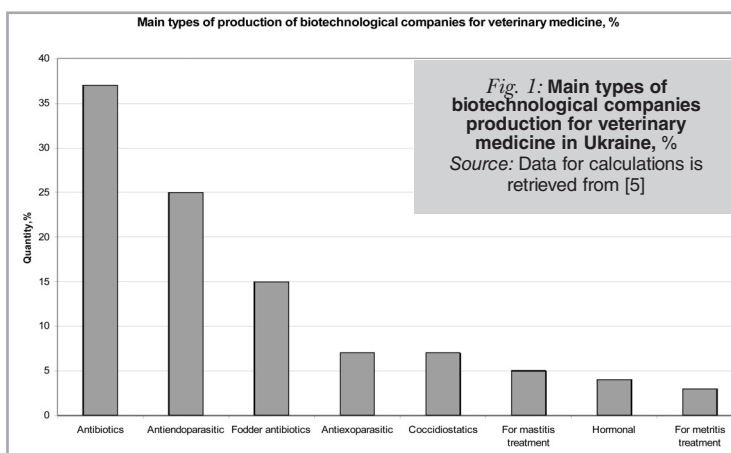
Thus, at total cost of export-import transactions of bio and chemotherapeutic preparations of 66462,66 thousand UAH (1 USD = 5 UAH) (import of biological products exceeds import of chemotherapeutic preparations in 1,45 times, and export of biological products makes 0,4 from export of chemotherapeutic preparations. Import of biological products makes almost 97% from applied to protect animals, i.e. the Ukrainian manufacturers of biological products have real possibilities for operation on the settled market of competitive production.

It is necessary to say that a significant amount (61,7%) of biological veterinary preparations is being bought at the expense of budgetary funds within state orders, which should stimulate domestic manufacturers of biological products. Consumption structure of veterinary preparations from different pharmacy therapeutic groups differs considerably, as it depends of character of disease, kind of animals which are being treated and their quantity. The share of biological preparations invariable – up to 70% (see Table 2).

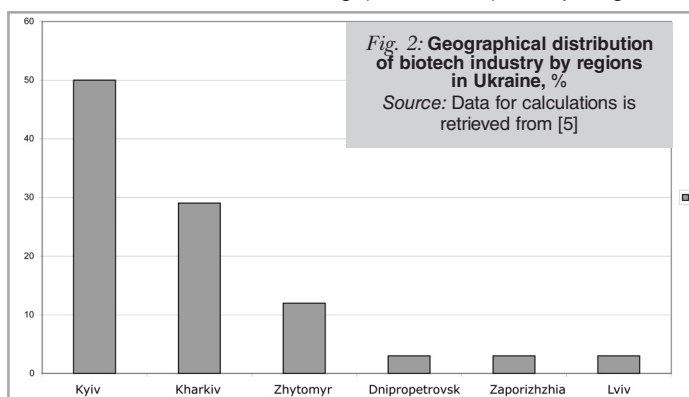
The important question is working out of information-analytical maintenance of the biotechnological manufactures development, in particular the corresponding statistical base created on the basis of the newest foreign methods usage for statistical account of highly technological manufactures activity. It is necessary to develop the unified system of statistics for display and research of different kinds of the advanced industrial technologies development according to the stages of their life cycle [6]. We suggest to perform monitoring of highly technological entities with application of graphic and mathematical methods [7].

We consider production update dynamics as the most basic and system indicator of innovativeness level of manufacture and market, but to measure it is problematic through traditional indicators, such as profitability, efficiency, etc. It is possible to apply trigonometrically function for measurement of innovative activity dynamics of a manufacturer (cluster or market sector), which makes it possible to formalize innovativeness dynamics indicator through fixing of the moment of launching various kinds of innovative products to the market and to reduce to one denominator innovations that are not comparable by other means:

$$\operatorname{tg}0x = \sin 0x / \cos 0x \quad (1)$$



producers and goods is almost completely absent). In addition, the biotechnological enterprises in Ukraine are included, in official statistics, to such areas, as wood, pulp-and-paper, the food-processing industry, agriculture (on the international classification of biotechnologies, it is so-called green sector of bio economy). Also there are also biopharmaceutical enterprises (accordingly, red sector), and also that produce bio fuel and do soil and waters bio clearing (white sector). Comparing to the



For example, successes of manufacture in management of innovative activity can be displayed graphically in a drawing, which displays life cycle of three innovative products where it is possible to express level of achievements in the innovative policy through size of a tangent of a corner between a straight line and x axle, which originates in «0» point and passes through points which display the beginning of life cycle of the new innovative goods on the market – the higher is value of a tangent, the more dynamical is manufacturer's (market sector) innovative policy (see Figure 3).

In case of lower tangent of A0x the manufacturer conducts passive innovative policy (Figure 4). Level of innovativeness of a manufacturer depends, first of all, of effective innovation management. This value was calculated for Farmak JSC, mentioned tangent of A0x was adjusted for the value of the share, which is occupied by innovative production in total amount of production of the manufacturer.

Leaning on the design procedure of efficiency of innovative management offered by us for biotechnological manufactures and market segments, three levels of standard coefficients are defined, which classify manufactures according to level of innovation management efficiency. For example, according to this classification, Farmak JSC with factor 5,53 is on an average level of innovation management efficiency. Comparing to existing methods [8], we consider this method as more practice and more effective from operation time expenses.

Let us note that the market of biological veterinary preparations and veterinary medical means is stable as preparations which are offered on it at present moment, exist not less than five-seven years.

The system macro- and microeconomic actions should become a strategic question of stimulation of development of innovative biotechnologies: creation in structure of the state budget (similar to the EU countries) a special fund, which means will go on maintenance of positive changes in usage of these technologies according to certain priorities of the state investment under strict control of directions and productivity of their use; increase of a share of innovative biotechnologies in the state purchases for the purpose of the state stimulation of high technology and innovative production manufacture not only in agricultural complex and medicine, but also for biotechnological components introduction in energy saving, information and development of information-telecommunication technologies, etc. Exactly in time of usage of these technologies a primary factor of their efficiency and productivity is high level of management, i.e. planning, organizing, motivation and control.

Conclusions. Introduction of new technologies of the sixth technological mode, including biotechnologies, is included naturally into the general strategy of modern global economically-ecological crisis overcoming, which is appreciably caused by disagreements between traditional technologies of third and fourth technological mode and economics and ecology condition in general. Biotechnology as semantic centre of the sixth technological mode, solves the majority of available ecologic-economic disagreements through acceleration of nature's evolution according to rates of society's needs development. Dynamics of highly technological manufacturers production (market sectors) change, which is offered to evaluate by mathematical methods usage, in particular, the proposed trigonometric function, should become the basic indicator of innovativeness.

References

1. *The Global Technology Revolution. Bio/Nano/Materials Trends and Their Synergies with Information Technology by 2015* (2001). Retrieved from http://www.rand.org/pubs/monograph_reports/MR1307/index.html
2. Maslak, O. I. (2010). *Economic estimation of innovational and investment infrastructure monitoring*. Retrieved from: http://archive.nbuv.gov.ua/portal/natural/vcpit/TPiEV/2010_58/NTU_XPI_58_2010_20.pdf (in Ukr.).
3. National Science Foundation (2010). *Science and Engineering Indicators 2010*. Retrieved from <http://www.nsf.gov/statistics/seind10/c4/c4h.htm>
4. Pyliavets, V. M. (2013). Peculiarities of the cluster approach implementation in enterprises' activity of oil and fat complex. *Ekonomika i derzhava (Economics & State)*, 8, 91-94 (in Ukr.).

Tab. 1: Indicators of export and import of animal protective preparations in 2011

Economic indicator	Biological		Chemical	
	Export	Import	Export	Import
Product value (thousand UAH)	1282,6	36617,95	3300,07	25262,04
Part of total volume, %	3,39	96,61	11,55	88,45

Source: [5]

Tab. 2: Realisation of biological veterinary preparations by enterprises, which are part of «Ukrzoovetprompostach» system in Ukraine, 2011 (thousand UAH)

«Ukrzoovetprompostach»	«Ukrvetprompostach», national company	«Brova-pharma»	Products for antiepizootic measures with budget funds			Total
			«Ukrzoovetprompostach»	«Ukrvetprompostach», national company	Total	
25359,70	0,00	20729,47	35850,93	38403,56	74254,49	120343,665

Source: [5]

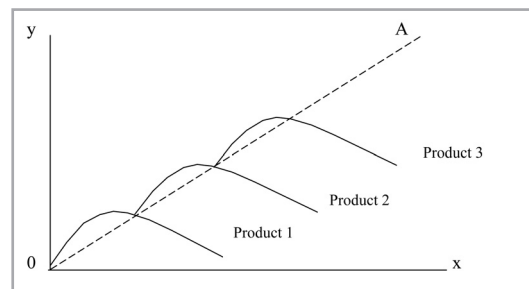


Fig. 3: Illustration of active innovative policy of a manufacturer (market) Source: Developed by the author

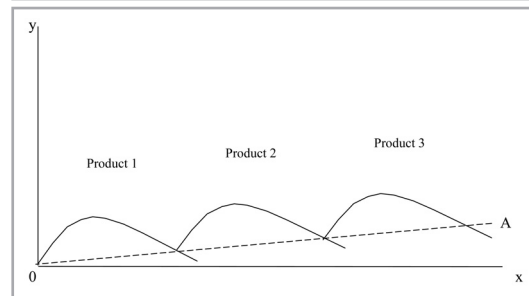


Fig. 4: Illustration of passive innovative policy of a manufacturer (market) Source: Developed by the author

5. NAAS, Department of Veterinary Medicine (2012). *Information-analytical materials about veterinary preparations' market structure in Ukraine*. Kyiv, Ukraine (in Ukr.).
6. Prudnikova I. (2013). Informational support for diagnostics of organizational structures in enterprises management quality. *Ekonomichnij Casopis-XXI (Economic Annals-XXI)*, 5-6(2), 51-53 (in Ukr.).
7. Kostyuk, R. V. (2010). Biotechnological enterprises management organization. *Journal of National University of State Tax Service of Ukraine*, 1. Retrieved from http://www.nbuv.gov.ua/e-journals/znpnudps/2010_1/zmist.html (in Ukr.).
8. Azarova, A., & Zhytkevych, O. (2013). Calculation methods of domestic enterprises' competitiveness evaluation. *Ekonomichnij Casopis-XXI (Economic Annals-XXI)*, 3-4(1), 93-95 (in Ukr.).

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References (in language original)

1. *The Global Technology Revolution. Bio/Nano/Materials Trends and Their Synergies with Information Technology by 2015* [Electronic resource]. – 2001. – Accessed mode : http://www.rand.org/pubs/monograph_reports/ MR1307/index.html
2. Маслак О. І. Економічне оцінювання моніторингу інноваційної та інвестиційної інфраструктури [Електронний ресурс] / О. І. Маслак. – 2010. – Режим доступу : http://archive.nbuv.gov.ua/portal/natural/vcpit/TPiEV/ 2010_58/NTU_XPI_58_2010_20.pdf
3. Science and Engineering Indicators 2010 [Electronic resource] / National Science Foundation. – 2010. – Accessed mode : <http://www.nsf.gov/statistics/seind10/c4/c4h.htm>
4. Пиливець В. М. Особливості впровадження кластерного підходу в діяльність підприємств олієжирового комплексу / В. М. Пиливець // *Економіка та держава*. – 2013. – № 8. – С. 91–94.
5. Інформаційно-аналітичні матеріали щодо структури ринку ветеринарної продукції України. – К. : НААН, відділення ветеринарної медицини, 2012. – 35 с.
6. Пруднікова І. М. Інформаційне забезпечення діагностики якості організаційних структур управління підприємствами / І. М. Пруднікова // *Економічний часопис-XXI*. – 2013. – № 5–6(2). – С. 51–53.
7. Костюк Р. В. Організація управління біотехнологічними підприємствами / Р. В. Костюк // *Збірник наукових праць Національного університету державної податкової служби України (електронне наукове фахове видання)*. – Режим доступу : http://www.nbuv.gov.ua/e-journals/znpnudps/2010_1/zmist.html
8. Азарова А. О. Розрахункові методи оцінювання конкурентоспроможності вітчизняних підприємств / А. О. Азарова, О. В. Житкевич // *Економічний часопис-XXI*. – 2013. – № 3–4(1). – С. 93–95.

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