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THE ROLE OF RESEARCH AND DEVELOPMENT WITHIN THE PGZ GROUP

Abstract. The paper presents the activities of the Polska Grupa Zbrojeniowa (Polish Armaments Group) (PGZ) in the area of research and development in the process of modernizing the Polish Armed Forces aimed at reconstructing the Polish defence potential and strengthening the potential of Polish science and defence industry. Priorities of the development of the Polish Armed Forces are discussed along with trends in technology and areas of activities of PGZ as the consolidating unit of the defence industry companies.

Keywords: PGZ Group, research and development activities.

1. INTRODUCTION

In Poland currently a process of technical modernization of the armed forces is being implemented. Two of the main goals of this process include building the operational capability of the Polish Army and strengthening of the potential of Polish science and defence industry.

Polska Grupa Zbrojeniowa S.A. (Polish Armaments Group) (PGZ) is a major player in this process and functions as a consolidating unit of the defence industry manufacturing and service providing companies. It concentrates most of the national defence industry, more than 30 key companies of various level of technological development and of innovativeness of the products they offer. The most promising areas of their activity, because of the highest quality of equipment and armament delivered to the army, include communications, battlefield command, as well as radar technology and optoelectronics. PGZ also aspires to be a promoter of innovation in the economy, among other things by participating in the construction of unmanned aircraft, or missile systems. Currently, PGZ works on more than two hundred development projects which are funded both by the National Centre for Research and Development (NCBR), Ministry of National Defence (MON), Ministry of Treasury (MSP), and by the companies themselves, which follow the guidelines of the research and technological and innovation policies of the State defined in the National Research Programme. These projects also fall into the technological areas of priority identified here. Conducting research and development projects should support the process of enhancing the operational capabilities that the Polish Armed Forces plan to attain in the coming years.

2. ACTIONS OF PGZ S.A.

2.1. Reconstruction of the Polish defence potential

Modernization of the Polish Army shall be both a great opportunity as well as a challenge for the companies of the PGZ Group, which is to be the major participant in that modernization. In practical terms this will translate into completing a large part of the orders for the military and into the participation of the PGZ Group companies in the most advanced projects undertaken with foreign entities. According to MON, in cases where a supplier of a complex weapons system will be a foreign company, the Polish defence industry will have its significant part in its creation. One of the criteria of selection will be the level of involvement of the Polish partners. Under such circumstances the Polish armaments industry will acquire the most advanced technologies from foreign contractors and the Polish companies will

acquire unique competencies ("product polonization"). In the future it is expected to help the Polish armaments industry modify, repair, develop and manufacture diversified systems. Huge orders from the Polish Army open an opportunity to rebuild the Polish industrial capacity not solely on the basis of assembling finished pieces or acting as a subcontractor for foreign companies, but based on real manufacture. This will ensure that full lifecycle of products will be secured, including manufacture of spare parts and, more importantly, product maintenance, which requires obtaining appropriate certificates. This in turn will help significantly raise the qualifications and competencies of the Polish engineering personnel and enable its contribution to production modernization.

At the same time the competitive edge of the Polish companies can be built based on their potential and resources. These companies may creatively use their new capabilities to develop proprietary technologies adapted to the demands of the clients and of the market as a whole.

2.2. Cooperation with research organizations

Consolidation of the companies creates favourable conditions for promoting cooperation and collaboration between the armed forces, industry and research centres by creating new opportunities and expediting the introduction of innovative solutions. Cooperation with leading research units and universities on construction of UAVs (drones for reconnaissance and reconnaissance/strike purposes) may serve as an example here. This also applies to future technologies developed within the framework of such programmes as: Electromagnetic Pulse Cannons, Laser Systems and Non-Lethal Microwave Weapons, New Directed Energy Weapons and Defence Systems. These programmes are funded by the National Centre for Research and Development, and their goal is to strengthen the potential of Polish research and industrial organizations and to gain technological independence by creating Polish know-how in the field of critical technologies related to state defence. Creating mechanisms and use of tools in the area of research and development is one of the main tasks of PGZ. To this end activities are undertaken to gradually eliminate barriers in this area. This task is carried out not only through the exercise of owner supervision over the companies, but primarily by setting up consortia, conducting research and development work and creating platforms for communication between science and industry, and ultimately co-funding of major projects. One of the means of achieving that is collaboration between PGZ and many R&D institutions, among them: Military University of Technology, Warsaw University of Technology, Medical University of Warsaw, Industrial Development Agency JSC, Radomskie Centrum Innowacji i Technologii Sp. z o.o., Institute for Sustainable Technologies – National Research Institute, Institute of Electron Technology (ITE), Gdańsk University of Technology, Institute of Electronic Materials Technology (ITME), and many more. On the basis of this document the institutions are to cooperate in order to create favourable conditions for research and development, followed by their commercialization, support for the process of technology transfer from research circles to business, and promote access to knowledge and cutting-edge research. The individual companies of the PGZ Group also conclude similar agreements with universities according to their needs.

Such agreements enable the universities to participate in projects carried out by the consortia, as exemplified by the development of Short-Range Missile System codenamed NAREW. Acquiring new solutions is also made possible by the Technology Transfer Platform which is currently being implemented by the Industrial Development Agency (ARP). The Platform is devised as a stage for communicating the needs related to innovative projects and for establishing relationships with the partners of AGP and PGZ, and also for presenting technologies to third parties (for licencing or other forms of use agreed between the partners).

2.3. Dual-use technologies

Developing technologies for military purposes may raise possibilities for civilian applications thereof. This is particularly important in the aspect of financing the so-called dual-use technologies.

PGZ takes initiatives to implement systemic solutions to eliminate existing barriers. One of them is the proposal to expand the list of National Smart Specializations which indicate the economic priorities in the area of R&D and Innovation, and to streamline funding to the areas that ensure added value to the national economy and improve its competitiveness in foreign markets. Smart specializations should contribute to the modernization, structural transformation and diversification of products and services. With the above in mind, PGZ took an initiative to formulate a new specialization related to the defence and security sector and named: "Innovative technologies, processes and products in support of security". It will contain a catalogue of technologies important from the viewpoint of the armed forces. The defence industry, being a component of the state security system, constitutes a growth factor which promotes technological progress in civilian sectors and products. Introduction of a specialization in the area of defence is of great importance from the viewpoint of acquiring funds from the European Union for technological development and innovation in the financial perspective of 2014 to 2020. Consultations and arrangements are at their final stage and we hope to have the specialization introduced in a short time.

The special role of PGZ in eliminating barriers in R&D consists in: improvement of skills in managing progress in innovation and R&D, establishing internal structures to initiate and coordinate innovation projects, developing mechanisms for defining innovative solutions to be implemented in Poland, developing mechanisms of effective cooperation between industry and research institutions, leading to the implementation of projects, creation of databases in order to review the potential of a given technology in global markets, cooperation with the Ministry of Defence in recommending development projects carried out by the companies of the PGZ Group.

2.4. International activities

One of the tasks the PGZ Group has been assigned is to gain a strong and competitive position in the international arena, using the potential of its constituent entities. Therefore, the key issue for the future of the Polish armaments industry is not only to anticipate the expectations of the Polish Army, but also the search for new markets. Specific actions are taken in order to broaden the export offer of the Polish industry. The Ministry of Defence is developing a special programme of export support, which includes, among others, establishing a leasing fund to support those states that cannot afford buying weapons. PGZ is expecting to sell weapons manufactured by the "Łucznik" factory in Radom in the civilian market in USA. In addition the Beryl guns will be delivered to Nigeria and Grom anti-aircraft missile systems to Lithuania. A research vessel will also be delivered to the University of Gothenburg. In the near future PGZ will seek to substantially boost its exports. PGZ actions are aimed at creating two pillars, i.e. a modern and innovative product and capturing export markets to dynamically foster the growth of the defence sector and reduce the gap to the leaders in the military sector. International activities also include participation of the PGZ Group in international organizations, above all within the European Defence Agency (EDA), the NATO Industrial Advisory Group (NIAG) and the European Space Agency (ESA).

3. RESEARCH, DEVELOPMENT AND IMPLEMENTATION PRIORITIES

PGZ actions are in accordance with the research and development lines defined in the National Programme for Research and in "Research priorities in the national defence sector for the years 2013-2022" which include:

- information and network technologies,
- sensors and observation,
- precision weapons and arms,
- autonomous platforms,
- protection and survival in the battlefield,
- advanced materials, including high energy and smart materials.

In addition, the above activities call for the development of the so-called breakthrough technologies which were defined together with other NATO States, the Allied Command Transformation (ACT) and NATO Science and Technology Organization and which include:

- diffuse information processing (in the "cloud"),
- smart autonomous systems,
- wireless communication systems,
- hyperspectral and terahertz sensors,
- affordable and efficient night vision,
- directed (beamed) energy,
- satellite technologies,
- virtual and augmented reality and cognitive interfaces,
- nonconventional weapons (non-nuclear, kinetic and non-kinetic weapon systems),
- smart materials,
- nanorobotics (nanotechnologies) – nanoelements that boost ISR capabilities,
- high-temperature superconductivity,
- power supply and energy storage systems,
- biotechnologies,
- progress in medicine,
- social networks,
- supersonic platforms and drives,
- miniaturized electronic systems,
- stealth and counter-stealth technologies.

The key supporting technologies in the EU include:

- nanotechnology,
- microelectronics,
- nanoelectronics,
- photonics,
- advanced materials,
- biotechnology.

Actions which PGZ undertakes as an initiator of innovative solutions include not only the implementation of these priorities, but also the observation and implementation of new technological trends that will shape the global defence sector over the next 10-20 years. Changes in the defence sector are already visible today. These changes include a shift towards

the use of, for instance, unmanned and autonomous systems, robotics, C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance) – sensors, systems, 3D printing technology, cyber-technology and energy weapons (lasers, electromagnetic radiation). Taking advantage of these development trends in land, naval and aerial systems in the business activities of companies grouped in PGZ is crucial for the future of the Polish defence sector. These technological trends affect not only the defence industry, but also the civilian sectors, for instance in the case of dual use technologies.

5. STRATEGIC LINES OF ACTION

Strategic lines of actions taken by PGZ in the field of research and development are aimed at strengthening the competitive power of the weapons manufacturers in order to modernize the Polish Armed Forces by taking advantage of the potential of the Polish companies and by accomplishing the priority tasks of technical modernization of the Polish Armed Forces.

The budget planned for the fourteen operational programmes to be implemented in the years 2013-2022 is in excess of 93 billion zlotys, whereas the overall expenditures on technical modernization of the Armed Forces during the same period exceed 137 billion zlotys.

The primary source of funding is to be the state budget where, starting from 2016, no less than 2% of the Polish GDP is to be allocated to defence. This level of funding is specified in the Act on the transformation and technical modernization of the Polish Armed Forces drawn up by the Ministry of Defence and passed by the Polish Parliament.

6. CONCLUSIONS

Catching up with the European leaders in the military sector by the Polish defence industry requires faster growth of the latter. Factors that stimulate this process include transparent rules of equipment and weapons acquisition, and requirements on weapon systems strictly defined by the army on the one hand, and development of modern design and technological solutions based on cooperation with foreign partners and with Polish research organizations on the other hand. Only after innovative manufacturing solutions are developed will there be an upswing in exports and the Polish companies cease to play only the role of subsuppliers of simple subsystems. PGZ will definitely have to take on the initiative of making these changes and to garner modern armament systems. As the motto has it, "strong together", coordinated actions of our Companies and joint work on the most advanced solutions will significantly enhance our position on international markets and, most importantly, will strengthen the Polish defence potential.

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