

Cite This Article:

Zakharova D. S. Analysis of ways to optimize scientific and technical support of the military-industrial complex of Ukraine [Online] // *Economic Processes Management: International Scientific E-Journal*. 2016. № 3. Available: http://epm.fem.sumdu.edu.ua/download/2016_3/epm2016_3_5.pdf

Received
August 23, 2016

Accepted
September 7, 2016

UDK 355.1

JEL Classification: H56, L64

**ANALYSIS OF WAYS TO OPTIMIZE SCIENTIFIC AND TECHNICAL
SUPPORT OF THE MILITARY-INDUSTRIAL COMPLEX OF UKRAINE**

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The analysis of ways to optimize scientific and technical support of the military-industrial complex of Ukraine is considered in the article. Main problems and perspective directions of technological development for military purposes are identified. The experience and capacity of higher education institutions in the implementation of scientific and technical developments in this field are studied.

Keywords: *military-industrial complex of Ukraine, economic growth, defense sector, scientific and technical support.*

Introduction. Today in Ukraine there is a situation where the domestic military-industrial complex is unable to fully meet the needs of the Armed Forces of Ukraine in terms of anti-terrorist operation. This factor causes a danger to national security. Therefore very important is the issue of scientific and technical support of the military-industrial complex of Ukraine, which has become especially important since the beginning of the anti-terrorist operation. It should be taken into account that in the last decade Ukrainian military-industrial complex has worked mainly on the foreign market due to lack of domestic demand.

Analysis of recent researches and publications. A wide range of domestic and foreign studies is devoted to problems of the current state and possible future changes of

scientific and technical support of the Ukrainian military-industrial complex. Among domestic publications, special attention should be paid to the works of V. Badrak, S. Bondarchuk, S. Zhurets, I. Kabanenko, S. Konoplov, O. Lytvynenko, A. Mikhnenko, L. Poliakov, V. Riabych, Yu. Tolochnui, B. Shchehliuk. In their works, authors focus on studying the current state of the military-industrial complex of Ukraine, analyze the threat level from aggressor state.

Main purpose of the article is to identify problems and perspective directions of technological development for military purposes; to study the experience and capacity of higher education institutions in the implementation of scientific and technical developments; to study how military-industrial

enterprises use state support tools, how they improve their scientific and technological level.

Results and discussions. The main reasons for unsatisfactory functioning of the military-industrial complex from the point of scientific and technical support are:

- high level of physical and moral depreciation of fixed assets, structural deformation and imbalance of the military-industrial complex;

- the leading role of research in the development and implementation of modern production technologies of weapons and military equipment has been lost;

- low level of productivity, high power intensity of production, our country falls behind leading countries in technological development;

- lack of full cycle production of weapon and military equipment;

- absence in Ukraine of necessary conditions for the development of microelectronics, nanotechnology, making it impossible to create advanced weapons and military technologies;

- dependence of the rocket and space industry, aviation, shipbuilding, engine, electronics on imported components and materials;

- reduction of enterprises' own funds aimed at the creation and modernization of armament, military and special equipment;

- uncertainty at the national level in priorities of military-technical and military-industrial policy, the policy of military-technical cooperation;

- absence of systematic measures for state support of export of high technology products, including products of the military-industrial complex;

- low efficiency of scientific and industrial base use;

- lack of resources, inefficient and ineffective use of available resources;

- lack of skilled workers, technical and engineering personnel in enterprises of the military-industrial complex.

Therefore, in Ukraine problems that require

government intervention and legal regulation by the state are slowly resolved. Nevertheless, in the field of defense production remained significant domestic reserves. Their use in fundamentally new approaches can provide significant economic recovery of the military-industrial complex.

“State program of reforming and developing the Defense-Industrial Complex for the period till 2020” is directed to solve these problems. This program involves the creation of favorable conditions for effective functioning and development of scientific and industrial institutions that ensure the implementation of the military-economic and military-technical policy and define the scientific, technical and technological stability of the defense sector; providing of scientific, technical, technological and industrial base of the defense sector; design, development and implementation of new technologies [1].

Considering the question of scientific and technical support of the Ukrainian military-industrial complex, we have to consider the experience of leading countries in this field. In particular, the US experience shows us following: important elements of the military-industrial complex are various research organizations, and departments at universities that operate on the implementation of government orders. Thus the main institute of the US Department of Defense that is responsible for the financing and development of emerging technologies for use by the military is Defense Advanced Research Projects Agency (DARPA). Among the main tasks of this organization is to maintain US technological superiority in the military field. The work of this organization is based on the selection and funding of most perspective projects in the sphere of high technologies. Among the key principles of the organization is the financial interest of specialists and project managers, providing complete freedom of action in projects, flexible approach to the decision to continue or to close the project [2, p. 10].

Ukraine faces a problem of underfunding programs of the military-industrial complex. Despite the powerful military-industrial sector, the demand in its facilities over the last decade has been rather low. The Ministry of Defense of Ukraine actually refused to fund the development and modernization of armament and military equipment. For example, in the period from 2011 to 2013 defense programs for the development of defense industry were financed by one third provided from state programs [3]. As a result, defense enterprises need large-scale reconstruction and technical re-equipment, and research institutes are abandoned.

The situation with the financing of the military-industrial complex began to change only after the deployment of military conflict in the east of Ukraine and Russia's aggression against Ukraine. It became the impetus for the development of weapons and military equipment for the national army. In particular,

the Ministry of Defense of Ukraine received in 2015 funding for "Ukrainian defense industry in a hybrid war with Russia" 47.9 billion UAH (almost 2 billion USD) [4]. This is 20.5 billion UAH more than the previous year. In 2016 the military budget is 55.6 billion UAH [5]. For comparison: expenditures of leading states for the maintenance and development of the army are 7.5% of GDP in China, 6.9% of GDP in Russian Federation, 6.3 % of GDP in USA, 5.3% of GDP in Great Britain and 4.1% of GDP in France [6]. For today in Ukraine this figure is 2.4% of GDP.

Over 8% of the defense budget will be channeled to the development of weapons – 4.6 billion UAH (almost 200 million USD). For comparison: in 2014 this figure was 3.9 billion or 14.5% of the defense budget (Fig. 1). Up to 12% of the funds provided for the purchase of arms and military equipment abroad. In addition, a number of scientific research and engineering developments will be provided.

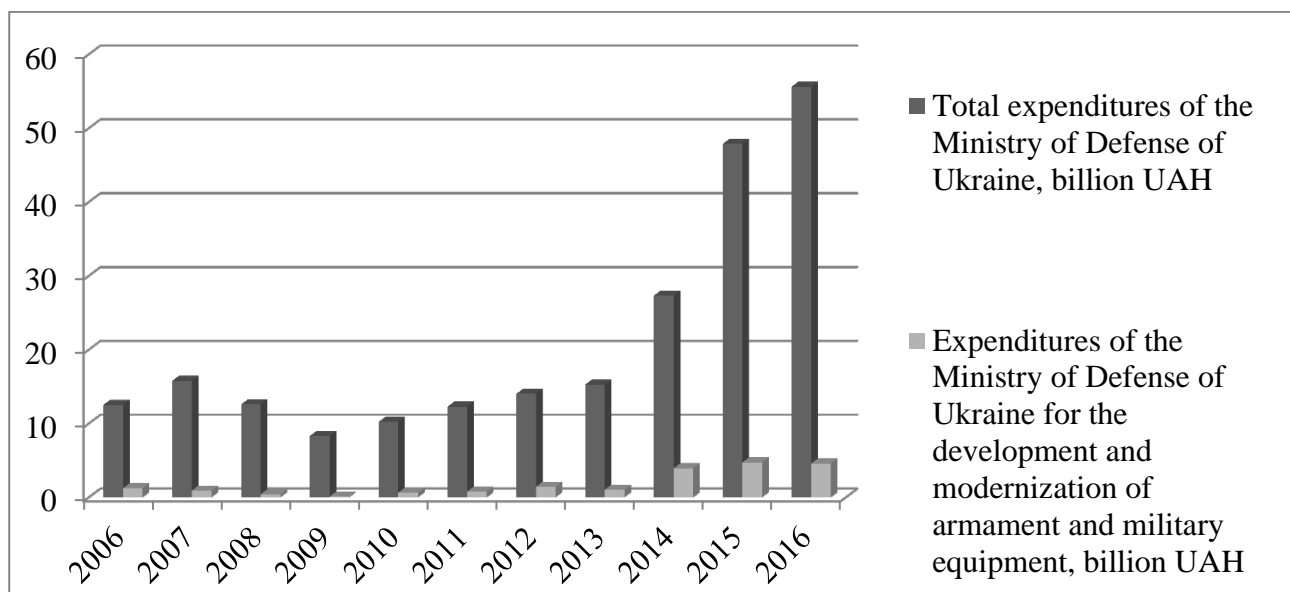


Fig. 1. Expenditures of the Ministry of Defense of Ukraine for the development and modernization of armament and military equipment in 2006-2016., billion UAH

Source: The budget of the Ministry of Defense of Ukraine for 2006-2016

Since the beginning of 2014 the situation in the manufacturing sector of the military-industrial complex has transformed radically.

Among main factors of such transformation we can point to the following:

- because of military actions significantly

increased state order for overland military armored equipment and its maintenance, ammunition etc.;

- economic relations with Russian Federation were severed, export of military goods to Russia and imports from this country were stopped;

- there is a downward trend in defense orders from other countries because our country can't inspire confidence owing to the risks of military confrontation.

As a result of these factors greatly increased the role of the defense industry for the economy of Ukraine. Enterprises of this sector accumulate substantial financial resources and are sources for related industries. Our country has significant achievements in the creation of information technologies, which are now considered as the basis of technological progress. They can be used for the development of communication systems and television, computing, control systems of complex objects, to solve many problems of mechanical engineering, chemical industry, instrumentation, medicine etc. Almost all ultra-pure single crystal materials (160 species) that are needed in IT sphere can be produced in Ukraine.

Some technologies have dual purposes. They include production technologies of new composite metal, aluminum and light armor materials based on titanium alloys; technologies of engine production; technologies of laser devices production for control systems that provide the competitiveness of test equipment; technologies of basic elements production for optical devices needed in aviation and in space technologies [7].

Systematic information and communication events have been started. They relate to the prospects of scientific and technical support of the military-industrial complex of Ukraine. Such events are visited not just by military experts, but also by leading scientists of research institutions and universities, engineers and designers of public enterprises, representatives of ministries and other central

executive authorities, national science academies, institutions and defense industry, students and graduate students from leading universities.

In 2016 were presented the results of cooperation between universities and research institutions from Ukraine defense industry enterprises to promote the creation of modern special and dual purpose technical systems. Such questions were considered: the current state and prospects of development of engine building for armored vehicles; scientific support of technological developments to provide tactical and technical characteristics of armored combat vehicles. New methods of restoration and strengthening of armored wear details were presented. New methods of creating special trench-digging machines for continuous fortification equipment were shown. For the purposes of the Armed Forces of Ukraine were presented: developments of portable and mobile stand-alone power plants (they can work in field conditions using a wide range of energy sources); mobile remote controlled system for processing dangerous objects in the field conditions; developments in monitoring of the spatial position of telecommunications satellites; film coating to reflect light, biomechanical robotic complex "Exoskeleton" etc. [8].

Through effective research work in 2015 was developed and produced a number of new products. In particular, in Antonov Aeronautical Scientific-Technical Complex tactical unmanned aircraft complex was manufactured; in state enterprise "Scientific and Production Complex "ISKRA" was the newest observation radar station created; in state Kyiv Design Bureau "LUCH" – anti-tank guided missiles PK-3, PK-2M, light portable missile system "Corsar", helicopter antitank missile system "ALTA". Should be noted collaborative projects of Kharkiv Morozov Machine Building Design Bureau and polish company "Huta Stalowa Wola". They develop new self-propelled artillery that is conducted according to the standards of NATO. It will be

based on chassis of Ukrainian Oplot-M main tank [9].

Based on the above mentioned, main ways to optimize scientific and technical support of the military-industrial complex of Ukraine should be:

- attracting investments in the development and acquisition of advanced technologies;
- collaboration with foreign enterprises to substitute import of Russian military components;
- involvement of scientific and technical

capacity of national universities to produce new military equipment at Ukrainian enterprises;

- establishment of cooperation and organization of joint ventures with world leading defense companies;
- improvement of research and development sector;
- involving of young scientists to solve the problem of import substitution.

Mentioned optimization ways include some technical support measures of the military-industrial complex of Ukraine (Fig. 2).

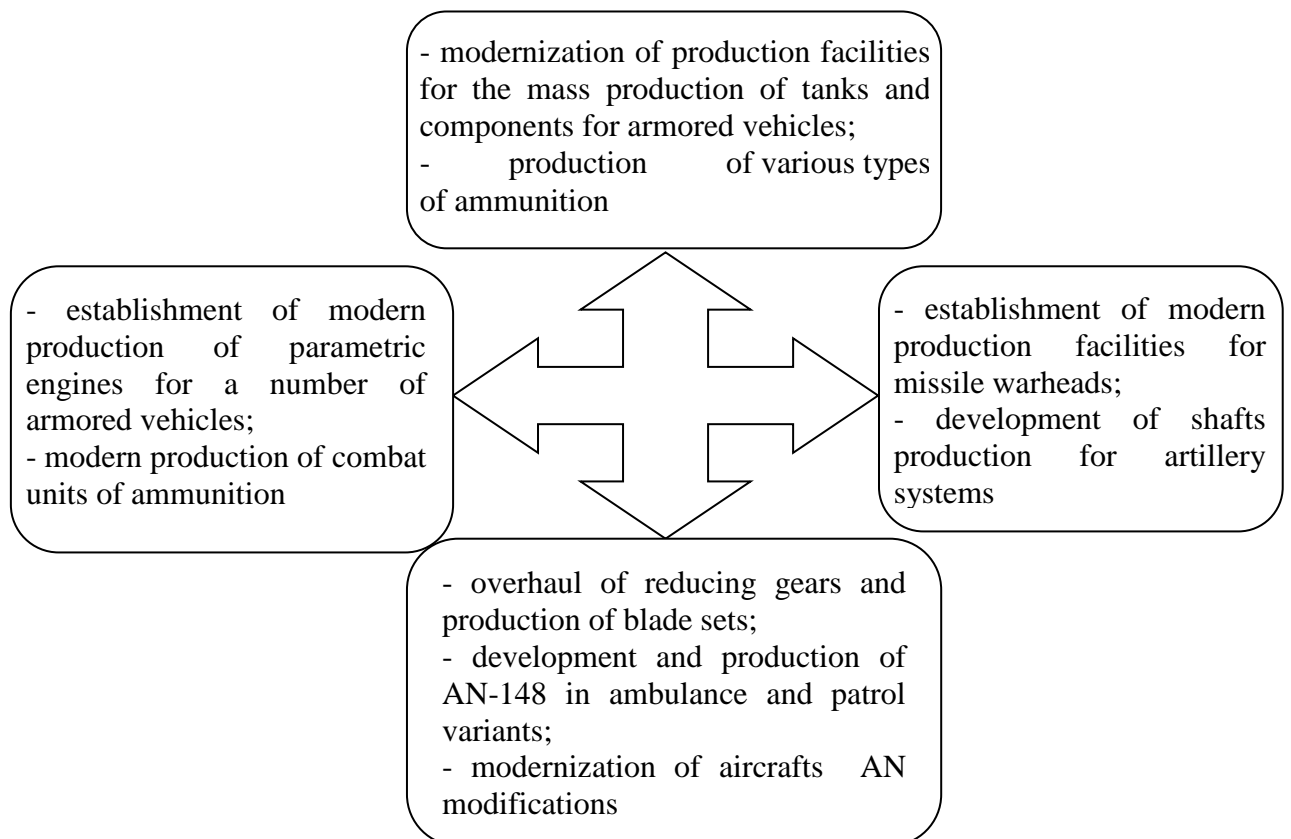


Fig. 2. Technical support measures of the military-industrial complex of Ukraine

Source: authors' development

Conclusions and further researches directions. We have analyzed that Ukraine has strong potential for the production of military equipment, devices and ammunition. However, very actual is a question of low financing of military equipment purchase for defense purposes of Ukraine. For example, expenditures

of leading states for the maintenance and development of the army are over 5% of GDP, and in Ukraine – only 2.4%. Necessary in the near future is to create favorable conditions for effective functioning and development of scientific and industrial institutions, providing of scientific, technical, technological and

industrial base of the defense sector. Suggested in the article ways to optimize scientific and technical support of the military-industrial

complex of Ukraine can cause economic growth in the defense sector.

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**АНАЛІЗ ШЛЯХІВ ОПТИМІЗАЦІЇ НАУКОВО-ТЕХНІЧНОГО ЗАБЕЗПЕЧЕННЯ
ОБОРОННО-ПРОМИСЛОВОГО КОМПЛЕКСУ УКРАЇНИ**

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У статті проведено аналіз шляхів оптимізації науково-технічного забезпечення оборонно-промислового комплексу України. Визначено основні проблеми та перспективні напрямки розвитку технологій військового призначення. Проаналізовано досвід та можливості вищих навчальних закладів у виконанні науково-технічних розробок у даній сфері.

***Ключові слова:** оборонно-промисловий комплекс України, економічне зростання, оборонна галузь, наукова та технічна підтримка.*

**АНАЛИЗ ПУТЕЙ ОПТИМИЗАЦИИ НАУЧНО-ТЕХНИЧЕСКОГО ОБЕСПЕЧЕНИЯ
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В статье проведён анализ путей оптимизации научно-технического обеспечения оборонно-промышленного комплекса Украины. Определены основные проблемы и перспективные направления развития технологий военного назначения. Проанализирован опыт и возможности высших учебных заведений в реализации научно-технических разработок в данной сфере.

***Ключевые слова:** оборонно-промышленный комплекс Украины, экономический рост, оборонная сфера, научная и техническая поддержка.*