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Nuclear weapons in an international security environment

Krzysztof ZAŁĘSKI

WSB University, Dąbrowa Górnicza, Poland; kzaleski@wsb.edu.pl, ORCID: 0000-0002-0245-5987

Abstract

Nuclear weapons are a historically acknowledged factor of security development and maintenance of the strategical balance. Therefore, in spite of programs preventing its proliferation, most states having such weapons modernize and develop their nuclear arsenals, perceiving it as a sign of power and a guarantee of security. The methodology employed in this article critical analysis and synthesis of reliable sources from the scope of the area of research. The nature of the article is explanatory with elements of inference. This paper presents an evaluation of circumstances inducing a state to possess nuclear weapons, in consideration of both the positive and negative consequences of their possession. In the author's view, studying this article should at least evoke a reflection on the development of nuclear weapons as a means of forming modern relations of security.

Keywords: nuclear weapons, legal restrictions of nuclear weapon use, modernization of the nuclear arsenal

1. Introduction

Although 70 years have passed since the first use of nuclear weapons, irrespective of the tragic consequences of this occurrence, they continue to play an important role in global politics. Moreover, there is a large group of states aspiring to possess them. North Korea – an insignificant totalitarian regime until quite recently – has become a political entity remaining in the center of attention of world powers: the United States, the Russian Federation, China, Japan and South Korea, because of its possession of a nuclear weapon. Although this state does not have much to offer, it drives a hard bargain. Its only expectations concern the price that the world is ready to pay for its denuclearization. The expectations are high. North Korea expects the lifting of political and economic sanctions and, consequently, the coverage of all costs of social and political-economic transformation of the state. In the hands of North Korea's leader, the nuclear weapon is the only bargaining tool, but a very strong one.

It is a kind of "trump card" about which partners may not know everything, but with which they have to reckon. Is it not an enticing prospect for other quarrelsome states? Iran perceives nuclear technology issues in a similar way, presenting a new attitude in this matter [1,2]. Today nobody doubts the fact that the possession of a nuclear weapon is a guarantee of security. It does not matter whether these guarantees may sometimes be "fragile". Here I will refer to the denuclearization of Ukraine. For the return of nuclear arsenals developed in the territory of Ukraine to the Russian Federation, the Budapest Memorandum having the force of a treaty was signed. It was supposed to guarantee the sovereignty and territorial integrity of Ukraine. It is worth noticing that in 2014, after its annexation of the Crimea, Russia refused consultation in this matter, and the signatories to the treaty did not show the determination expected by the Ukrainian party in spite of appeals by the Ukrainian Parliament. Thus, we can ask a question: what has been left of international guarantees?

Sadly, not much; the only available option is to make diplomatic attempts, but do they matter at all in the face of a real threat of using nuclear weapons being at the disposal of the endangered state? It is difficult to estimate what actions Russia would dare to undertake against Ukraine if it realized that its neighbor has a nuclear potential and is also driven to despair with the existing threat to its sovereignty. Only political speculations remain – there are no other examples indicating the conditions of possession and voluntary disposal of nuclear weapons and the impact of this act on further policy. However, the cases of North Korea and Iran are different from the situation of Ukraine, so there is no basis for considering them jointly.

The aim of this work is to analyze political and military relations with regard to nuclear weapons. In the course of studying materials, the author observed already at the beginning of the analysis that nuclear weapons have been an essential element of adopted policy, a component of military doctrines and strategies and, most of all, a strategic element of deterrence. Therefore, the natural consequence of the author's reflections was the adoption of selected research issues, including:

- 1) What is the place and role of nuclear weapons in doctrines of “nuclear” states?
- 2) How are nuclear weapons perceived in NATO's strategic conceptions?
- 3) What are international legal restrictions with regard to the use of nuclear weapons?
- 4) What nuclear weapon powers and devices are at the disposal of NATO states?
- 5) What role do nuclear weapons play in the doctrine of the Russian Federation?
- 6) Why do nuclear weapons remain so “attractive” that various states conduct research on their construction and development?

2. Nuclear policy in relations of international security

At the NATO summit in Prague in 2009, the President of the United States of America made this significant statement: “...we will reduce the role of nuclear weapons in our national security strategy, and urge others to do the same” (Zarychta S., 2016) [3]. The aim of these words was to suggest that the period of the perception of security in terms of possession of nuclear weapons was coming to an end. As one could assume, the world without nuclear weapons is a world free of all kinds of dangers arising from their very existence. When making this historical declaration, President Barack Obama may have had doubts about its likelihood himself, adding immediately that the implementation of this vision might take a few decades, but it is feasible. Unfortunately, this vision was an illusion – or maybe only a PR trick of the newly elected president aspiring for a Peace Nobel Prize?

The most important actors having nuclear weapons – mainly the Russian Federation, to which this statement primarily referred – treated it as an act of political naivety used against the new president as well as the United States. Ten

years have passed, and little has changed in the nuclear policy of NATO, the United States and the Russian Federation. As during the Cold War period, it is again used as a political deterrent and for the reinforcement of diplomatic efforts in international relations. Is a new arms race beginning to form? Probably yes – at least many military analysts think so. This is confirmed by the unilateral suspension of the INF treaty by the United States since February 2nd, 2019; as a consequence, Russia did the same. This means the beginning of the end of the treaty establishing the international control of the proliferation of nuclear weapons deployed on intermediate-range ballistic missiles (500–5,500 km) in Europe [4].

In his address to both houses of the Russian parliament in January 2018, Vladimir Putin used the words that leave no doubt any more: “Russia has started an active phase of testing a new intercontinental Sarmat ballistic rocket [5]. The new missile is to replace Voivode – currently the most powerful Russian intercontinental ballistic missile.” Putin stated that Russia would take further steps in response to the growth of the American anti-rocket defense system. This did not escape the attention of NATO's leaders. At his meeting with the President of Poland Andrzej Duda, Jens Stoltenberg stated that Russia is ready and wants to use force to change borders within Europe. In the arms race that has already started, Russia seems to be winning. In response to any kind of presence – even a symbolic one – of NATO forces in Baltic states and Central & Eastern Europe, Russia builds strike forces close to the external borders of the Alliance. In spite of the apparent political dialogue (John Kerry's talks with Sergei Lavrov and Vladimir Putin), security relations have not been so tense since the mid-1980s. In the military rhetoric of the Russian Federation, the NATO states and the United States have become a “very probable opponent”. It seemed that after the Cuban crisis in 1962, when the real threat of a nuclear conflict existed, the world came to its senses and that ‘nuclear states are not at war with one another’. Did that really happen? No. The nuclear threat is still very real. Having joined a group of states with a nuclear potential, North Korea does not intend to resign from exposing its power due to the possession of nuclear weapons. As the leader of North Korea, Kim Dzong Un, has recently remarked that his state will use nuclear weapons against the United States (or any other enemy) only for the defense of its own territory [6]. Thus, contrary to what President Obama envisaged a few years ago, the world without nuclear weapons does not exist.

An assumption was made that the security environment in Europe and around the world underwent serious modification after the end of World War II, becoming divided into two opposite political-military blocs that used their nuclear potential for deterrence and for exerting a political impact on each other. As a consequence of this, nuclear weapons began to be perceived as an effective guarantee of security. The weapons that additionally increase the importance of a state on the international arena constitute a sort of insurance policy in case of a higher threat, particularly for states with an average or small military potential. This is how North Korea treats nuclear weapons (‘others have to reckon with me while

I have them'). Therefore, there is still little progress in nuclear disarmament issues. Apart from the failure to "stop" the process itself, we can also observe the expansion of nuclear potentials, particularly in Asian states. For this reason, the remaining challenge is to suppress the proliferation of mass destruction weapons and nuclear terrorism and to guide the nuclear deterrence strategy towards challenges and threats, including asymmetric and hybrid actions.

3. Legal conditions of the use of nuclear weapons

As has already been noticed, nuclear weapons are a guarantee of security; and, on the one hand, an indicator of the position of a state on the international arena, while on the other hand, a serious threat to security. How can we reconcile these confrontational theses? What is bigger: the threat, or the sense of security? The world came to know the consequences of the use of nuclear weapons after the United States had launched attacks on two Japanese cities: Hiroshima and Nagasaki in 1945. These accidents did not stop the nuclearization of the world; just the opposite, they stimulated this process, leading to a global arms race in this field. This is reflected by the number of states in possession of nuclear weapons; there are also many states whose ambition or even dream is to have their own nuclear weapons. The nuclear non-proliferation policy proves ineffective, too. North Korea has acquired such weapons in the eyes of the global public opinion, thereby permanently destabilizing the strategic situation in the Far East region. In the light of international law, the activity of states in the field of nuclear weapons should mainly consist in:

- maintaining the permanent supervision of the nuclear arsenal being kept, without the right to transfer weapons or devices used for their production;
- monitoring nuclear policy, e.g., by restricting attempts of non-nuclear states to acquire nuclear weapons;
- undertaking negotiations with a view to limiting the nuclear arms race until total disarmament under international control;
- producing nuclear energy only for peace purposes.

The proliferation of nuclear weapons is theoretically favored by the existing international legal state. There are no legal limitations imposed on the research, development or modernization of nuclear warheads being held. In general, the nuclear non-proliferation treaty divides states into two groups: nuclear and non-nuclear states. This allows policy-makers to employ the idea that there is a certain group of privileged states – "nuclear" states – that possess nuclear weapons lawfully and the remaining states that do not have such weapons. Is it the right distinction? No – it would be more appropriate to divide states according to their technological capacities. Otherwise, according to the aforementioned treaty, only the USA, Russia, Great Britain, France and China would be lawful nuclear powers. States like India, Pakistan or Israel would not be among them, because they are not a party to the adopted Treaty; the same goes for states such as North Korea (which withdrew in 2003) and South Africa,

which acceded to the treaty in 1992 and destroyed its nuclear arsenals (Bryła J., 2006). Nuclearly subthreshold countries, if such a term can be used, include the states standing at the border of nuclear technologies opening the road to their production. These states include Argentina, Australia, Belgium, Brazil, Germany, Italy, Japan, Netherlands, New Zealand, Sweden, Switzerland, Taiwan, and many other states, such as Algeria or South Korea.

In the course of further reflections on the legality of possession of nuclear weapons, it would be possible to conclude that since the aforementioned states hold their nuclear weapons lawfully, why would they not be entitled to use them in certain situations? This type of rhetoric is used, for example, in the defensive doctrine of the Russian Federation, which reserves the right to use nuclear weapons in the case of a threat to its national interests. This gives rise to the question: what circumstances could allow the Russian Federation to use nuclear weapons? There is an ongoing dispute in this field on the basis of doctrines of international law. This issue is settled to a certain extent by an opinion issued by the International Court of Justice (ICJ) [7] in 1996 in connection with a question asked by the General Assembly of the United Nations: Is the threat or use of nuclear weapons in any circumstance permitted under international law? The ICJ replied that there was no clear prohibition or norm in international law that would allow or strictly ban the use of nuclear weapons or a threat of such use. Opposite views on that subject were presented, for example, by Professor Remigiusz Bierzanek, who argued that since the possibilities of using suffocating or similar gases are forbidden, this very fact is a sufficient basis for assuming that it would be unreasonable to think that each new weapon will be prohibited only when a special convention is concluded (Bierzanek R., 1982). This matter had also been examined by the United Nations General Assembly, which even adopted the relevant resolution 1653/XVI questioning the legality of the use of nuclear weapons in 1961. However, it was not adopted unanimously. The main nuclear states, such as France, Great Britain and the United States, voted against it (Góralczyk W. Sawicki S., 2009). This gave rise to the legal situation of substantive indeterminacy. Thus, it is assumed that, in the light of the ICJ's opinion, every use of nuclear weapons, or only a threat of using them, will be prohibited if the following rules are violated:

- 1) the principle of humanitarianism resulting from the 4th Hague Convention of 1907 – it must be followed by all fighting parties under the law;
- 2) combating only against the enemy's armed forces so that the effects of the use of nuclear weapons would not be harmful to civilians;
- 3) the complete prohibition to attack undefended or non-military objects; this is required under Article 27 of the Hague Convention imposing the obligation to save, as far as possible, temples, hospitals, schools, etc., which is difficult when nuclear weapons are used (Journal of Laws, 1927);
- 4) using combat measures causing the excessive suffering of population is not allowed, and the use of nuclear weapons certainly leads to such consequences;

- 5) the consequences of the war must not affect neutral states, and nuclear weapons do not guarantee that the consequences of their use will not affect states that are not engaged in the conflict;
- 6) the principle of proportionality that applies in the decision-making process, including the choice of objects in compliance with the principle “human cost – military effect”;
- 7) the obligation to refrain from the use of threat or force against the territorial whole or independence of any state (Journal of Laws, 1947.23.90).

The first six principles were derived directly from the international humanitarian law of armed conflicts, which means that they apply to all parties to the conflict. Nevertheless, there may be a factual state that will “justify”, or rather constitute an extraordinary circumstance, e.g., a threat to the existence of the state concerned that will force them by means of circumstances to exercise the right to self-defense using all available means, theoretically going “as far as” the use of nuclear weapons. It is worth adding that the right to self-defense arises directly from Article 51 of the Charter of the United Nations, which applies both to individual and collective self-defense. This provision allows or rather enables the defense of a state not having nuclear weapons by states that have such weapons. These are the premises on which NATO’s nuclear policy is based.

4. Nuclear weapons vs. the sense of collective security

Nuclear weapons have exerted a huge impact on the character of international relations. Firstly, they brought World War II in Asia to an end; secondly, they guaranteed security to Western European states during the Cold War period. This is why so many states have attempted to possess them, perceiving their arsenal as a cheap military means – cheaper than the expansion of conventional forces, to obtain a comparable level of deterrence and the potential consequences of destruction.

During World War II, both Nazi Germany and the United States did intensive research on the construction of a nuclear bomb. There was a peculiar race against time that led the United States to construct the world’s first nuclear bomb under the Manhattan program. It was successfully tested on July 16th, 1945, but used against Japan shortly afterwards on August 6th, when Hiroshima was bombed; three days later, on August 9th, the same happened to Nagasaki. One can wonder whether two attacks were necessary, whether these attacks had a military character, or rather they were a political demonstration of power aimed at intimidating the Soviet Union. We can also speculate what would have happened if the Germans had been the first to build a nuclear weapon? Obviously, we can assume with a high degree of likelihood that they would have used this weapon against the allies or the USSR in the last phase of the war. The only open question would be the choice of attack targets that would produce a comparable or certainly even bigger shock that would force the allies to negotiate.

The nuclear bombs dropped on Japanese cities confirmed their destructive power. Thus, they became an object of desire, which triggered a series of nuclear programs in various states. The most advanced party in this race was the Soviet Union, which carried out the first successful nuclear test in 1949. In this way, it became the second nuclear state in the world. The “nuclear states’ club” was joined by Great Britain in 1952 and by France in 1960. In 1964, China joined this group. In the course of further work on the development of nuclear weapons, a thermonuclear (hydrogen) weapon was designed in 1952; subsequently, a neutron weapon was constructed in 1962. Thus, the nuclear industry started in full swing. Attempts were made to reduce the weight and dimension of nuclear bombs so that they could be carried by strategic bomber aircraft. Intensive work were conducted to miniaturize nuclear warheads so that they could be mounted in ballistic missiles, mines and crumps. This process was never stopped.

5. NATO’s nuclear policy

The arms race that started in the 1960s was one of the main elements of the Cold War. Armament programs were developed with a view to the production of intercontinental missiles, land-based and marine-based ballistic missiles and tactical missiles. Also, the deployment of American tactical nuclear weapons in Europe started. These actions were aimed at the potential use of nuclear weapons during a subsequent global conflict, if any. Nuclear weapons were also supposed to improve the security of the United States and NATO’s allied countries.

The huge destructive power of nuclear weapons and the rapid development of war technology led to changes in the military strategy, tactics and organization of forces. Views of the character of the future war changed essentially, too. It is, however, worth noticing that the growing popularity of nuclear weapons did not suppress the role of land troops and conventional weapons. There were opinions that nuclear weapons themselves might not decide the course of war themselves. At the end of the day, it was assumed that conventional armed forces were necessary to vanquish the enemy completely and to gain control of its territory. Therefore, nuclear weapons were perceived only in combination with the use of conventional forces (air, marine and land forces).

In the 1960s, the “balance of fear” arose between the USA and the USSR, based on the balanced nuclear potential, which meant that nuclear weapons became the main means of deterrence. The negative consequence of this balance was the continuous arms race, which led to the development of new forces and means within the scope of new strategic conceptions being introduced. Obviously, nuclear weapons and means of carrying them played a fundamental role. This was reflected by the formulation of the deterrence strategy, which was based on simple principles that made it necessary to create an appropriate nuclear arsenal that would be equal to or preferably stronger than the enemy’s potential. The nuclear arsenal of a state did not only reinforce

its position as a superpower on the international arena and create a security policy, but could also destroy the enemy with its nuclear strength. During that period, military strategists realized that the advantage in having nuclear weapons was slowly losing its importance and that the United States' advantage in this respect and in the maintenance of international security would decrease because the USSR slowly but effectively balanced its potential with the USA's nuclear potential. Nuclear weapons were believed to be a necessary element of levelling the advantage of the Warsaw Pact in conventional armed forces and types of armament.

The 1970s brought a temporary detente in relations between the USA and the USSR, which resulted in an attempt to build means of trust aimed at creating an effective international security system. In 1968, the Nuclear Non-Proliferation Treaty (NPT) was signed, being a milestone in building mutual trust and obliging signatory states to refrain from transferring nuclear weapons and from helping other states to obtain them. In the subsequent years, bilateral talks were continued, resulting in the conclusion of important international treaties concerning the control, restriction and reduction of strategic armaments. The Conference on Security and Co-operation in Europe in 1973 and the adoption of the Helsinki Final Act on August 1st, 1975 were the signs of this detente.

As a result of the disintegration of the bipolar system, the likelihood of a large-scale military conflict with the use of nuclear weapons decreased considerably at the beginning of the 1990s. However, the states did not resign from the expansion of their nuclear arsenals. After the end of the Cold War, the role of nuclear weapons as a means of deterrence ceased to match the new reality. Previously, both the United States and the USSR had treated nuclear weapons as a special opportunity to gain global dominance. The United States also perceived nuclear weapons as a counterbalance for Soviet conventional forces deployed in Eastern European countries and as a means of suppressing its expansionist plans. Over many years, the security and war strategy of Western states was based mainly on the deterring role of nuclear weapons and the possibility of using them. However, it was assumed that every attempt to use nuclear weapons would immediately result in retaliatory action. It would lead to a total unlimited long-term nuclear war that, apart from terrible destructions on both sides of the conflict, would bring annihilation to millions of lives. Of course, there was a question who would win this war? The winner's losses in the nuclear war might prove so huge that the benefits of this victory would be questionable. It was asked whether the use of nuclear weapons was the only means of achieving the goal, because none of the goals of the war seemed important enough to risk the destruction of the population and the ruin of one's own country.

6. Resources and modernization of nuclear weapons

The countries that have nuclear weapons are intensively modernizing their arsenals. In the current geopolitical reality, it is difficult to imagine the possibility of their reduction. In

other words, the vision of the world without nuclear weapons is practically vanishing. The success of the 1990s – the time of successful implementation of disarmament programs of the United States and Russia that led to the reduction of the number of strategic warheads (Start I and II) and the tactical reduction of nuclear weapons in Europe – is unlikely to occur again. These actions encompassed also French and British nuclear potentials. After the collapse of the Soviet Union, Ukraine, Belarus and Kazakhstan voluntarily resigned from the possession of nuclear weapons. South Africa's nuclear program came to an end, too, and the nuclear potential was liquidated.

We can assume that the successful disarmament gave a significant impulse to American and Russian leaders to formulate political declarations on the possibility of withdrawing nuclear weapons completely as a thing of the past – a sort of relic left after the Cold War period that did not match the contemporary geopolitical reality. Successful disarmaments took place in Europe. On the other hand, a nuclear arms race began in the Far East in 1998. In 2003, North Korea withdrew from the nuclear non-proliferation treaty. At the same time, Iran continued its work on nuclear weapons, too. This made it difficult to work on global disarmament. The United States was not blameless, either – in 2001, it unilaterally withdrew from the treaty on the limitation of antiballistic systems. During this politically difficult time, a vision of the world without nuclear weapons appeared. It was presented by Barack Obama first in Berlin in July 2008, and then in Prague in April 2009 during the celebration of the 60th anniversary of NATO. It is estimated that these plans were one of the main reasons for which Barack Obama, already as President of the USA, received a Peace Nobel Prize. This changed his negotiating position and helped finalize talks concerning the New Start treaty concluded with Russia in Prague in April 2010. The treaty limited the number of strategic nuclear warheads to 1,550 on each side. That was generally the end of successful disarmament actions. The negotiations concerning the reduction of tactical missiles were not even undertaken. The main reason was the lack of interest on the part of Russia. In spite of Russia's reserved reaction to further nuclear disarmament, the United States independently withdrew Tomahawk missiles armed with nuclear warheads from service, thus depriving its navy of tactical nuclear weapons. The President of the United States unilaterally announced the further reduction of the number of strategic warheads to 1,000–1,100 by 2023. These plans were confirmed in the Nuclear Weapons Employment Strategy prepared in 2013. What has been left of it? Not much. All states having nuclear weapons at their disposal invest in their modernization and the modernization of means of their delivery. None of the nuclear powers, excluding the United States, is announcing the reduction of these weapons.

The advanced plans of the expansion of the United States' nuclear potential encompass the air force in the first place. A new LRS-B (Long Range Strategic Bomber) is going to be put into service around 2024; in further years, it will successively replace B-52H and B-1B models. Altogether, the

introduction of around 80–100 aircrafts is planned [8]. The new machines can optionally be unmanned. This may stir a discussion on the possibility of arming unmanned aircraft with nuclear weapons. The Americans are also conducting studies on a new category of ballistic missiles. The new missiles would enter into service in stationary and mobile versions (intended, among others, for submarines) at the end of the third decade. The plans include also the expansion of ballistic missile defense, because the existing system is not capable of resisting an all-out nuclear attack, which the American government openly admits.

The United States’ nuclear disarmament policy is confronted with growing nuclear weapon expenses in China and, primarily, the Russian Federation, whose armament budget is approaching 14% of the GNP. In this situation, the USA is not likely to make another disarmament step. According to the arrangements of the New Start treaty, the United States will reduce its potential to the assumed level of 1,550 warheads by 2018. The experts say that, as a consequence of this, the United States has lost their advantage in the number of strategic nuclear warheads being held for the first time in many years. Russia’s arsenal has been a few times bigger than the American one for a long time. The American arsenal consists mainly of B-61 nuclear aircraft missiles modernized to the standard of a precision missile. Thus, the United States focuses on quality rather than quantity. Fifth-generation combat aircrafts (F-35) designed with the use of stealth technology are being prepared for the role of carrier vehicles; it is assumed that they would be ready to carry out nuclear strikes around 2024. The modernized B-61 missiles will also probably be made available to the European members of NATO under the Nuclear Sharing program.

Intensive armaments are also carried on by the Russian Federation, which plans to restore the production of Tu-160 strategic bombers in a new version; it has also started work on a new PAK-DA bomber that will be equipped with cruise missiles with hypersonic propulsion. The modernization of missile forces is in progress. New RS-24 Jars and RS-26 Rubezh systems are being entered into service. At the same time, work is continued on a new heavy RS-28 Sarmat missile weighing over 100 tons [12]. The new missile that will enter into service in the third decade of the 21st century will be capable of carrying up to 15 warheads and flying over the South Pole, thus making it possible to attack the USA from the direction at which it does not have elaborate missile defense systems at its disposal. After 2030, the Russian Navy is planning to enter into service fifth-generation submarines armed with RSM-26 Bulava missiles (the marine version of Topol-M missiles).

Russia does not neglect tactical nuclear weapons, either. It does not even hesitate to violate the INF Treaty of 1987 on the Elimination of Intermediate-Range and Shorter-Range Missiles [9]. Russia does this by deploying Kalibr-NK cruise missiles in the Kaliningrad region and the Caspian Sea region with a reach exceeding even 2,500 km and Iskander-K missiles with a R-500 cruise missile with a range of around 2,000 km. Apart from Kalibr-NK missiles capable of carrying

nuclear weapons that were used during the Syrian War, the Russian Navy is also working on P-900 Alfa anti-ship missiles. The container version of these missiles that can be deployed, e.g., on civil ships is being tested. If these plans are confirmed, that would be a real curiosity. At that moment, it seems that we should begin to wonder whether Russian tactical nuclear weapons are merely a scarecrow or a real threat to NATO?

Similar plans are being made by the People’s Republic of China, which has the world’s third nuclear arsenal at its disposal. The only difference is that the modernization of China’s nuclear potential is conducted in a more secret way. The most important Chinese development program is DF-41 ballistic missiles with a range of around 15,000 km. They are armed with a thermonuclear warhead with a power of 1 Mt or up to 10 MIRV (Multiple Independently Targetable Reentry Vehicle) warheads, or independently targetable warheads with an adjustable explosion power ranging from 20 to 250 kt. The Chinese air force plans to enter into service a new-generation Xian H-20 strategic bomber around 2025. According to unconfirmed available information, it can be an equivalent of the American B-2 vehicle. The navy is also being modernized; in the next few years, it plans to introduce second-generation ballistic missiles with a range up to 8,000 km capable of carrying a single nuclear warhead or 3-4 MIRV warheads. New submarines to be introduced will be equipped with eight missiles of this kind. China is also working on new-generation missiles for land troops. They are to be characterized by lower radar cross-section and a range of up to 4,000 km.

Table 1. Nuclear potential of various states around the world (as on July 2017)

No.	State	First test	Deployed warheads*	Other warheads**	Total
1.	USA	1945	1800	5000	6800
2.	Russian Federation	1949	1950	5050	7000
3.	United Kingdom	1952	120	95	215
4.	France	1960	280	20	300
5.	China	1964		270	270
6.	India	1974		120–130	120–130
7.	Pakistan	1998		130–140	130–140
8.	Israel			80	80
9.	North Korea	2006		10–20	10–20
Total			4150	10785	14935

* Deployed warheads are those mounted on missiles or located in bases of operational forces.

** Other warheads are those being stored, withdrawn or awaiting disassembly.

Source: own work based on SIPRI Fact Sheet, Trends in world nuclear forces, 2017 [13].

In a group of states having nuclear capacities, it is worth focusing on North Korea, which is working very intensively on intermediate-range and long-range ballistic missiles. The technology of construction of intermediate-range ballistic missile is probably based on missiles using the Soviet technology of the 1960s that are capable of hitting targets at a distance of up to 4,000 km.

According to the propaganda of Kim Dzong Un's regime, this country already has the missiles capable of hitting targets in the USA. This does not seem very probable, at least for the time being, but after the successful tests of Hawasong 15 missiles in 2017, this vision may soon prove quite real [10]. Can further nuclear powers arise? If North Korea can, others can do the same, too. Therefore, we can assume with full certainty that the group of nine existing nuclear powers will soon increase.

In 2015, the international community managed to conclude a nuclear treaty with Iran, which agreed to suspend its nuclear weapon construction program in return for the annulment of sanctions. For the time being, we do not see any other countries that would intend to develop nuclear technology at all costs. It must be noticed, however, that this is a consequence of political actions rather than technological barriers. For many countries, such as Germany, Japan, South Korea or Australia, building their own nuclear bomb is a question of maybe a few months, should they desire to have one. Therefore, the illusion of the world without nuclear weapons still remains an illusion (Nuclear forces – table).

7. Polish nuclear experiences

Poland has never pursued any deliberate independent nuclear policy. Our interest in nuclear weapons was a consequence of international alliances. In the second part of the 1950s, the Soviet Union made the results of ongoing nuclear research available to Poland. At a scientific conference held in the Academy of the General Staff of the Polish Armed Forces in November 1954, the commanding staff of the armed forces, including the military air force, was informed about plans to equip NATO's air force with nuclear weapons, which seemed to require the air force of the Warsaw Pact to have such weapons, too. This is how our national experience with nuclear weapons began. The need to adapt military aircraft to the possibility of equipping them with nuclear weapons resulted in a change of requirements for bomber aircraft, indicating that their adaptation to the role of "nuclear weapon carriers" will require the capacity to operate at a height of over 12,000 m and that they should have the biggest possible range and the capacity to operate in weather conditions of any kind. Therefore, new aircraft designs were necessary.

The first aircraft of the Polish military air force with a capacity to carry a nuclear bomb was Ilyushin Il-28 – a subsonic turbojet-powered bomber delivered to Poland in 1952. This aircraft, along with MiG-15 turbojet-powered fighters delivered at the same time, can be regarded as "the first major technical revolution". It is worth adding that Il-28 was quite a modern bomber at that time – it could take a bomb weighing

between 1,000 kg and 3,000 kg (with a limited quantity of carried fuel). The most important combat load for this aircraft was nuclear bombs, commonly called special bombs. A typical nuclear bomb for this aircraft was a RDS-4 Tatyana bomb with a power of 30 kt and a weight of 1,200 kg (Suvorov W., 2013).

Tatyana was a standard special bomb of the Soviet air force. In the 1950s, it was produced in a quantity of maximum 20 pcs per annum. This bomb was suspended on a special reinforcement beam in the bomb bay in the fuselage of the Il-28 aircraft. The bomb was dropped from a horizontal flight. Bomb drop training was conducted using the IAB-3000 (Imitacjonnaja Awiacjonnaja Bomba) imitation device, which could be used for training ground handling personnel and flying personnel. The explosion of the imitation device perfectly resembled the explosion of a nuclear bomb, imitating also a kind of "nuclear mushroom cloud". The tactic of nuclear bomb drop training was interesting. As Jakub Marszałkiewicz indicates, the Soviet tactic of using Il-28 bombers was implemented in theory for the Polish air force, too (Marszałkiewicz J., 2016). The special bomb carrier was protected by an Il-28 aircraft squadron force, mainly for the purpose of hiding it in a group of aircraft, and by a force of 4–6 electronic warfare aircraft and, as far as possible, also by fighter cover aircraft.

Altogether, a combat formation flew over its own territory at a height of 10,000 m, mainly due to the lower consumption of fuel. The flight profile provided above was still maintained over the territory of Poland, up to the borders of detection of the enemy's advanced radar stations. At this border, the formation "went" downwards, theoretically under the zone of detection of NATO radar stations, performing masking manoeuvres – primarily the repeated separation of the striking group and the departure of a part of the force in the eastern direction. This would suggest a change of plans, i.e., the "pacification" of the enemy's air defense. Similar manoeuvres were used for crossing the borders of development of the enemy's air defense means, mainly Nike Hercules and Hawk missiles. After crossing the air defense borders, the carrier aircraft, using a profile flight below 1,000 m, approached the target; in the final stretch, it rapidly gained height, adjusted navigation and bombing data and dropped the special bomb.

After the drop, the aircraft returned and, lowering its flight, flew away from the bombing place. In order to increase the range of impact, "refueling" airports were created in Poland and East Germany. The theoretical use of these airports was to ensure a broader range of combat impact up to the borders of the English Channel. However, the chances of crews' return after completing a special mission were slight. Therefore, the selection of personnel for these tasks was very careful; preferred candidates were single officers who did not have a family abroad and, primarily, ideologically committed persons – fervent party members. In subsequent years, along with deliveries of successive new aircraft, the training system with special bomb imitation devices (IAB-500) covered a majority of air regiment personnel who systematically performed special drops at Polish and Soviet firing grounds.

In the 1960s, the Air Force Institute of Technology in Warsaw designed a Polish nuclear bomb imitation device

in co-operation with domestic research centers, particularly with the Military Institute of Engineering Technology from Wrocław. The body of the imitation device was made of epoxide laminate, whereas the detonation load was made of 200 kg of TNT and 500 kg of soot. Like the Tatiana special bomb, the imitation device was suspended in the bomb bay of the Il-28 aircraft. The first exercise drops from an Il-28 aircraft were performed in the Bay of Puck. Grzegorz Skowroński indicates that on the day of these tests, in spite of maintaining full secrecy, the beaches were filled with crowds of curious people who somehow gained knowledge about the drop of a “nuclear bomb”. Interestingly, there were no protests – nobody was afraid of destructive agents. The only intriguing fact was how quickly the news about one of the biggest military secrets of that time reached society (Skowroński G., 2004). It is also worth stressing that all successive models of modern combat aircraft were adapted to the carriage of nuclear weapons. This referred to MiG-21, Su-7, Su-20, Su-22, MiG-23, Su-22 and theoretically MiG-29 aircraft. The Russians tried to persuade Poles into buying intermediate-range bombers – Tu-16 Tupolev vehicles, but these purchases never materialized due to the costs of purchase and future operation. In the 1960s, R-70 and R-300 tactical and operational missiles adapted to the carriage of nuclear weapons were purchased.

In Soviet bases located in Poland, at least 300 special bombs and missiles with nuclear warheads were kept until the 1990s. These weapons were withdrawn in 1989, at the stage of the Round Table negotiations. The problems of storage of nuclear weapons in Poland are described in various sources – among others, by Tadeusz Szulc (Szulc T., Nicpoń K., 2007). In the Cold War period, according to the strategy of the Warsaw Pact, nuclear weapons were used mainly as a means of fire impact for fighting against mobile targets, primarily march columns of armored troops and enemy forces in the grouping areas, as well as command posts, communication centers, airports, landing grounds, etc. The primary target of a nuclear air attack was to be a tank battalion column (losses of 60–70%, i.e., 2/3 of existing forces). For the destruction of such a target, the use of a bomb with a power of around 50 kt was planned. Nuclear weapons served also as a means of increasing the pace of operation. The use of nuclear weapons theoretically allowed troops to develop an offensive operation, for example in the north-coastal direction, to a depth of 500–600 km, in a stretch of 200–250 km, while maintaining the offensive pace of 60–80 km per day. The spatial breadth and pace of the operation performed with the use of classic warfare agents was twice as small.

Currently, the Polish Armed Forces do not pursue an active nuclear policy, although it is said or rather speculated that Poland might return to the game under the Nuclear Sharing program. According to the data of Defence24.pl, five NATO states made an active use of this program in 2015, including: Italy, Turkey, Germany, Belgium and Netherlands, equipped with F-16 and Tornado nuclear bomb carrier aircraft. These vehicles are adapted to the carriage of American special B61 air bombs. In the future, F-35 aircraft should also be adapted

to this role, and Poland may be their beneficiary, too. The idea of incorporating Poland into this program is a consequence of the growing threat from the Russian Federation. Therefore, if Poland joined the Nuclear Sharing program, this would mean a rapid growth of security for us, which is also organizationally parallel to the planned withdrawal of Germany from this agreement, mainly due to the withdrawal of Tornado IDS aircraft and the lack of plans to adapt Eurofighter vehicles to the new role. The potential change of policy towards Poland may also be probable thanks to improving political relations with the United States and the stable and expanding engagement of the United States in Poland and in the Central & Eastern European region in general.

It is also worth noting another fact, which is well known: the Polish nuclear program was started as early as the 1970s, during Edward Gierek’s rule. Was it real? It is difficult to tell – there are many doubts about this, and many people treat this as a sort of sensation that causes a more or less heated discussion in the media, particularly the local ones. The leading person in the nuclear weapon acquisition program was Brigadier General Professor Sylwester Kaliski (1925–1978) – the commander-rector of the Military University of Technology, a graduate of the Faculty of Civil Engineering of the Gdańsk University of Technology. In 1973, he performed a controlled thermonuclear microsynthesis, obtaining the plasma temperature of 10 million degrees (the “Focus” experiment). The official goal of this research was to create a source of cheap, pure and practically inexhaustible energy. The first theoretical publications on that subject were published in 1969; later, after 1975, results of the research were kept secret. These results aroused huge interest among the political authorities of the People’s Republic of Poland, including Edward Gierek himself. It is supposed that he had certain hopes for the creation of a Polish nuclear bomb, which could improve the position of Poland in relation to the USSR within the Eastern Bloc, as this had allowed France to obtain large political and military independence of the USA in the past (Wetoszka A., Truskowski A., 2017). The mysterious death of Professor Kaliski in 1978 put an end to the Polish nuclear program. According to some opinions, this was an assassination, with secret service officers of the USSR, the People’s Republic of Poland and many Western states being mentioned as its potential perpetrators. It is believed that the possession of its own nuclear technology, let alone a bomb, by Poland, was not in the interest of the Soviets nor the West.

8. Conclusion

The performed analyses show that nuclear weapons have been and still are an important means of deterrence. The construction of the nuclear weapon revolutionized the rules and methods of warfare. Its use had an impact on the contents of doctrines and concepts of use of armed forces and ensured the continuous development of the structures and equipment of armed forces. Because of their destructive force, nuclear weapons play the main role in the deterrence policy and are the primary means of maintaining security. In the Cold War

period, they were an important element of the strategy of the balance of powers of NATO and the Warsaw Pact, using the “doctrine of fear”. The fear of the consequences of their comprehensive use ensured the stability of the bipolar system of powers for many decades. The signed treaties and disarmament agreements were a step forward aimed at increasing public security in the context of global challenges and preventing the proliferation of nuclear weapons. However, these actions were not fully effective, as politicians and experts realize more and more frequently today. There is no tendency to resign from nuclear weapons in the modern world. Quite the opposite – there are states that almost dream of acquiring such weapons. In spite of ongoing negotiations on the subject of arms reduction, the biggest challenge for the modern world is still nuclear terrorism and the proliferation of mass destruction weapons, including nuclear weapons. Also, there is no significant difference in the doctrinal perception of nuclear weapons among “nuclear states”, which suggests that nuclear weapons are an equally important element of security for the United States and for the Russian Federation. The examples presented in this work indicate clearly that, contrary to what may seem, nuclear weapons are not entirely unfamiliar to Poland. In the era of the People’s Republic of Poland, the armed forces had access to nuclear weapons and were systematically trained in this field under alliance agreements. During Edward Gierek’s rule in the 1970s, Poland pursued also its own secret program of acquisition of nuclear energy for military purposes in order to increase Poland’s independence on the international arena. Currently, Poland is not pursuing any armament program connected with nuclear weapons. Polish crews are not trained in this respect. However, it is still theoretically possible for Poland to participate in NATO’s Nuclear Sharing program, if such a need arises.

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