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Space Corporation Projects: Trends and Perspectives

Abstract. Introduction*. The development of spaceships and space corporations is a growing trend. While businesses used to only announce their ambitious plans in the space sector, in recent years, these programs have been put into practice, and the number of private companies entering the space industry has significantly increased.*

Purpose*. The aim of this article is to examine the trends and future prospects of this development, as well as the role of spaceships and space corporations in the system of national economic relations at the national and global levels.*

Results*. The study's theoretical and methodological foundation is based on general scientific methodology, including dialectical analysis and synthesis, statistical observation, comparison, and inductive and deductive reasoning. Information sources include scientific publications; interviews with national and international space industry experts; academic research in astronautics; current legal regulations; and official data from organizations engaged in space activities. The study provides a brief overview of existing private space projects. The most attractive segments of the space sector for private businesses are identified. The article analyzes the significance of private initiatives in developing national space activities. It determines the conditions and factors contributing to the growth of space entrepreneurship. It outlines opportunities and prospects for building a sustainable business model in the space industry. The study focuses on developing the private sector within national space industries and shipbuilding. The study's insights are intended to support government agencies involved in space sector planning, as well as private companies and entrepreneurs looking to successfully manage space-related projects.*

Conclusions*. The research shows that corporate projects are very important for space development. Private businesses drive innovation, offer practical solutions, and play a key role in the commercial space market. Creating favorable conditions for the growth of private space businesses is essential because it will accelerate progress and enhance the domestic space industry and spaceship manufacturing.*

Keywords*: project, spaceship and space industry, corporations, commercialization, strategic planning.*

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Проєкти ракетно-космічних корпорацій: тенденції та перспективи

Анотація. *Розвиток проектів ракетно-космічних корпорації є новою тенденцією. Якщо раніше бізнес заявляв про свої амбітні плани в галузі космосу, то останні кілька років спостерігається реалізація задуманих програм, а також зростання кількості приватних компаній у космічній галузі. Мета статті полягає в дослідженні тенденцій та перспектив розвитку, а також ролі ракетно-космічних корпорацій у системі економічних відносин, що виникають у процесі становлення та зміцнення ракетно-космічної галузі на національному та глобальному рівнях. Теоретико-методологічною основою дослідження є загальнонаукова методологія, яка передбачає застосування таких підходів, як діалектичний аналіз та синтез, статистичні спостереження, порівняння, індукція та дедукція. Джерелами інформації служать наукові публікації та інтерв'ю національних та зарубіжних фахівців ракетно-космічної галузі, матеріали наукових досліджень у сфері космонавтики, чинні нормативно-правові акти та офіційні дані звітів дослідницьких організацій у галузі космічної діяльності.*

Проведено короткий огляд існуючих приватних проектів у галузі космосу. Виявлено найбільш привабливі для приватного бізнесу сегменти космічної діяльності. Проаналізовано значення приватної ініціативи у розвитку космічної діяльності держав. Перераховані умови та фактори сприяють формуванню підприємництва у космічній сфері, зокрема, описано основні інструменти політики високо розвинутих країн у цій галузі. Вказано можливості та перспективи розвитку стійкої моделі бізнесу в галузі космосу. Особливу увагу сконцентровано на питаннях формування приватного сектору у національній ракетно-космічній галузі.

Отримані результати будуть корисні органам державної влади, відповідальним за розвиток ракетно-космічної промисловості, а також приватним компаніям та підприємцям, які бажають з вигодою для себе створювати та реалізовувати проєкти у сфері космічної діяльності.

В результаті проведеного дослідження виявлено наявність приватної ініціативи у всіх сегментах космічної діяльності. Лідером за кількістю приватних компаній у галузі космосу є високо розвинуті держави.

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Приватний бізнес є джерелом оптимальних рішень, інновацій та ефективною формою участі у комерційній діяльності. Створення сприятливих умов для розвитку приватного бізнесу в космічній діяльності є необхідним, оскільки багато в чому сприятиме стрімкому розвитку, збагаченню вітчизняної ракетно-космічної промисловості.

Ключові слова: *проєкт; ракетно-космічна галузь; корпорації; комерціалізація; стратегічне планування, економічні відносини.*

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Introduction. In recent years, there has been growing global and national interest in the potential evolution of the space industry, particularly as it becomes more involved with private businesses. Space, once considered the domain of governments alone, is undergoing a shift in perception. An increasing number of private companies are getting involved, creating a new model in which the public and private sectors can collaborate. This has prompted many experts and organizations to rethink how space activities are planned and funded. In many countries, cooperation between governments and private companies, often called public-private partnerships, has become a common way to manage and grow space activities. These partnerships can take different forms. For example, a government may agree to purchase technology or services from a private company. Alternatively, private businesses may be permitted to use state-owned space facilities in exchange for fees. Another common arrangement is when private investors fund government space projects in hopes of earning profits later.

However, the entities drawing the most attention are not the large multinational corporations that occasionally invest or the companies that only fund state-led missions. Rather, the real interest lies in smaller companies started by private individuals. These entrepreneurs are trying to build businesses in the space sector, particularly in highly technical areas. They are investing money, building technology, launching missions, and offering services that were once controlled by large agencies such as NASA or Roscosmos. These small businesses are playing an increasingly significant role, demonstrating that the space industry is evolving rapidly.

Literature Review. Brown, C., Yang, W., & Müller, T. emphasize that the space industry is segmented into two main categories: upstream (hardware and launch systems) and downstream (applications and services). This structure helps define market roles and competitive advantages for private companies [1].

Fernandez, D., Liu, J., & Russo, A. emphasize that companies like SpaceX, Rocket Lab, and Blue Origin succeed by combining access to venture capital with public policy support to create a competitive launch ecosystem that accelerates commercial space access (2).

Garcia, R.; Singh, A. & Chen, Y. point out that the global space technology (spacetech) market is growing rapidly, having received over $6 billion in venture capital (VC) funding in 2024 alone. They attribute this growth to an increased focus on space-based AI, reusable launch systems, and in-orbit manufacturing technologies [3].

Kukreja, R., Oughton, E. J. & Linares, R. examine the environmental impact of low Earth orbit (LEO) satellite constellations. They conclude that reusable rockets reduce greenhouse gas emissions by over 90%, offering a sustainable innovation advantage for private launch firms.

Lee, M., Patel, S., & Rossi, L. investigate how additive manufacturing is transforming the production of space technology by enabling faster prototyping and reduced costs for satellites and rockets, particularly for small launch services [5].

Leutert, F., Bohlig, D., & Kempf, F. present a model of autonomous in-orbit manufacturing that integrates artificial intelligence (AI), robotics, and digital twin technology to fabricate small satellites directly in space. This model shows potential for reducing costs and increasing system flexibility [6].

Singh, R., Owusu, F., & Andersson, C. propose a three-tier space ecosystem consisting of an upstream layer, a data integration layer, and a downstream layer. They highlight how digital platforms create value by linking infrastructure with services across industries [7].

Smith and Johnson identify challenges in evaluating downstream space activities, especially in quantifying the indirect economic value of satellite data for non-aerospace industries such as agriculture, logistics, and urban development [8].

Stevens, E., O'Brien, M., & Duarte, S. analyze evolving public–private partnerships and conclude that private firms rely on public funding and policy to scale operations. However, this also raises concerns about strategic vulnerability [9].

Wang, L.; Zhao, Q.; and Kumar, P. explore China's dual-track space sector. They note how politically supported private firms, such as LandSpace and i-Space, are challenging state monopolies by offering reusable launch vehicles and quickly adopting new technologies [10].

Research Goals. The article aims to assess the current state of the space industry, explore its division into upstream and downstream activities, and analyze the extent of private company participation in these areas. The article aims to investigate key factors contributing to the success of private space ventures, including technological innovation, access to funding, and political support. The article also evaluates private companies' performance in sectors such as satellite manufacturing and rocket launching and examines the role of government support in fostering their growth. Furthermore, the article considers the potential for the space industry to expand its services beyond the traditional aerospace sector to everyday consumers and businesses.

Results. Space is a complex field that is generally divided into two broad categories. One category, called "upstream," covers everything related to building and

launching spacecraft or satellites. The other category, downstream, covers activities that use data collected from space, such as GPS, satellite TV, and weather reports. Many private companies are already active in the downstream part of the industry. These companies receive data signals from space and transform them into useful services. There is already a lot of competition in this area because many companies offer similar services to consumers.

Private companies are also becoming more active in the upstream part of the space industry. For instance, Elon Musk's company, SpaceX, was the first private company to deliver cargo to the International Space Station using a rocket and spacecraft that it manufactured. This marked a significant change in the industry. Another company, Orbital Sciences, built a similar spacecraft called Cygnus. Richard Branson's company, Virgin Galactic, is developing spacecraft for space tourism. They built one called SpaceShipTwo in collaboration with Scaled Composites. Other small companies, such as XCOR Aerospace, are manufacturing engines and entire spacecraft independently. Jeff Bezos's company, Blue Origin, is developing spacecraft such as the New Shepard.

A group called Copenhagen Suborbitals in Denmark is trying to build affordable rockets and launch systems without government help. They have already built and launched several rockets. In the UK, Excalibur Almaz has begun providing space services and has launched two experimental spacecraft: Genesis I and Genesis II. Meanwhile, new companies with more ambitious goals are appearing. For example, Planetary Resources wants to build spacecraft that can mine rare minerals from space. Another, Inspiration Mars, is planning a cargo mission to Mars. Moon Express is focused on collecting materials from the moon for commercial use. Astrobotic Technology is designing a rover called Red Rover that could be used on future space missions.

One of the fastest-growing areas in the private space sector is satellite production, particularly of small satellites, such as microsatellites, nanosatellites, and CubeSats. In India, Dhruva Space was the first private firm to manufacture microsatellite platforms. In Russia, Dauria Aerospace builds satellites for Earth observation and communication in low orbit. The company is also developing cloud-based software to make satellite data easier to use in business and everyday life. In Germany, Berlin Space Technologies builds microsatellites from start to finish. Effective Space Solutions, an Israeli company, is developing a new type of small spacecraft called a "DeOrbiter," which can adjust the position of damaged or drifting satellites and extend the life of communication satellites. Private companies often build and use small satellites like these.

SkyBox Imaging, a company based in the United States, uses microsatellites to capture detailed images of Earth. Google purchased this company to expand its own space capabilities. Planet Labs is another company doing similar work with its own fleet of microsatellites. In New Zealand, Rocket Lab manufactures light launch vehicles. In Switzerland, Swiss Space Systems is developing systems for launching small satellites. The UK company Reaction Engines is developing a revolutionary hybrid engine called SABRE. The British government has agreed to help fund the project.

NanoRacks started as a group of space hobbyists and has grown into a private company that offers services giving other businesses access to equipment aboard the International Space Station. Clients can lease lab space on the station or pay to launch small satellites using special hardware called the CubeSat Deployer. NanoRacks also sells laboratory modules that facilitate conducting experiments in space, which can be useful for companies trying to test new technologies or medical treatments.

Several important factors have enabled private businesses to enter the space industry. First, many of these businesses use technology that governments or research institutions have already developed. Rather than starting from scratch, they take existing parts and knowledge and build on them, saving a lot of money. Second, governments have helped make this possible by passing laws that allow private businesses to use space technology.

Second, globalization has created a global market for space services. Companies are no longer limited to selling their products in just one country. They can offer them worldwide, making space a more attractive place to do business.

Third, technology has become more affordable and compact. Many electronic components used in space technology are now standardized and easy to purchase. This benefits companies that build satellites because they don't have to create every part from scratch—they can just buy what they need and focus on assembly and improvement.

Fourth, governments are trying to attract private investment into the space industry. Countries that are just starting to develop space programs now have the opportunity to focus on business models and commercial strategies from the outset. In the United States, for instance, NASA collaborates closely with private companies and supports their development. This helps ensure that both the public and private sectors can grow together in space.

Commercialization is now a major force in the space industry. This means transforming space from a government-only activity into a source of profit for businesses. This shift is occurring among not only small businesses but also large public companies, government organizations, and partnerships. These groups are focusing on commercial contracts rather than government missions.

Private companies differ from government organizations in one significant way: they take financial risks with their own money. Because of this, they are highly motivated to produce cost-effective, reliable, and attractive products. They have strong incentives to

innovate and deliver on time because their survival depends on it. Two key factors determine the competitiveness of a space product: cost and quality.

Companies improve their success by carefully managing projects, standardizing parts, using lighter materials, and building modular equipment that is easy to upgrade. They also try to find new ways to solve problems. These efforts help them save money and innovate simultaneously. Private companies are small and flexible, so they can move quickly, bring new ideas to market faster, and change their plans without too much bureaucracy. They are not slowed down by the paperwork and formal processes that often delay government projects.

They also try to ensure that their research and development efforts result in profitable products. For instance, SpaceX leads in space launches because its prices are lower than those of many competitors. In Russia, Dauria Aerospace won a contract to build two satellites for Roscosmos, beating out a major state-owned company. According to experts, Dauria won because they offered better features at a lower price and responded quickly with a complete project plan.

Another private company, S3 from Switzerland, is developing a launch system that uses an airplane and a shuttle powered by regular fuel. This method could reduce launch costs by over four times compared to current systems. This makes it easier for small companies—or even individuals—to get involved in space exploration. This kind of development could create a commercial foundation that would allow governments to focus on larger goals. If private companies can handle simpler tasks in Earth's orbit, governments can dedicate their resources to more ambitious missions.

Conclusions. In conclusion, private companies are becoming increasingly active participants in the space industry, particularly in technologically advanced areas such as satellite manufacturing and launch operations. The fastest growth is occurring in the small satellite segment and in services that rely on satellite data. Innovation and efficiency are driving new opportunities in these areas. However, many of these companies are relatively new and depend heavily on government support. They often operate through corporate projects or partnerships that provide financial resources, technical expertise, and regulatory assistance. These public-private sector collaborations have been essential in helping private space ventures gain a foothold in the industry. Despite their dependence on such support, these companies have demonstrated that private enterprise can be viable and effective in space-related activities. If this trend continues and their projects prove sustainable, we may soon witness the emergence of a broader commercial market for space services targeting not just government clients or specialized industries but also the general public. This could pave the way for entirely new sectors driven by space technologies and reshape how society interacts with and benefits from activities beyond Earth.

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