Determinants of development and innovation activity of the us military economy

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Abstract

The essence of the main determinants of development and innovative activity of the US military economy is revealed. The interdependence, interchangeability and complementarity of certain components of the US military economy, innovation, security and policy of military and economic development are reflected. Emphasis is placed on the system, complexity in decision-making to achieve leadership positions in the military sphere in the global geopolitical landscape with an emphasis on the feasibility of permanent research and development, taking into account the digitalization of all business processes.

Key words: defense economy, military expenditure, digitalization, research and development (R&D), exports, confrontation, USA.

Introduction

The fundamental determinants of achieving US leadership in the military field are rapid technological progress, which is based on global scientific and technological innovations that change the goals of development and form new landmarks for changes in the technological landscape. The rapid development of the Internet and digital technologies is causing a chain reaction to changes in the spheres of production, logistics, distribution, which leads to increased efficiency and productivity of the military economy of the state.

Material and methods

The scientific discourse on the expediency of the innovative direction of the development of the military sphere of states, in particular the United States, has been studied by many scientists such as: Anthony I., Ferdinando L., Kushlina V., Pankova L., Khvatov Y.

The methodological basis of the article was the modern provisions of the theory of innovation, methods of cognition, which are formed in the basic works of the theory of organizational behavior, the theory of competition.

The purpose of the article is to study the experience of the United States in achieving strategic development goals for world domination and national security through the use of innovative transformations to increase the competitiveness of the military and eliminate risks.

Results and discussion

One of the important indicators that characterize the general state and prospects of the military economy of the state is the amount of state allocations for defense R&D.

Defense R&D is a priority in the US strategy of global dominance. The main purpose of such a policy is to maintain and increase the technological advantage of the United States over all countries. Thus, in 1992-1996, the share of the United States was 65% of all funds allocated in the world for the development of R & D. Moreover, to a large extent, funding was provided from funds received from arms exports (Anthony I., 1998). This approach has enabled the US defense industry to build a strong foundation for modern leadership in the global arms market.

Over the last three decades, the world defense sector has undergone radical changes that have determined its current configuration, development algorithms and basic parameters. One of the main drivers of development was the movement towards an innovative economy.

U.S. military innovation is linked to the Department of Defense's offset strategies or offset strategies. Historically, three compensation strategies have been formed in the United States. The first strategy is related to the famous speech “New Look” (“New Look”) in 1954 by US President D. Eisenhower, which stated that the United States needs to strengthen its leadership in the nuclear field to oppose the Soviet Union in Europe. An important driver of innovative breakthroughs was the creation in 1958 at the US Department of Defense of the Department of Advanced Research and Development – Defense Advanced Research Project Agency (DARPA).

The agency was established to:

maintaining the technological superiority of the US military;

prevent the unexpected emergence of new technical means of armed struggle for the United States;

support for breakthrough research;

bridging the gap between basic and applied research and their implementation in the military sphere.

The main task of DARPA is to analyze and form a correspondence between combat missions and technological capabilities, including new combat concepts arising from the use of these technologies. The peculiarity of DARPA's activity in comparison with the programs of R&D and other military and university centers is the long-term prospects of possible implementation of discoveries and a significant level of risk of the Agency's projects. Research is conducted on an interdepartmental and interdisciplinary basis, is not limited by Pentagon regulations and regulations and is conceptual in nature – technological developments create new opportunities for both the armed forces and the civilian sphere.

The DARPA budget is less than 1% of national R&D appropriations and 4% of the US MoD research and development budget. DARPA does not have its own laboratories, but effectively uses a system of grants, contracts, and cooperative funding to conduct R&D in private companies and universities. For a constant flow of new ideas, DARPA's strategy is based on a fairly flexible management philosophy. Its main principle is the minimization of institutional interests. The focus is on new employees with a fresh perspective on important issues. They are hired for 4-6 years. During this period, new managers (employees) should, if necessary, refocus the work of their predecessors or suspend it. This makes it possible to implement very risky projects. The lack of its own equipment and laboratories helps to reduce overhead costs, which the Office aims to implement radical innovations.

Attempts to copy DARPA's schemes and methods even in the United States have failed. Experts say that the success of this agency can only be within the Ministry of Defense. Representatives of the Harvard Business School (GBS) see the phenomenon of DARPA in the following elements (Pankova L., 2016):

ambitious goals – either to solve real peace problems (like GPS) or to create new opportunities (like stealth technology).

Problems must be a challenge, a catalyst for science;

temporary project teams bringing together world-class industry and science experts. The intensity of research and the stipulated terms of work form a certain challenge for highly talented specialists;

independence – DARPA has high autonomy in the selection and implementation of the project. This makes it possible to take high risks, move quickly to the ultimate goal and attract talented researchers and experts.

The effectiveness and efficiency of DARPA is confirmed not only by the fact that it still operates. Moreover, the experience of this organization is actively adopted in the XXI century not only by other US agencies, but also used in all leading countries.

The formation of the second offset strategy dates back to the late 1970s, when after achieving nuclear parity between the two largest states (the Soviet Union and the United States) within the US military, measures were taken to restore deterrence in Europe through the development of high-precision weapons systems, stealth technology, GPS systems, reconnaissance satellites and communication satellites within the C4I systems (command, control, communications, computing and Intelligence), etc.

It was within this offset strategy that the first major innovation breakthrough in the United States was realized, which manifested itself not only in the creation of the above technologies, but also in organizational and managerial changes, which later ensured the formation of an effective and sustainable mechanism for innovation in the economy. It was at that time that the world's most powerful national innovation system (NIS) was created in the United States (Pankova L., 2019).

The need for the Third Offset was announced by US Secretary of Defense Chuck Hagel during the presidency of Barack Obama in November 2014. Its main goal was to strengthen the long-term military-technological advantages of the United States.

Experts see the reasons for the introduction of the third offset in the following (Pankova L., 2016):

reducing the US technology gap with other countries, especially in Asia, especially against the background of their rapid pace of technological progress;

development in the Russian Federation and the People's Republic of China of weapons systems for counteraction in the traditional spheres of US superiority (anti-ship, anti-space systems, cyber weapons, etc.);

the concern of US arms manufacturers about the declining level of R&D funding for new weapons and technologies;

according to many American experts, the third offset is designed to prevent confrontation with Russia and China. “The basis of this strategy is to develop new methods of warfare that will allow the United States to deter Russia and China so that they can never enter into armed conflict with the United States”;

the basis of the third offset will be based on the use of artificial intelligence systems, the use of autonomous weapons systems, the use of human-machine interaction in decision-making.

In all three offsets, US efforts were aimed at establishing a military-technological advantage over the USSR / Russia. However, in the implementation of the second offset, US efforts were focused on the possibility and necessity of overcoming competition from Japan in the field of high technology (especially electronics). And in the third offset efforts are aimed at deterring not only Russia but also China (Pankova L., 2016).

The third offset is the most difficult to analyze and research due, firstly, to the current challenges facing the United States and the world, namely: hybrid wars, asymmetric threats, growing uncertainty and unpredictability, and secondly, the tools that will achieve its purpose. Today, there is an active search for new forms of interaction between the military and civilian economies, military production uses business models such as “startups”, actively uses tools to digitize the economy and expands interaction with international partners.

Analyzing the US offset strategies, it can be noted that they are built on the principle of prejudice, and aim to maintain military-

technical, technological, geoeconomic and geopolitical leadership, which allowed the United States to maintain its leading position in innovation and technology, to be a world center. on the development and implementation of new digital solutions in the military and civilian sectors.

In the 2000s, the process of transformation of the military economy in the United States intensified significantly, as evidenced by the second innovation and military-innovation breakthrough in 2014 in the framework of the Defense Innovation Initiative DII (Defense Innovation Initiative). US Department of Defense experts characterize this stage by the growing participation of private capital in development, including military, as well as the use of commercial resources to address key military-technical issues, including the active development of a new cluster of dual technologies, especially in digital (Big Data, quantum computers), virtual reality, artificial intelligence, etc.).

R&D is the core of the concept of transformation of the US military economy, and their development is a necessary condition for achieving the goals of transformation. This means that "the transformation of the Ministry of Defense involves reforming its research capacity, which is particularly important for maintaining advantages over rivals. If the Department of Defense does not follow the path of technological change, fail to rapidly integrate new technologies, or maintain an appropriate R&D environment that encourages innovation, the United States risks losing its military capabilities. This means changes in approaches to the acquisition of new technologies and the use of advances in science and technology. It will also provide guaranteed and rapid access to commercial technology, which in turn will help establish "new links with new structures" (Defense Science Board. Defense Science and Technology).

The next key element of the transformation is to encourage the introduction of technologies from the commercial sector. The growing trend in the use of commercial technologies and the need to attract new industrial players to defense projects are both a driver and a consequence of the transformation of the defense sector.

Analyzing the results of US military-innovative development, we can conclude that it was based on two important factors – the consistent investment of large sums in R&D and radical changes in the structure of interaction between the military and civilian economies.

Financing of defense R&D. From 1958 (during the introduction of the first offset and the creation of the US Department of Defense DARPA, whose task was to ensure the US military-technological advantage in the long run) to 2015, defense R&D allocations increased in 2015 by 337% .in 1958 to $ 70 billion in 2015).

From the end of 1970 until 1989, i.e. during the implementation of the second offset, which resulted in the first innovative breakthrough, allocations for defense research increased by 97%. And although in the 1990s there was a decrease in allocations for research and development of defense (by 21% from 1990 to 2000), in absolute terms (in terms of prices in 2015) allocations for defense R & D increased from 38 billion $ in 1990 to 53 billion dollars. in 2000. Despite some reductions in appropriations, the overall linear trend is growing.

Since the 1960s, there has been a gradual increase in the share of private capital in the structure of R&D funding, which has now equaled budget allocations. The increase in private investment in research and development has contributed to the expansion of the scientific and technical base of civilian industries, and the relevant bills to accelerate innovation – the emergence of new tools for cooperation between military and civilian sectors of the economy. These are double technologies (double innovations), technology transfer, development of public-private partnership (PPP).

Double technologies (double innovations). The main coordinator of the development of the concept of dual technologies was the Ministry of Defense, which developed the first list of critical technologies (ITC) in 1989. In this list, dual-use technologies accounted for 75%. The US Department of Defense has funded the

development of the ITC for 10 years, allocating approximately $ 2.5 billion to $ 3.0 billion annually. Subsequently, similar lists began to be developed by the National Space Agency and the US Department of Commerce. All this gave impetus to innovative breakthroughs, contributed to the increase of cost efficiency through the multiplier effect of technology exchange between the subjects of innovation.

Public-private partnership (PPP). The US experience shows that in innovative development, along with effective scientific and technical and military-technical policy, effective regulatory framework, systematic and large cash inflows in development research, technology transfer, etc., it is important to form the mechanism of innovation processes. The United States has formed a strong network of interaction between all actors in the national innovation system and interaction among R&D performers and users of technological innovations, the main core of which has become PPP. PPP activation can be attributed to the introduction of the second offset.

PPP is becoming an increasingly important tool for improving the efficiency of economic activity and optimizing a complex set of production, organizational, managerial and other activities carried out in the creation and sale of defense products in industrialized countries (Pankova L., 2016). In the United States, DARPA played an active role in the development of the PPP concept. Today, the range of forms of PPP has significantly expanded: consortia, centers of excellence (Centers of excellence), cooperative agreements of various levels.

The state in the PPP, as a rule, determines the “rules of the game”, it is the customer, investor and executor. Its participation is manifested through the use of direct and indirect measures. The direct ones include R&D funding, R&D implementation through a system of laboratories, research centers, etc. Indirect ones include tax benefits, methods of antitrust regulation, and political lobbying for exports. The state order also plays an important role. PPP increases the resilience to various negative impacts on the innovation sphere and in the long run its role in the system of innovation and technological development will grow.

Increasingly, venture capital is being used within the PPP. An example is the In-Q-Tel venture fund, initiated by the US Central Intelligence Agency in the late 1990s. It invests public financial resources in private companies in the interests of achieving US technological advantage in information security, knowledge generation, physics, biology, and more. Examples of technologies developed by In-Q-Tel are portable power sources, microcameras, surveillance devices, digitization and data analysis programs.

Annually, the In-Q-Tel fund is replenished with resources amounting to almost $ 37 million. in order to finance the CIA. This allows you to make 12-15 portfolio investments in the company in the amount of 500 thousand dollars. up to $ 3 million According to analysts, the return on In-Q-Tel venture capital is about 26% per annum. All dividends and amounts received by the CIA are invested in new projects (Kushlina V., 2018).

Today, the US Defense Ministry is actively implementing and supporting the task of finding opportunities to increase the effectiveness of military innovation in order to expand the competitive advantages of the United States in the digitalization of the economy.

On a priority basis, research is carried out in the following promising scientific and technological areas:

adaptive management – creation of adaptive platforms (universal software platforms), multifunctional information systems and means of development and design;

defense technologies – fundamental physics, technologies based on new physical principles, materials science and biotechnology, medical and biological means of protection;

information technologies – information systems of monitoring and control, image recognition systems, cognitive systems of machine translation;

microsystem technologies – microelectronics, photonics, micromechanical systems, architecture of integrated circuits and distributed data storage algorithms;

tactical technologies – high-precision weapons systems, laser weapons, unmanned weapons based on air, space, ground and sea platforms, space monitoring and control systems;

strategic technologies – communication systems, means of protection of information networks, means of electronic warfare, systems of detection of masked targets on new physical principles, energy saving and alternative energy sources.

The introduction of new technologies in the defense sphere fundamentally changes the nature and tasks of the armed forces in the post-industrial world. The scientific and technological level of the American economy, significant financial resources, and an effective combination of academic and applied science with state-of-the-art management allow the United States to remain a world superpower and pursue its foreign policy and security objectives anywhere in the world.

Effective transformation (catching up modernization) of the national economy to a new technological system is possible under the following conditions:

the ability of the state to use and adapt to national needs an innovative model of economic development;

developed national market, institutional capacity of the economy to technological modernization;

favorable climate for investment and innovation capital of all forms of ownership and jurisdiction;

strategic state support of private capital in the innovation sphere;

determination of the guaranteed annual amount of budget funds for financing research in the field of critical technologies within the framework of the state defense order.

The importance and significance of the digital component of innovative development is actively growing. Digitalization, of course, will affect (and is beginning to affect quite radically) not only the development of information and communication technologies, but also the mechanisms of business processes (business relations) in the military-industrial complex, to improve the production base (primarily through 3D technology), as well as to increase the efficiency of modern and the emergence of new operational concepts, improving the quality of operational combat operations and their computer simulation, the radical changes in decision-making architecture. However, the results of the digitalization process, as well as the risks it carries, have not yet been calculated. It is worth noting that this process takes place in the context of a strong link between economic development and national and international security.

The new innovation-digital breakthrough today is preceded by the following factors:

in the coming years, the US government plans to increase spending on R&D.

activities on development of new technologies, including digital, among which it is necessary to allocate autonomy, robotics, artificial intelligence, quantum computers expand;

the US Department of Defense has organized activities similar to those in place during the implementation of the first innovation breakthrough, in particular, the Long-Term Research and Development Plan (LRRDP), modeled on a similar program for the implementation of the second offset strategy;

As part of the Defense Innovation Initiative (DII), a special Defense Innovation Unit Experimental (DIUx) was established in 2015, located in Silicon Valley to accelerate the delivery of critical commercial technology to the military. This unit should identify and fund the most promising startups, whose activities are aimed at supplying military products / components unavailable for one reason or another for traditional companies in the military sector, taking into account the model of their financing and high-tech commercial market (Ferdinando L., 2016).

Thus, the main condition for the implementation of the Defense Innovation Initiative is the improvement of the relationship between the military and civilian economy compared to the period of the first innovation breakthrough. This is primarily due to the development of the digital economy, which

makes it possible to create products important for the defense sector by high-tech companies that are not affiliated with the military and that are not part of the traditional cluster of companies that fulfill military orders.

Analysis of the transformation of the US military economy in the context of innovative development of both military and civilian economies showed that the creation of an effective mechanism was facilitated by the development of a working legislative and regulatory framework for innovation, which increased the link between military and civilian economies, active development of entrepreneurship and improvement of production base. But there are also weaknesses and threats, including a reduction in the technological gap with other countries, intensification of competition from foreign competitors, escalating threats in cybersecurity, lack of highly qualified engineering personnel, declining education (according to the US education index). 1st place shifted to 12th in 2019 (United Nations Development Program: Education Index 2019), deteriorating macroeconomic situation in the world.

Summarizing the above, the transformation in the US military-economic sphere is determined by:

intensification of the movement to the approach of military and civilian sectors of the economy;

expansion of cooperation and integration;

internationalization;

strengthening market relations in the military economy;

improvement of material and technical base for the creation of military products;

increasing attention to the processes of commercialization and diffusion of technologies;

strengthening public-private partnerships.

All this together increases the elasticity in the creation of modern weapon systems, increases cost-effectiveness and expands the possibilities of using the achievements of science for military purposes.

In general, it is clear that effective development in the XXI century is impossible without innovations, which have become a key factor in large-scale structural transformations and a key element of military-economic and political competition between countries.

Conclusions

Thus, the modern development and innovative activity of the US military economy is based on far-sighted military economic policy, a systematic approach to innovative changes in the military economy, creating stimulating and motivating conditions for the introduction of new methods and ways to achieve goals in the production of new products. US military and economic security. The paradigmatic transformations of the US military economy are due to changes in security guidelines and tools and correlate with the peculiarities of dynamic innovation and digital development.

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