COOPERATION BETWEEN UKRAINE AND POLAND ON SPACE DEVELOPMENT

Svitlana Koshova
PhD in Public Administration, Associate Professor,
Department of Healthcare Management and Public Administration
Shupyk National Healthcare University of Ukraine
9 Dorohozytska Str., Kyiv, Ukraine, 04112
https://orcid.org/0000-0002-7637-4311
svet.lana.koshova@gmail.com

Abstract. This article considers the issues of co-operation and prospects of a partnership between Ukraine and Poland in the development and use of outer space. Space is an invaluable tool for achieving sustainable development around the world. The space industry is one of the high-tech industries without which the existence of the modern world is impossible, it is one of the factors that ensures the national security of the state. With the launch of the first satellite into space, the world, entered a new era of technology, which significantly expanded its boundaries. One of the key trends in world space activities is to intensify and increase the importance of international co-operation in space exploration. Close cooperation between Poland and Ukraine in the field of space programs gained momentum after the signing in 2015 of the Memorandum on the Exploration and Use of Outer Space for Peaceful Purposes. As the countries are neighbors, they have many common interests and issues that need to be addressed. Key areas of co-operation between Ukraine and Poland in space exploration are outlined, in particular, meeting public needs in the field of remote sensing of the Earth, conducting joint scientific and applied space research on the creation of promising models of rocket and space technology and advanced technologies. Poland sees a serious potential for partnership with Ukraine in space, one of the most promising areas of co-operation in the new environment may be the joint creation of rocket and space technology. We can state that combining the experience and potential of Ukraine with the capabilities and knowledge of Poland in the space industry will have a serious competitive market potential. The cooperation between Ukraine and Poland also includes the exchange of information and experience, implementation of joint scientific and technical projects, training programs, exchange of specialists, as well as the organization of scientific events and conferences on space activities.

Keywords: Space, Space Industry, International co-operation, European Space Agency.

INTRODUCTION

Recently, discussions on the prospects for the development of the domestic space industry at both national and global levels have become relevant.
In addition to the ambiguity of the leading space powers in the development of space strategies and the approval of major space projects, there is a relatively new trend in the space industry, the increased presence of the private sector and active international cooperation.

The result of growing competition in space is the development of International relations in the study and development of outer space. At present, absolutely all, countries, states, to some extent feel the need to attract additional resources and technologies to improve the efficiency of space activity.

Current problems are urging states to change their attitude to natural resources and rebuild their policies. This global community is, aided, by ongoing assistance from the global space market, which is a significant segment of the global high-tech market. Each country’s space industry is one of the most competitive, as it includes a significant number of high-tech enterprises that represent the country at the global level.

Space activity has had a positive impact on the life of society, which is constantly evolving and opens to the world promising opportunities for its inexhaustible potential.

Scientists have identified three key drivers of innovation in space:
- State space programs in the field of science and national security;
- Expanding the use of space-related technologies and services;
- Desire to explore space.

Geopolitical interests have always played a leading role in the development and implementation of space programs, and will continue to do so in the future. With government support, space science and research are key drivers, for certain, research and development. In addition, the issue of prestige and leadership of the state is the ability to carry out space activities.

A significant number of countries in the world allocate significant financial resources for the development of the space industry, which is a source of scientific, technological and technological progress, as well as a leading factor in ensuring national security. That is why the modern development of civilization is, objectively and closely connected with the further cooperation in the field of development and use of outer space.

The main trend of world cosmonautics is its progressive development and significant contribution to solving current problems facing countries, which significantly increases the importance of international cooperation in space exploration.

World space activity is developing dynamically and finds its manifestation in the sustainable development of civilization on Earth.

The topical issue is to ensure the stable development and prospects of the space industry, which belongs to the important strategic sector of state security and occupies a key place in the country’s economy.

Advances in space provide the country’s leading position in the international space technology market, as well as add significant importance in the development and use of outer space.

Therefore, undoubtedly, the co-operation of the world’s countries in the field of space development is an important and urgent issue in ensuring the effective development of this high-tech sector, which is able to provide the conditions for long-term strategic growth and technological leadership.
MATERIALS AND METHODS

The research materials are information and statistical information of international analytical agencies and state statistical bodies, monographs, articles by domestic and foreign scientists. The range of methods utilized include, Content Analysis, Biblio-Semantic and Systematic Approach.

This article used research approaches and methods, which should include the dialectical and structural method, methods of analysis and synthesis, as well as the statistical method of space research and the feasibility of forming and implementing state development programs.

The work of domestic scientists, in particular, Yu. Alekseev, M. Bendikov, V. Gorbulin, O. Degtyarev, O. Dzhur, S. Koshova, E. Kuznetsova, N. Meshko, V. is devoted to the problematic issues of development and further prospects of the domestic space industry.

Juror, I. Sazonets, L. Soroka, A. Cherkasov, O. Fedorov and others. However, taking into account, the views of these authors, it should be noted that Ukraine currently has a significant number of unresolved issues in the prospects of the domestic space industry as a factor that stimulates innovative development of the national economy.

The purpose of the article is to study the interaction and prospects of the partnership between Ukraine and Poland in the development and use of outer space.

RESULTS AND DISCUSSION

At present, almost all of the world have covered the development of the world space market. In particular, the development of the space industry is increasingly stimulating the involvement of new countries in space, the implementation of programs for space exploration, which generally increases competition, stimulates the development of this strategic sector, increasing its commercial potential, promoting new technologies and opening new areas for space technologies (Atamanenko, & Fedoniuk, 2014). In fig. 1 shows the key trends in the space sector.

Fig. 1. Key trends in the space sector
Source: (Atamanenko, B. A. & Fedoniuk, R. V., 2014)
In the world’s leading countries, space activities are among the highest priorities of development, which includes interconnected components (Fig. 2).

Modern space activities are an important component of the world economy, science and security. It combines infrastructural and “breakthrough” areas. The total volume of the world space market is about 360-370 billion US dollars. About 3,380 spacecraft are currently in orbit (compared to 2,700 in 2020).

The current stage of development of space activities is characterized by the emergence of new challenges for understanding and institutional design. The reason for this is the growth and new formats of private sector involvement, the problems of long-term use of near-ground resources, the institutionalization of sectoral and national interests. The answer is, including the emergence of new phenomena such as “New Space” – New Space.

In general, the current paradigm of New Space includes the following components:

- Growth of direct consumption of space activities and their integration into various spheres of activity and business;
- Development of the general technological level and loss of uniqueness of a number of competencies of the space industry;
- Miniaturization and transformation of small satellites into an effective application tool;
- Reduction of barriers to entry for space startups and companies from related industries;
- Active use of venture and exchange financing;
- Increasing the participation of private companies during the life cycle of space projects, which were previously managed by state players;
- Increasing the variety of forms of public-private partnership and the gradual revision of the perception of the public good in the field of space activities as a pure product of government agencies (European Space Policy Institute, 2022).

Promising space markets include, in particular;
- Space transport and information systems,
- Space tourism,
- Space production,
Electricity generation in space.

All projects and programs implemented, both public and private, can be attributed to one of three relatively independent groups in terms of value of results: quality of life (Quality of Life), sustainable development and security (Sustainable Development), research and space exploration.

Currently, important areas of development of world space activities include:

- Study of outer space;
- Solving national security problems;
- Solving socio-economic problems with the use of space;
- Use of scientific and technical results of astronautics in all spheres of development of modern society;
- Solving problems of creation and development of promising spacecraft, etc. (Koshova, S., 2022).

Quantitative development of space markets in the last decade has led to a qualitative change in the structure of markets in the system of relations of participants, which is a comprehensive change in the institutional system in terms of relations and incentives (Nyameshchuk, G. V., 2011).

In recent years, the domestic space industry has identified international co-operation with the European Space Agency and NASA as a priority vector of its development.

Currently, Ukraine co-operates with 30 countries. Has concluded international agreements with 28 countries, and participates in 12 international space organizations, it is international cooperation in the field of space exploration that will lead Ukraine to the implementation of future programs and projects.

The formation of the Polish space experience dates back to the XV century, with the famous figure of that time Copernicus. His work "On the rotation of the celestial spheres" carefully describes the heliocentric theory of our planetary system.

In the 16th and 17th centuries, Johannes Hevelius (mathematician and astronomer) and Kazimierz Semenowicz (engineer; rocket designer) contributed to the further development of Poland in astronomy.

In the 1970s, Poland began to use satellite imagery in practice. However, despite the launch of a Polish citizen into space in 1978, Poland remained a minor player in the international space arena before becoming a member of the European Space Agency (ESA) in 1994 (European Space Policy Institute, 2022).

The European Space Agency (ESA) is the main regulator of the European space market, whose mission is to manage the development of the European space industry and ensure that public investment will ensure socio-economic impact and national security (The European Space Agency, 2022).

ESA’s strategic goal is, based on the peaceful development and use of outer space by all states.

In fig. 3 shows the key tasks of ESA.
**Fig. 3. Key tasks of the European Space Agency**

Source: *(The European Space Agency, 2022)*

ESA is currently implementing three space programs:

- **Copernicus** is the world’s leading Earth observation system focused on climate monitoring.

- **Galileo**, Europe’s own European global navigation satellite system, which provides highly accurate global positioning data, consists of a grouping of 24 operating satellites.

- **EGNOS** – European Geostationary Navigation Service, a pan-European safety and navigation system for aviation, maritime and ground users in most European countries *(The European Space Agency, 2022)*.

- Later in 2002, a new version of the agreement with the European Space Agency allowed Poland to participate in ESA’s research programs.

  Polish equipment was used in virtually every ESA's flagship research mission *(Cassini-Huygens, Integral, Mars Express, Rosetta, Venus Express and Herschel)*.

Over the last three decades, Poland has formed its own space sector, which improves and maintains priority achievements. This consists of several research centers, research groups at universities and small and medium-sized enterprises. All initiatives and complex tasks are, related to satellite and space technologies. In addition, Polish companies have the knowledge and experience that could allow them to, quickly integrate into the space industry *(European Space Policy Institute, 2022)*. Based on companies operating in the aviation and defense industries and the backbone of the space industry in other countries.

Poland’s membership in ESA and its subsequent agreements have opened the door for Polish citizens to participate in ESA's research missions. The Space Research Center (SRC), in collaboration with several Polish companies, has developed a large number of scientific tools, most of which have been used during important European scientific space flights *(European Space Policy Institute, 2022)*.

Currently, Poland is an important partner of Ukraine. One of the tasks facing the State Space Agency of Ukraine is to study the experience of Poland, as this country was also in the socialist system.

After its collapse, the Poles have achieved a lot, and Ukraine is interested in their experience of joining and participating in ESA, as well as the country’s capabilities.
In particular, Poland will show Ukraine the way to ESA, in the process of which domestic production and scientific potential will be involved in the implementation of those projects that may be of interest to both Poland and Ukraine.

Co-operation between Ukraine and Poland dates back to April 2015, when a Memorandum of Understanding was signed between the State Space Agency of Ukraine and the Polish Space Agency in the field of research and use of outer space for peaceful purposes. The purpose of signing this document is to ensure co-operation between Ukrainian and Polish enterprises, institutions in the field of space activities (State Space Agency of Ukraine, 2022).

The Memorandum agreed on:
- Promising areas for the development of Ukrainian-Polish cooperation in space, including space research;
- Remote sensing of the Earth;
- Opportunities for bilateral cooperation in the context of the membership of the Republic of Poland in the European Space Agency;
- Co-operation within the framework of the European Union’s Horizon 2020 program;
- Creation of a joint working group on space within the framework of the Intergovernmental Ukrainian-Polish Commission on Trade and Economic Co-operation, as well as opportunities for the establishment of joint space enterprises (Government portal, 2022).

In November 2015, the Cabinet of Ministers of Ukraine signed Order № 1207 “On signing the Agreement between the Cabinet of Ministers of Ukraine and the Government of the Republic of Poland on cooperation in the field of research and use of outer space for peaceful purposes.”

The year 2015 was an extremely fruitful year in the development of Ukrainian-Polish cooperation in space. In particular, after the signing of the Memorandum bilateral visits were significantly intensified at the level of management and representatives of enterprises, research institutes and organizations in space.

In 2016, an agreement signed between the Polish Armaments Group and the State Space Agency of Ukraine, which provided for co-operation in the development of optical and radar technology for artificial satellites used for observation, as well as technology for launching spacecraft into Earth orbit. Ground-based instruments available in Ukraine and Poland can be shared, for scientific purposes. For example, observing outer space.

There is a lot of space debris in space now, and everyone wants to understand how this debris moves and where it can fall. There is considerable experience in this direction in Poland and Ukraine and the main thing is that Ukraine has the means to implement this program. There are some common points of contact on this issue in order to continue to move in the direction of implementation. However, the most ambitious task in this cooperation is to create a new European light launch vehicle, which is in demand in the global market of launch services (State Space Agency of Ukraine, 2022).

Within the framework of Ukraine’s co-operation with the Polish Space Agency POLSA, a promising area of partnership is the joint creation of Earth remote sensing satellites to monitor the environmental situation, forests, rivers, and even the situation of illegal border crossing by refugees, which will strengthen national security.

This combination of Ukraine’s experience and potential, and Poland’s capabilities and knowledge in the space industry that has serious competitive market potential.
In 2017, in accordance with the bilateral co-operation between the Polish Space Agency POLSA and the State Space Agency of Ukraine, a working meeting was held (State Space Agency of Ukraine, 2022).

During this meeting, some problematic issues related to the development of space technologies were discussed. These problems are to be resolved by improving public-private partnerships and ensuring the investment attractiveness of space activities (Fig. 4).

In 2018, a delegation of the Polish Space Agency POLSA visited SE “Design Bureau” South “them. MK Yangel”. The meeting discussed potential ways of co-operation between Ukraine and Poland in the field of rocket and space technology. Presented, in particular, were the possibilities of the Polish Space Agency and industrial co-operation in the field of engine systems, modern technologies and materials.

A contract was also signed, which is the second element of a project worth more than 70 million Polish zlotys for the development of missile control technologies. By combining the capabilities of Ukraine and Poland in the field of space rocketry, countries can achieve significant results and significant savings in financial resources (State Space Agency of Ukraine, 2022).

In March 2022, representatives of the Lviv Regional State Administration met with the Deputy Head of the Polish Space Agency in Lviv, the result of which the State Space Agency of Ukraine plans to establish a co-ordination center for joint projects.

Together with Ukrainian representatives, it is planned to do everything to make the Ukrainian Space Agency a member of the European Space Agency. This, of course, provides significant prospects for space professionals.

It is planned to form an ecosystem in the directions Rzeszow – Lviv and Warsaw – Kyiv. In particular, for the Lviv region, this means new jobs, the creation of potential rocket carriers that will carry satellites into space (Lviv Regional State Administration, 2022).

Ukraine works with the Polish Space Agency in several areas. One of these is the technology
of orbital systems. The Polish Space Agency also helps to organize joint exhibitions at international exhibitions. This was the case, for example, with the creation of a joint POLSA-SSAU stand during the FIDAE Space and Defense Sector Fair in Chile. Another area of cooperation that currently exists between Ukraine and Poland is launch technology and satellite Earth observation.

The development of space technologies is one of the most effective means of stimulating the development of high-tech sectors of the national economy, a decisive factor in its competitiveness and improving the national security sector. It is also important that for the domestic side, space activities are an important factor in strengthening international cooperation, an instrument of national integration into European structures and a means of gaining Ukraine’s status as a regional leader.

CONCLUSIONS

Space research is one of the engines of economic development. Their results help improve the quality of life on Earth. By continuing to explore space, humanity will make new discoveries, expand its knowledge and be able to answer a number of fundamental scientific questions.

The task of conducting space research and using outer space for peaceful purposes is a favorable basis for fruitful international cooperation between Ukraine and Poland. The diversity of space exploration tasks cannot be, exhausted by one country, no matter how high it is scientifically and technically. Participation in space research for each country – highly developed in scientific and technical terms or only developing – significant benefits and practical interest. Thus, the role of international cooperation for Ukraine in the field of space exploration should increase in the future.

Poland is interested in co-operating with Ukraine in the development of missile control systems. As Poland is only developing its competencies in this area, Ukraine has already accumulated considerable experience in research and production of medium-range missile weapons. The use of domestic experience and knowledge can help increase the potential of Polish missile industry.

Co-operation between Ukraine and Poland includes the exchange of information and experience, the implementation of joint scientific and technical projects, training programs and exchange of specialists, as well as the organization of joint scientific events and conferences.

REFERENCES


Nyameshchuk, G. V. (2011). Features of the transformation of the economic potential of the space industry of Ukraine in the implementation of international scientific and technical cooperation, Bulletin of Dnipropestrovsk University, 10(2), 63–70.