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INNOVATIVE DEVELOPMENT MANAGEMENT NETWORK ENTERPRISES IN THE CONTEXT OF INCREASING THE EFFICIENCY OF FINANCIAL AND ECONOMIC ACTIVITY

Abstract. For the network enterprises under research, the acquisition, organization of application of technologies, programmes, equipment which will improve economic, market, technical indicators, will provide the possibility to increase the general level of innovation has been suggested. To ensure the optimal selection, the use of innovative platforms for the selection of technologies, programmes, equipment has been proposed. Its application provides the possibility to identify the needs of innovative development of each of the enterprises under research and to develop individualized areas of innovation. The purpose of the article is to identify key problems of innovative development of Ukrainian network enterprises and to develop ways to improve its management on the basis of promising technologies. The methodology of assessing the state of innovative development of enterprises on the basis of four groups of indicators, namely the financial ones, the impact of innovative capacity on the level of international business development, staff composition, and logistics system, which has been implemented for five network structures on their primary information base, is presented. The expediency of adapting the Polish experience regarding the use of an innovative selection platform, which provides simulation modelling of the implementation of technologies and programmes, to the conditions and features of Ukrainian networks has been proved. Only network enterprises and their management system and innovative development were considered. The use of algorithms for commercialization of technologies, software that will allow the staff of research units of network structures to identify individualized needs of innovative development and develop individualized areas of innovation of the network structure, thus ensuring greater efficiency of innovation has been proposed. The results of the assessment made it possible to identify the main problems of innovation in network enterprises.

Keywords: innovative development, simulation modelling, intellectualization, network interaction, network enterprises.

JEL Classification O31, O32

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УПРАВЛІННЯ ІННОВАЦІЙНИМ РОЗВИТКОМ МЕРЕЖЕВИХ ПІДПРИЄМСТВ У КОНТЕКСТІ ПІДВИЩЕННЯ ЕФЕКТИВНОСТІ ФІНАНСОВО-ЕКОНОМІЧНОЇ ДІЯЛЬНОСТІ

Анотація. Для досліджуваних мережових підприємств запропоновано придбання, організація застосування технологій, програм, обладнання, які поліпшать економічні, ринкові, технічні показники, дадуть можливість підвищити загальний рівень інноваційності. Для забезпечення оптимального вибору запропоновано використання інноваційних платформ для вибору технологій, програм, обладнання. Його застосування дає можливість виявити потреби інноваційного розвитку кожного з досліджуваних підприємств і розробити індивідуалізовані напрями інновацій. Мета статті — виявити ключові проблеми інноваційного розвитку мережових підприємств України і розробити шляхи вдосконалення управління ним на основі перспективних технологій. Упроваджено методологію оцінки стану інноваційного розвитку підприємств на основі чотирьох груп показників: фінансових, впливу інноваційного потенціалу на рівень розвитку міжнародного бізнесу, кадрового складу і логістичної системи. Представлено п'ять мережових структур первинної інформаційної бази. Доведено доцільність адаптації польського досвіду використання інноваційної платформи відбору, що забезпечує імітаційне моделювання впровадження технологій і програм до умов та особливостей українських мереж. Розглянуто тільки мережові підприємства, їхні системи управління та інноваційний розвиток. Запропоновано використання алгоритмів комерціалізації технологій, програмного забезпечення, яке дозволить співробітникам дослідних підрозділів мережових структур виявляти індивідуальні потреби інноваційного розвитку та розробляти індивідуалізовані області інновацій мережової структури, забезпечуючи тим самим велику ефективність інновацій. Результати оцінки дозволили виявити основні проблеми інноваційної діяльності мережових підприємств.

Ключові слова: інноваційний розвиток, імітаційне моделювання, інтелектуалізація, мережева взаємодія, мережові підприємства.

Формул: 0; рис.: 4; табл.: 2; бібл.: 15.

Introduction. The level of innovative development of network enterprises operating in national and international markets indicates their ability to create highly efficient in terms of technology, consumer qualities, market requirements products (services) that ensure their competitive position, financial and economic development, have an impact on the increase of the country's innovation.

Ensuring the innovative development of network structures in international markets largely depends on the efficiency, flexibility towards market requirements of relations among their participants. Given the importance of research on this issue, we consider it important to study the impact of network connections on the innovative development of the studied network enterprises of Ukraine (including international markets) and identification of the main areas for their improvement.

Research analysis and problem statement. Theoretical, methodological aspects of studying the innovative development of network enterprises have been researched in the scientific works of the authors in the plane of emphasis on the criterion of innovation in all areas of functioning of these entities. Можна виділити наступних вчених: Gianfranco [1], Gnyawali & Srivastava [2], Guan & Ma [3], McPhillips [4], Forsman [5], Ferras Hernandez & Nylund [6], Bittencourt, Zen & Prévot, [7].

Although there are researches in this area in the modern scientific community, there is a need to identify current problems and ways to overcome them in the context of the functioning of Ukrainian network structures of an innovative nature.

The task is to identify the main problems of innovation in network enterprises.

The purpose of the article is to identify key problems of innovative development of Ukrainian network enterprises and to develop ways to improve its management on the basis of promising technologies. **The methodology** of assessing the state of innovative development of enterprises on the basis of four groups of indicators, namely the financial ones, the impact of innovative capacity on the level of international business development, staff composition, and logistics system, which has been implemented for five network structures on their primary information base, is presented.

Results of the research. Improvement of the innovation sphere has a significant impact on the development of business entities and their members according to the market, technological and economic components of achieving revenue growth. The innovative development of networks in various sectors of the economy has a positive influence on small, medium and big businesses. Their members are their structural elements due to the fact that the effective organization of the research and technology sphere contributes to highly competitive results. The network structures of the country are the leaders in the growth in the domestic market [8—11]. The spheres of foreign economic development of the national economy determine the key directions of transformation in various industries [12—15]. Identifying the problems of innovative development of leading network enterprises will permit them to settle their general characteristics and key areas of improvement, which will positively affect the industry and national indicators, as well as the international ranking in certain spheres.

Five network enterprises operating in the field of innovative technologies of Ukraine have been taken as an example to carry out the research.

The aim of the first stage of the assessment is to study the financial indicators that characterize the innovative development capacity (including in the international market).

According to the calculations made at this stage, the formulated conclusions provide us the possibility to compare the situation in this area within the activities of these networks.

According to the results of the study, all studied network structures showed a decline in the level of knowledge-intensity of products (services), which indicates a reduction in research and development costs over three years. PJSC «Ukrainian Radiation Protection Institute» showed a higher indicator value (45.6% in 2016 compared to the average values of other networks at 15.1—30.8%, 27.7% in 2017 (average values for this period), 32.7% at the level of 14.6—30.4% in other network structures). PJSC «DATAGROUP» also showed a significant level of knowledge-intensity of products (services), but this figure has also decreased in this network. The decrease in the level

of this indicator shows a general reduction in the costs of modern domestic network structures for the development of new products (services).

The results also show that the state of intellectual capital (indicator 2 in *Table 2*) had the highest value in PJSC «DATAGROUP», which was aimed at maintaining a high level of intangible assets (software and patents for technological processes). The second stage of the study examines the impact of innovative development capacity on the level of progress of international business networks. This impact is assessed through the share of sold innovative products (services) in total sales in the international markets (*Fig. 1*).

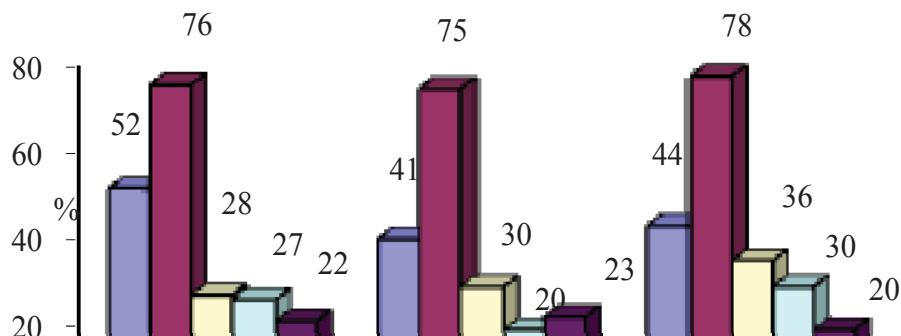


Fig. 1. The share of sold innovative products (services) in the total sales in the international markets of network enterprises

Source: compiled according to internal data of enterprises.

Calculation data (see *Fig. 1*) shows that JSC«Ukrainian Radiation Protection Institute» has a higher level of the studied indicator which is resulted from a significant competition of its innovative services in the international markets. This includes the export of services (expert assessment of the state of radiation safety) to three EU countries (Lithuania, Latvia, Estonia) and Belarus. This indicator represented 76—78% of the network’s innovative services as part of total export. It is to be noted that such a high indicator is due to the well-coordinated activity of the participants regarding the export of competitive services. PJSC «DATAGROUP» had a medium level according to this indicator (52—44% of innovative products (services) in terms of export).

At the third stage, the assessment of the staff composition indicator that characterizes the innovative development capacity (including in the international market) was carried out.

Fig. 2 contains the value of the share of employees engaged in innovation activities in enterprises.

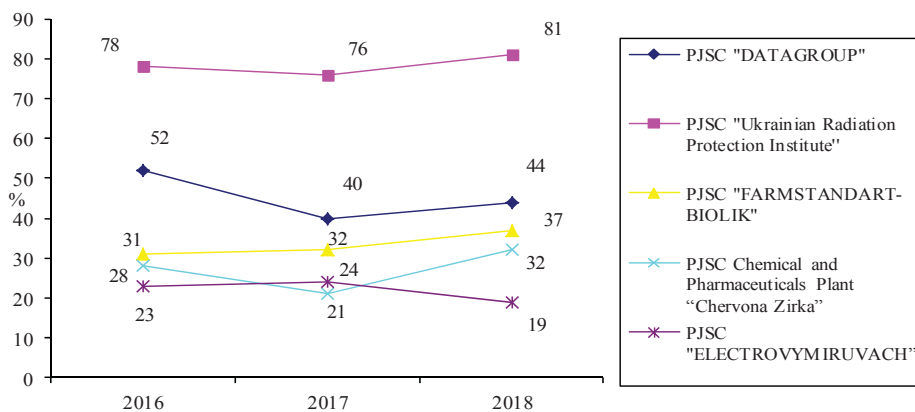


Fig. 2. The share of employees engaged in innovative activities of network enterprises over the period of 2016—2018

Source: compiled according to internal data of enterprises.

The analysis showed that PJSC «Ukrainian Radiation Protection Institute» has the highest level of staff involvement in innovation activity (from 78 to 81%) which is largely due to the significant share of innovative services export.

As we can see, there is a direct connection between the changes in staff involvement in innovation activities (especially those who are engaged in the development of new types of products (services)) and the innovative changes in the export level within these networks.

Fig. 3 demonstrates the importance of the share of costs for material motivational incentives for staff in the total payroll. This indicator demonstrates the level of participation of networks in the material incentives for staff, and it indicates the interest of the latter in the work of these structures.

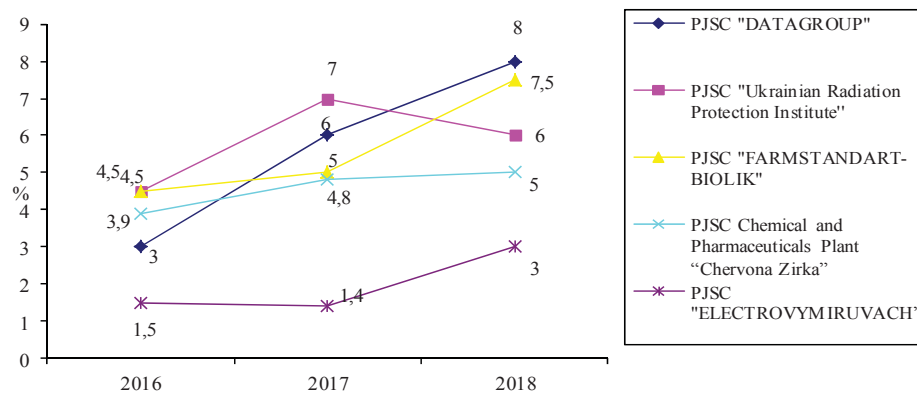


Fig. 3. The share of costs for material motivational incentives for staff in the total payroll of network enterprises over the period of 2016—2018

Source: compiled according to internal data of enterprises.

At the fourth stage, the indicators of logistics systems that characterize the innovative development capacity (including in the international market) have been evaluated. In this regard, the level of the share of the equipment which is used for innovative activity in the total equipment and its influence on the growth of sales of innovative products (services) has been analysed (Fig. 4). It was found that all the networks had a high level of this indicator.

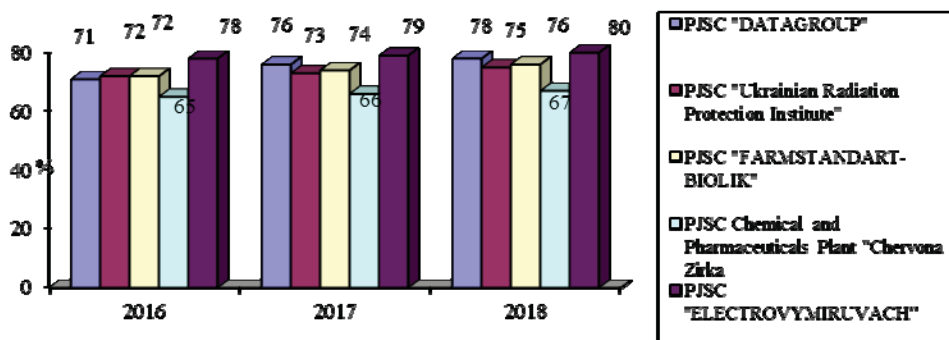


Fig. 4. The share of equipment used for innovation in the total equipment of network enterprises over the period of 2016—2018

Source: compiled according to internal data of enterprises.

We will identify the problems of innovative development of the network enterprise PJSC «DATAGROUP».

Table 1 presents the amount of losses from the costs for defects (damage, restoration of Internet communication) of PJSC «DATAGROUP» over the period of 2016—2018.

Table 1

Volumes of losses from the costs for defects (damage, restoration of Internet communication) in PJSC «DATAGROUP» over the period of 2016—2018

Indicator	Value			Absolute change		Relative change	
	2016	2017	2018	In 2017 compared to 2016	In 2018 compared to 2017	In 2017 compared to 2016	In 2018 compared to 2017
Sales volume (Form 2 of Ukrainian financial reporting), thousand UAH	780763	876286	1002199	95523	125913	12,23	14,37
Total cost, thousand UAH, including:	694123	805648	974936	111525	169288	16,07	21,01
Expenses for defects (damage, restoration of Internet connection) (according to internal data), including:	3150	16002	43375	12852	27373	408,00	171,06
The share of costs for defects (damage, restoration of Internet connection) in the total expenses, % (p. 2.1 / p. 2 · 100)	0,45	1,99	4,45	1,54	2,46		
The amount of profit before taxes, interest (Form 2 of Ukrainian financial reporting), thousand UAH	86640	70638	27263	-16002	-43375	-18,47	-61,40

Source: compiled according to internal data of the enterprise.

Table 2 presents the forecasting of the possibilities of using six options for optimizing innovative development for PJSC «DATAGROUP».

Table 2

Forecasting options for optimizing innovative development for PJSC «DATAGROUP»

Stage / Elements	Characteristics / Result
Implementation of a simulation modelling platform	Financing: one structural unit that has financial potential due to the contribution of the majority shareholder in creating a joint innovation platform, and acts as the core in the network formation. Application: at the level of network participants, under the guidance of the Unified Center.
Simulation modelling of six options for optimizing innovative development, including:	
Introduction of testing and diagnostic procedures for cable network maintenance management at all stages of their operation. Application for diagnostics, testing of brands technological software, testers of these brands:	10 extended multifunctional sets for testing and diagnostics of fiber-optic cable networks (to serve at least 1.0 million customers (accrued at the end of 2018)). 100 testers (to serve at least 1.0 million customers (accrued at the end of 2018)) of brands (according to internal data of a company)
Own technological software, purchased testers of the brands Fluke Networks, Tempo Communication, Jonard, Softing IT Networks, NetAlly	Technical and software capabilities for diagnostics and testing of fiber-optic cable networks, elimination of defects from damage losses, restoration of Internet connection. Technological and software testers make it possible to prevent damage to fiber-optic cable networks.
Technological software of the brands Fluke Networks, testers of this brand	Reasonable reduction of the total cost for defects (in 2018, it was 4.45%) (according to Table 3).

Table 2 (continued)

Stage / Elements	Characteristics / Result
Technological software of the brands Tempo Communication, testers of this brand	
Technological software of the brands Jonard, testers of this brand	
Technological software of the brands Softing IT Networks, testers of this brand	
Technological software of the brands NetAlly, testers of this brand	
Deciding on the optimal selection of one of the options	According to the conditions, characteristics of the development, financial capabilities. All options, according to technical and programme characteristics, provide the possibility to ensure elimination of unplanned damages (defects)

Source: compiled according to internal data of the enterprise.

According to the results of forecasting (Table 2), it has been established that, in the implementation of this proposal, its six options have prospects of using in order to overcome the problems for eliminating defects. It has been determined that the selection of the optimal option for PJSC «DATAGROUP» may be carried out by using a simulation modelling platform.

Conclusions. The deterioration of network interaction in respect of ensuring the effectiveness of combining efforts on the joint purchase of materials, raw materials (services); insufficiently effective intellectualization in the network enterprises; lack of coordination of network interaction participants regarding the creation of joint education programmes, training for staff, which causes an insufficient level of staff readiness to perform certain functions, tasks, the existence of a high level of defects, which affects costs, have been noted among the significant negative aspects of the network innovative development. Possibilities of improving the innovative development of Ukrainian network structures have been substantiated. The directions for resolving the problems of improvement of an innovative component of networks development which will provide the possibility to ensure overcoming of problems in the given field, have been defined. The use of algorithms for the commercialization of technologies, software that will allow staff of network structures research units to ensure greater efficiency of innovation, is promising.

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