TRENDS IN MILITARY SPENDING AND SHIFTS OF THE KEY PLAYERS IN THE GLOBAL SMART WEAPONS MARKET

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Abstract:
The widespread use of artificial intelligence in the military domain may have significant consequences not only for economic development and the specifics of the work activity of human society, but also for the global strategic balance. Thus, geopolitical actors of great and small weight in different regions cannot stay aside from the mentioned developments and strive to equip their military-political "arsenal" with weapons considered "smart" or to accumulate the necessary potential for their own development and production. In both cases, the increase in military spending is the primary factor that can contribute to the achieve of such goals. However, if in the first case it was a question of the acquisition of "smart" weapons, then in the second case, it is about the financing of scientific research activities in military domain. The research paper explores what policies different states have chosen to address the issues caused by these dilemmas, and how it has affected the economic development in these countries, solving defense and security problems, changing their geopolitical role and weight in the global security system.

Key words: artificial intelligence; defense industry; "smart weapons"; defense expenditures; economic development; sociotechnical imagination.

1.Introduction

The convergence of the improvement of weapons and military equipment with the trends of the rapid development of modern digital technologies, the "smart" arm race, already a reality for not only developed superpowers, but also relatively small states and regional actors, indicate that new means of influence on the adversary may appear in the near future, which in their characteristics will surpass existing models, changing the synergistic effectiveness of previous concepts of warfare. At the same time, it is obvious that the successes recorded in recent years, especially in the field of deep machine learning, as well as the unprecedented increase in the amount of available data necessary for analysis and self-learning have created significant prerequisites for widespread use of AI in the military domain, as well as for expending its application in other areas, which may have significant consequences not only for economic development and the specifics of the work activity of human society, but also for the *global strategic balance*.

As a wide-spectrum multiplier of military capabilities, artificial intelligence, in fact, in the modern world acts as a kind of substance of military power – such as electricity or radio communication – and not as a separate type of "weapon" [1]. It was the realization of the importance of this circumstance that has forced a large number of states to pay special attention to the development of AI, as well as to the production and acquisition of "smart" weapons. Moreover, in the conditions of the current world order, the superpowers (in particular, the USA, China, Russia) reserve a special place in their grand strategies for the importance of "strategic deterrence" of AI.

The trend can be described as an effort to position itself as a full-fledged participant in the global race for technological superiority, attempting to compete on this basis − that is, on the development in the field of AI − for economic, military, and geopolitical advantages. Today, these approaches are already part of broader national identity narratives of the superpowers interwoven

with more specific ideas of military "self-confidence" and pride, which serve the purpose of deterring an adversary in the long run [2].

Under such conditions, small states, as well as actors with large or small geopolitical weight in different regions, cannot remain aloof from the mentioned developments and seek to arm their military-political "arsenal" with weapons equipped with artificial intelligence technologies, or to accumulate the necessary potential for indigenous design and production of such weapons. In both cases, the increase in military spending is the primary factor that can contribute to the realization of such objectives. However, if in the first case we are talking about the acquisition of "smart" weapons, then in the second case, it is about the financing of military research and development. In this regard, especially in the case of small countries, a dilemma can arise in two different but related dimensions. Firstly, it is necessary to clearly assess and to record initially at the level of strategic guidelines for national security what is most important: to order and buy "smart" weapons from large private companies − mostly foreign − which, due to economies of scale, can provide relatively low prices or avoid dependence on them and direct military spending to the development of their own military applications? The stimulation of the "smart" technologies development in civilian sector can serve as an option for dilemma solution, given that the vector of innovative developments has shifted significantly in modern conditions, and today the effect of their distribution and further transfer to other domains begins with civilian industries. Indeed, new digital technologies are mainly developed in the civilian sector and only then they transferred to the military domain. Moreover, the financial resources allocated to scientific and technical developments in the civilian sector have come to significantly prevail over the spending allocated to research and development in the defense sector, as a result of which the defense sector becomes somewhat dependent on civilian (commercialized) developments in terms of certain technological developments [3]. However, the quandary of choosing direction of "smart" technologies development – civilian or military – may seem simple only at first sight. It is obvious that most military applications have important features both in terms of performance and reliability requirements for the tasks performed, and the characteristics of the processed data (infrared image recognition, data from radar stations, etc.), while applications developed for civilian sector may not meet these requirements and simply do not have the ability to adapt to the functions of military operational systems [4].

The main purpose if this paper is to study what kind of policy different countries have chosen to solve the problems caused by these dilemmas, and how it has affected economic development, defense and security issues in these countries, as well as changing their geopolitical positions, role and weight in the global security system.

2. The global "smart" weapons market and its key players

In scientific discourse, there is no universal definition of "smart weapons". Most often this concept refers to high-precision weapons equipped with computer-guided or self-guided munitions, radar, infrared, laser means of target designation, global positioning and satellite guidance systems, providing exceptional target engagement accuracy and reducing the probability of collateral damage (for example, to civilians) [5]. Moreover, the management and maintenance of such weapons are mainly provided by external operating systems, which may be geographically located quite far away. According to another approach, weapon systems equipped with artificial intelligence are considered "smart" [6]. In this study, the concept of "smart weapons" will be used in the latter sense, since in modern conditions artificial intelligence has become an important factor in improving the efficiency of computer-guided and self- designation weapon systems, without which these systems are no longer to be competitive in the market of high-precision weapons.

The world market of AI-powered smart weapons is currently described by an interesting trend that could previously only be observed during the implementation of nuclear programs by various superpowers, when even the hint that a particular state has the potential to produce such weapons increased the military and political weight of that state. It should also be noted that the United States and China avowedly declare that the interests of AI development are of a geopolitical nature [7], and the global competition in this area will unfold according to the logic of both "soft" and "hard" power. Russia, Great Britain, Japan, Australia, Germany, France, Israel, Taiwan, South Korea [1], Iran [8] and India [9] already have their permanent stall in this market. AI-augmented weapons are actually produced also by Italy, Norway, Singapore, Sweden, Turkey, even Poland (loitering munition) and Estonia (THeMIS unmanned ground vehicle by Milrem Robotics) [10].

As may be expected, a "smart" arms race between the main military and political rivals (USA, China, Russia) and, in this regard, a colossal increase in military spending (in USA, military spending increased 1.6 times during 2010-2021, in Russia – more than 3 times, and in China – 6.5 times) are fully justified by the national security strategies and other related strategic documents of these countries, emphasizing the importance of innovation in the area of AI development from the point of view of future strategic deterrence and ensuring the success of possible miliary operations. Back in 2017, China planned to invest up to $1.96 trillion by 2030 to promote innovation in the AI sector [11]. From 2017 to 2021, the US government doubled the annual financing of the development of cross-cutting military technologies − from 60.7 billion dollars to 117.2 billion dollars, that is, the average annual increase was 20% [12]. Even if this rate is maintained, it turns out that US investments in the development of military AI will be equivalent to Chinese investments by 2030. Russia's investments in the development of military AI are noticeably inferior to those of United States and China. Thus, in 2018, the Russian government allocated only $12.5 million for unclassified AI research and development, while investments in AI development in the private sector amounted to $500 million [13].

Nevertheless, more interesting for us is the participation of small states in the global "smart" weapons market. It is noteworthy that continued secrecy of the development of military AI technologies at the present time seems to have lost its relevance, and states hasten to declare their even unfinished − often untested − projects in order to be considered a participant in the "smart" arms race, thereby creating an image of a stronger opponent among geopolitical rivals.

Singapore is one of the countries that traditionally stands out for its large share of military spending in government expenditures. In 2000-2013, this country allocated almost 1/3 of budget expenditures to military spending, bringing them in some years (2007) to 40%. Starting from 2014, military expenditures did not decrease in absolute value, but their share in budget expenditures decreased noticeably, reaching 20-21%, and already in 2020 and 2021 reaching 11% and 15%, respectively. Upon the country' independence in 1966, only 3 engineers worked in the Ministry of Defense of Singapore, today the defense technology community includes more than 5,000 scientists and engineers, whose scientific achievements and developments address not only security issues, but also the challenges of development of the entire state, and now the transnational company ST Engineering is one of the largest players in the global "smart" weapons market, ranking 57th in the list of the 100 largest weapons manufacturers in the world. Singapore has drawn up an AI development plan for 2021-2025, through which it plans to allocate US$370 million for the development of the sector and an additional US$130 million for deployment of AI technologies in education and healthcare systems [14].

Israel is also one of those countries where military spending has always accounted for a large share of government spending. However, unlike Singapore, the Israel's military spending in absolute terms grew continuously in 2000-2021, with a relatively stable share of government spending in the

range of 13-15%, which also proves the effectiveness of military spending. And again, Israel is one of those states that, focusing on the development of scientific and technical potential, tuned it first the core of national security system, and then the development of the entire economy. The share of defense industry in Israel's economic growth reaches 4.6%, in exports – 7%; the 41% of all UAV traded in the world is sold by Israel. In 2021, a government-initiated study of AI infrastructure in Israel was conducted, the results of which served as a cue for authorities that Israel could lose its leading position in the world. In the direct aftermath, a new AI infrastructure development plan was established, envisaging to allocate 1.6 billion US dollars to ensure the advancement of AI domain over the next 5 years and one of the particularly important issues was the creation of supercomputers [15].

South Korea can also be conditionally considered as a small state with serious security problems. The share of military spending in total government expenditures of South Korea decreased from 14.5% to 10.5% over the period 2000-2021, while military spending has increased by about 2.5 times in absolute terms over the same period. In 2002, there were only two South Korean companies in the list of world's 100 largest companies in defense industry, and by 2021 there were already seven such companies. Today South Korea's robot density (or the number of robots per 10 000 employees) is seven times higher than the global average, surpassing even Japan [16]. Olympic Games in Pyongyang and initiatives to establish peaceful relations with North Korea prove that South Korea's geopolitical weight in the international arena has increased significantly, and military robotics and artificial intelligence have played an important role in this matter. To allocate larger financial resources for the development of AI sector − about 2 billion US dollars, South Korea started back in 2016. Already in 2022, the government decided to allocate another $6.15 billion for robotics and automation [17].

Taiwan is a small, semi-recognized state (only 14 countries have recognized its independence), but it accounts for 52% of global production of semiconductor chips, which are used in the production of AI technologies and which are historically exported to China and the United States. The Taiwanese National Chung-Shan Institute of Science and Technology, which is the headquarters research and development organization of the National Defense's Armaments Bureau of Taiwan, is the largest manufacturer of guided and self-guided missiles, fighters, aviation systems, that is now for almost five years has been ranked among the top 100 largest weapons manufacturers. For more than 20 years, military spending has consistently accounted for about 10% of government spending − and to about $10 billion in absolute terms. Nevertheless, in August 2022, Taiwan announced that it had nearly doubled its military budget until approximately $19 billion, with the main purpose of promoting domestic production of a number of advanced weapons [18]. It is obvious that against the backdrop of recent geopolitical developments (after Nancy Pelosi's visit), Taiwan's geopolitical role in the region and in the world has changed noticeably, and with the development of military AI technologies, Taiwan will strive to become a regional actor, independent of two superpowers [19].

Although the peculiarities of the policies of ***Turkey, Iran***, the ***UAE*** and ***Saudi Arabia*** on the development of military AI and positioning in the global market of "smart" weapons, as well as the realities of the redistribution of military spending in these countries, are also very interesting, we will evade these examples and turn to our neighbor ***Azerbaijan***.

Over 2000-2021, Azerbaijan increased its military spending tenfold: from $207 million to $2.6 billion. By creating the Ministry of Defense Industry in 2005, this country actually was able to create the defense industry almost from scratch. In 2009, the first simples of Azerbaijani weapons were exhibited at various international exhibitions, and in 2014, Azerbaijan already itself organized the ADEX international weapons exhibition, where it presented about 900 different military

products. In 2020, the range of military products that Azerbaijan presented at the exhibition has already exceeded 2,000 items [20]. After the 44-day war in 2020, the reconstruction of the Armed Forces of Azerbaijan was started on a large scale. Over the next two years, the growth rate of military spending exceeded 15%, and the share of military spending in total government spending increased from 11% to 14.5%.

According to Oxford Insights, Azerbaijan is in 67th place in ranking by 2021 index on Government AI Readiness, and lead the ranking in the region (Armenia is in 76th place). And this despite the fact that the development of a national strategy for the development of AI in Azerbaijan was designed only in 2022 on the initiative of the Ministry of Economy. At the same time, it should be noted that Azerbaijan, which has a habit of exaggerating its achievements in various fields, has not yet announced any project related to the application of AI in the military domain.

Instead, Azerbaijan actively advertises the fact that the 44-day war was, in fact, the first war where the advanced AI-powered weapons was used, without hiding the fact that it acquired loitering munitions and drone swarm technology from Israel and Turkey, respectively [21]. Close military and technical cooperation with the mentioned states, as well as information about the huge funds spent on modernizing the military sector, lead to the conclusion that Azerbaijan's need for "smart" weapons will also not suffer from a shortage of suppliers.

3. Concluding remarks for Armenia

The main hypothesis in the study was that various countries that are distinguished today by a developed defense industry (both relatively small ones: Israel, Singapore, North Korea, Taiwan, and larger states: India, Iran, Canada, France, Turkey) managed to redistribute military spending on the development of the high-tech sector, which, in turn, contributed to the creation of prerequisites for the production of "smart" weapons in these countries and the development of defense industry.

Still and all, is the optimal distribution and/or redistribution of military expenditures into high-tech production sufficient itself for any country (including Armenia) to have a high-tech defense industry? Definitely not. With this in mind, it is necessary to establish a clear communication structure between education, science, business, government and society. Sheila Jasanoff and Sang-Hyun Kim noticed a rather interesting trend in the formation of such an effective structure during technological evolution, on the basis of which they proposed the concept of the so-called "sociotechnical imagination" of society. *Sociotechnical imagination is collectively held, institutionally stabilized, and publicly performed vision of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology* [22]. That is, the desire to have high-tech defense industry must turned into a goal for the development of society and serve the vision of the collective future of society and general welfare codified in the concept of national security of the state.

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