


## Development of the Polish Space Industry – Opportunities and Threats

Rozwój polskiego przemysłu kosmicznego – szanse i zagrożenia

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**Abstract:** This article presents considerations regarding Poland's public policy towards the space industry. Among other things, the state of the domestic space industry was presented and opportunities and threats to its development were identified. The considerations end with conclusions, the implementation of which may contribute to optimizing the condition of the domestic space industry and eliminating some of the barriers to its development.

**Keywords:** Polish space industry, public policy, space technologies, state security

**Streszczenie:** Niniejszy artykuł prezentuje rozważania dotyczące polityki publicznej Polski względem przemysłu kosmicznego. Zaprezentowano w nim m.in. stan rodzimego przemysłu kosmicznego i wskazano szanse oraz zagrożenia dla jego rozwoju. Całość rozważań kończą wnioski, których realizacja może przyczynić się do optymalizacji kondycji krajowego przemysłu kosmicznego i likwidacji niektórych barier dla jego rozwoju.

**Słowa kluczowe:** polski przemysł kosmiczny, polityka publiczna, technologie kosmiczne, bezpieczeństwo państwa

The space industry and space technologies are the engines of the technological and economic progress of the countries that possess them. This industry is a kind of seedling for the development of a number of areas of social and economic life. There is also the growing militarization of space. Satellites provide the armed forces with, among other things, secure and uninterrupted communications and terrain reconnaissance. As a matter of fact, they become a key element in ensuring the efficiency of the command chain and the decision-making loop.

As you can see, having your own space capabilities and the space industry is today a requirement for the effective functioning of the state in many areas, in particular in the sphere of security.

The purpose of this article is to present a policy for the development of the domestic space industry, taking into account the opportunities and threats. This policy should be seen as one of the important public policies of the Polish state.

The dogmatic method and the literature study method were used as the leading methods in the study.

## **1. State of the Polish space industry**

The Polish space industry has significantly developed and strengthened over the past few years. Despite the high threshold for entrepreneurial entry into this industry sector, we have seen a steady increase in the number of entrants. Technical breakthroughs have reduced the cost of carrying 1 kg of cargo into space, making satellite services cheaper and more accessible. For example, in the late 1960s, the cost was close to \$900,000, while today, thanks to SpaceX and its Falcon 9 reusable rocket, the cost of launching payloads into low Earth orbit has dropped to around \$2,700. Already today, satellites and the data they provide are used, e.g., in agriculture, in sowing fields or irrigation, in communication and transport via GPS (Global Positioning System) navigation or in disaster management.

Currently, the domestic space industry offers a wide range of goods and services, ranging from software, including those that use artificial intelligence, through specialized tools and devices, to the production of nanosatellites and satellites and their launch into space. According to data from the Polish Space Agency (POLSA), our space industry consists of more than 300 state and private entities of a diverse nature, i.e. both of a business and research nature. It employs around 12,000 highly skilled workers.

Among the leading Polish entrepreneurs operating in the space industry, SatRev, Astronika, KP Labs, Thorium Space, and Creotech Instruments should undoubtedly be distinguished. These are the top five of our space industry, although it should be noted that other entrepreneurs are constantly trying to reach them.

The national space industry is becoming increasingly bold in the global market, acting both independently and in cooperation with foreign partners. This is recognized, among others, by the European Space Agency (ESA), whose opinion is that Poland will follow its own unique path in the development of this industry, based primarily on small and medium-sized enterprises. The SME sector adapts more easily to changing business conditions than the large enterprise sector (Idea 3W 29.09.2023). Ingenuity, creativity, innovation and initiative – these are the undoubted advantages of Polish entrepreneurs operating in the space sector.

New space technologies are already generating opportunities for economic space exploration. As Kamil Muzyka aptly states, “cosmic resources, like the Natural Resources of the Earth, will form the basis for the development of life and its possible inorganic varieties” (Muzyka 2022: 127). In particular, we are talking about space mining and the extraction of, e.g., rare earths or helium<sup>3</sup>, which could revolutionize the industry and avert an energy crisis associated with depleting hydrocarbon deposits. This issue is already at hand and it is worth our industry, including space, to take this into account in its development plans. It therefore becomes necessary to enact an appropriate legal regulation in the form of an Act on space activities, which has been repeatedly pointed out in their scientific works by, among others: Katarzyna Malinowska, Zdzisław Brodecki, Mariusz Tomasz Kłoda or Małgorzata Polkowska (Kłoda, K. Malinowska, B. Malinowska, Polkowska 2022: 95–119; K. Malinowska, Brodecki 2019: 48–61). The theses contained in them are broadly shared by the author.

## **2. Policy of the Polish state towards the space sector**

The development of the space sector and the growth of its importance in the realities of the modern economy and Industry 4.0 make us think about the role of the state in this area. Whether it should be a passive observer or an active player, initiating and pointing in the direction of actions. Given the above, the question arises of whether Poland has its own policy towards the space industry, and if so, what its assumptions are and whether it can be considered a public policy.

In an attempt to address the above issue, it should be mentioned that based on the Act of September 26, 2014, the Polish Space Agency was established

(Ustawa 2014/1533), which, according to art. 3 of the Act in question, performs tasks in the field of supporting (a) the space industry; (b) research; (c) the use of space; (d) the development of space technology, including satellite engineering; (e) the use of research and its results for applied, economic, defense, state security, and scientific purposes. In addition, the Polish Space Agency may provide support for, *inter alia*: (a) research and development; (b) support for innovation; (c) training; (d) consultancy; (e) participation in fairs, economic missions, and other events. This support shall be granted to (a) natural persons not conducting economic activity; (b) entrepreneurs; (c) entities whose statutory tasks include activities in the field of space use; (d) social and economic partners within the meaning of art. 5 point 7 of the Act of December 6, 2006 on the principles of development policy (Journal of Laws 2019, item 1295 and 2020 and of 2020 item 1378); (e) other entities operating in the field of space use or supporting this field.

The Polish state has therefore created a special entity, equipping it with material and personal resources and legally defined competencies and tasks, which aims to support the development of the space industry. Thus, it seems that this is a manifestation of the public policy of the Republic of Poland (RP) in this area.

By public policy, doctrine means all the conscious actions – including the conscious omissions – of those entities or actors that will be covered by the concept of government – also broadly understood (Szarfenberg 2016: 48). A similar position is taken by Andrzej Zybala, according to which the concept of public policy should be understood as “[...] rationalized public activities and programs that are based on accumulated, relatively objective knowledge and a systematized process of designing and implementing these activities” (Zybala 2012: 24). Thus, if we take into account that, on the basis of art. 4 of the aforementioned Act, the Polish Space Agency is subordinate to the minister competent for economy, and that the said Agency implements public activities and programmes, we shall come to the conclusion that we are dealing with Poland’s public policy in the area of space industry.

When considering the Polish state policy in the area of the space industry, it is also necessary to draw attention to Resolution No. 6 adopted on January 26, 2017 by the Council of Ministers on the adoption of the Polish Space Strategy (Uchwała 2017/203). The strategy emphasises the role of the space sector, recognizing that it is an important element of the Polish knowledge and innovation economy, and its links with other areas of the economy contribute to increasing their competitiveness.

The strategy formulates three strategic objectives by 2030, namely: (1) the Polish space sector will be able to compete effectively in the European market and its turnover will amount to at least 3% of the total turnover of this market (in proportion to Poland's economic potential); (2) the Polish public administration will use satellite data for faster and more efficient implementation of its tasks, and national enterprises will be able to fully satisfy internal demand for such services and export them to other markets; (3) the Polish economy and public institutions will have access to satellite infrastructure to meet their needs, especially in the field of security and defense (Uchwała 2017/203).

The implementation of the above strategic objectives will take place through the achievement of specific objectives. These include: (1) increasing the competitiveness of the Polish space sector and increasing its share in the turnover of the European space sector; (2) development of satellite applications – contribution to building a digital economy; (3) development of capabilities in the area of national security and defense using space technologies and satellite techniques; (4) creation of favorable conditions for the development of the space sector in Poland; (5) building human resources for the needs of the Polish space sector (Uchwała 2017/203).

The Polish Space Strategy was to be detailed in the National Space Programme for the years 2021–2026. This government document in the form of a draft sets out the objectives of the programme, priorities, directions of intervention, or implementation tools. It also provided for the manner, sources, and amount of funding for the programme (Ministerstwo Rozwoju, Pracy i Technologii 2021).

The main objective of the program was to expand the potential of industry and scientific units of the Polish space sector to meet the needs of the state and the economy and to compete effectively in international markets. Meanwhile, the specific objectives of the programme were to correspond to the strategic objectives of the Polish Space Strategy, and they included: (a) to expand the competence and increase the competitiveness of the Polish space sector; (b) to increase the use of satellite data by administration, science, industry, and society; (c) to use satellite technology to enhance the country's security and defense.

In turn, the priorities of the National Space Programme for 2021–2026 include Priority I – Building the capability to construct and launch space objects; Priority II – Building the Earth Observation Satellite System; Priority III – Building the National Satellite Information System; Priority IV – Expanding the National Space Security System.

With regard to material issues, the National Space Programme was to be financed from the following sources: (a) funds from the state budget, including the parts of the state budget of the individual ministers involved in the programme; (b) funds from the European Union, such as: EU Space Programme, Horizon Europe; (c) funds from the National Reconstruction and Resilience Plan. The total budget provided for the implementation of the tasks set out in the National Space Programme was set out in this document at the level of PLN 2,568.87 million.

As can be seen, the objectives and priorities of the Polish Space Strategy and the draft National Space Programme were consistent and convergent, which should be considered as a desirable action on the part of the public administration. It should be noted that this program ultimately did not enter into force, which is an important barrier to the development of the domestic space industry.

As an aside, it is worth mentioning that the Polish Space Strategy is linked to other documents of planning and implementing nature, i.e.: (1) Strategy for Responsible Development until 2020 (with an outlook until 2030); (2) Productivity Strategy 2030 (draft); (3) National Security Strategy of the Republic of Poland; (4) National Plan for Reconstruction and Increasing Resilience; (5) Space Strategy for Europe; (6) EU Space Programme; (7) Strategic Research and Innovation Agenda.

Consistency of objectives and tasks proves the existence of a well-thought-out public policy in the space industry. Whether it is (was) rational is another matter. An open question, however, is whether changes in the political leadership of the Polish state will not lead to the overturning of the proverbial table. While the application of amendments and updating of Poland's policy towards the space sector are justified, abandoning the possibility of creating it should be considered completely wrong and a missed decision. Time will bring the answer to this question.

### **3. Opportunities and threats of the Polish space industry**

The Polish space industry is difficult and demanding but at the same time negotiating for further development of the domestic industry. Of course, it faces both opportunities and threats.

The opportunities of the Polish space industry undoubtedly include a large, highly qualified workforce. Next, the real needs for satellites and satellite services, including those related to the acquisition and processing of satellite data, both of the Armed Forces of the Republic of Poland and other formations falling within the area of broadly understood security. Not without significance is also the emergence of new technologies within NewSpace, thanks to which it is possible to significantly reduce the cost of carrying 1 kg of cargo into space, as well as the threshold for entering the space business. The space industry is already becoming a seedling of innovation, allowing potential profits to be multiplied. Further opportunities can be seen in cooperation with the European Space Agency and other foreign and international actors, as well as in participation in international research projects. Further situations are related to the growing export opportunities of domestic space entrepreneurs. For example, on February 7, 2024 in Kigali, SatRev and Locus Dynamics signed an agreement to provide end-to-end satellite solutions for the collection of Earth observation data in Africa. The parties to the agreement will cooperate in the design, manufacture, and maintenance of microsattellites and related high-resolution sensors for various applications, establish related infrastructure in Rwanda, namely a satellite ground station and Mission Control Centre, and improve satellite data analysis capabilities (Space24 8.02.2024). Another opportunity is better coordination and planning of needs on the part of public administration and coordination with the domestic space industry. We need to meet the real needs of our country. As if in response, Prime Minister Donald Tusk announced the approval of a €300 million loan for a Polish satellite component to the European missile shield programme. This money can become not only an impulse, but even a lever for the development of our space industry.

In turn, the risks include a low interest of public administration in satellite data, which seems to result from a low awareness of their usefulness and an erroneous organizational culture. A helpful tool for changing this state of affairs can be business coaching, which is addressed to various organizations, including – as Anna Chochowska and Ewa Jasiuk aptly point out – also to public administration and its staff (Jasiuk, Chochowska 2024: 440).

Another perceived threat is the lack of proper education on the economic feasibility of space exploitation and the promotion of the Polish space industry.



A number of threats to the development of the Polish space industry have been identified by the auditors of the Supreme Audit Office (NIK), which they presented in a report relating to the development of the space sector in Poland (Najwyższa Izba Kontroli 2020). According to it, among the fundamental problems and threats to the domestic space sector, the following were singled out: (1) lack of a development plan for the space sector in Poland; (2) financial constraints; (3) system and organizational constraints; (4) lack of effective mechanisms for financing activities; (5) preferential approach of the state to private companies; (6) legislative constraints; (7) lack of a coherent, consistently implemented long-term vision of development; (8) selection of Polish experts to ESA decision-making bodies from among ministry officials; (9) insufficient group of experts evaluating the applications of the National Centre for Research and Development; (10) support for declarative actions through acceptance of partial research topics carried out by entities with little experience and competence, and support and implementation of spectacular actions with little commercial value and little impact on the development of national competence; (11) the location of the Polish Space Agency in Gdansk and the unnecessary creation of branches in various locations around the country, which reduces the efficiency of the Agency; (12) the failure of the Minister of Science and Higher Education to create a scientific discipline: Aerospace Technologies, despite the efforts and appeals of the research communities from all over the country; (13) lack of experience and credentials to win orders and contracts for the implementation of missions; (14) lack of adequate knowledge and experience in the field of space programmes; (15) lack of adequately educated staff on the labour market; (16) lack of readiness and even unwillingness of the government and local self-government administration to receive and operationally use satellite data (Najwyższa Izba Kontroli 2020: 77).

To a certain extent, similar views were presented during the expert debate of the defense portal, which took place on April 18, 2024. Insufficient interest and understanding of administrative and governmental factors for a certain autonomy and determination of Poland's priorities in the space sector were pointed out. A separate opinion is presented in this respect by the authors of the *Review of the Implementation of Indicators of the Polish Space Strategy*, who point to an increasing trend in the use of satellite data in the work of public administration. They attribute an important role in the above aspect to the workshops and training provided by POLSA, e.g., as part of the Sat4Envi project (PSPA March 2023: 7). They also draw attention



to the issue of a contribution to the ESA – both mandatory and optional. The above-mentioned document formulated and expressed the concern that the ratio of the amount of the optional contribution to the mandatory contribution is not growing at an optimal pace (PSPA March 2023: 4).

Moreover, listening to the views of the participants in the Expert Debate of the Defence Portal, one might even get the impression that the state is pursuing a space policy completely detached from the space industry, focusing not on its development but on participation in programmes, e.g., of the European Space Agency, as a sub-supplier and subcontractor for concerns with an advantage in this area (Sabak 26.04.2024). This view is broadly shared by the author.

On the basis of the above comments, it can be concluded that the Polish Space Industry is not a kind of ephemera. It occupies a permanently important place in the national economy. It faces a number of challenges, as well as opportunities and threats. Its future and Poland's position in the world depend on how efficiently it manages to take advantage of these opportunities and how skillfully it avoids threats. It is already possible for our country to aspire to join the group of most developed countries, i.e. the G20, and it is precisely the space sector with its innovative technologies that can help. These technologies can also make a significant contribution to improving our security, both internally and externally, which is of particular importance in the context of Russia's imperialist policy.

## **Conclusions**

Poland's policy towards the space industry is controversial. This is natural, given the scale and complexity of the issue. Nevertheless, the very fact of its existence has a positive effect on the condition of entities operating in the indicated area. This policy should be seen as one of the important public policies of the Polish state. This in turn leads to the following conclusions:

1. The presence of Poland in space is a historical necessity.
2. The development of the space industry is a chance for a civilizational leap for the entire economy of the country.
3. A rational policy for the development of the space industry, consistent with other public policies and programmes, should be developed and updated.

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