Decentralized Regulation of Space Activities in the Aspect of European Integration and National Security of Ukraine

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The article explores the nature and architecture of space governance and how it has evolved and will continue to evolve without a global government or supreme authority. Understanding how the principles and rules applicable to these activities are established, implemented, and reformed is fundamental. The paper highlights the emergence and development of global administration and the evolution of its study. This article is accompanied by an analysis of the space governance structure and a review of decentralized governance theories to propose a feasible, efficient and dynamic space governance model that will ensure its continuous evolution. The article highlights the importance of implementing decentralization of administration in space activities for Ukraine during the martial time and in the conditions of European integration.

Keywords: decentralization, administration of space activities, national security, European integration

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Introduction

Today in Ukraine, there is a considerable gap between the needs of space practice and its normative and legal consolidation, which determines the need to reform the national space legislation, in particular, to improve the tools of the system of state-legal regulation of activities in the field of research and use of outer space. One of the tools is the introduction of decentralization of regulation in the field of space activities. Thus, at the beginning of the

90s, a large number of enterprises and scientific centers in the field of space activities could not function and fell into decline. The impossibility of conducting a horizontal policy in the sphere of space activity became one of the reasons for its decline and suspension. The lack of decentralization and certain independence of individual structures in the space industry led to the decline of the space industry heritage. Over the past few years, Ukraine has taken specific steps and intensified the process of space activity; Ukraine has become one of the countries that signed the Artemis Agreement, and the leading task has become European integration in the aspect of space activity and in particular the approach to the European Space Agency.

The topicality of the work increased with the beginning of the war in Ukraine, so currently, all forces are focused on supporting the Armed Forces of Ukraine. However, it is now essential to support the space industry by implementing decentralization, providing independence to individual departments and sectors, introducing the possibility of continuing active space activities, and searching for profitable cooperation and support from European countries. It is now essential to carry out work according to the strategic plan because the space sphere needs a large concentration of forces to start its activities.

The history of space governance

The first step in the established principles in the space law field was the General Assembly's adoption in 1963 of the Declaration of Legal Principles Governing the Activities of States in the Field of Research and Use of Outer Space (Declaration, 1963). As a result, we established that the exploration and use of outer space would be carried out for the benefit and in the interests of all humanity and that outer space and celestial bodies are free for exploration and use by all states. According to the provisions of the 1963 Declaration, outer space and celestial bodies cannot be subject to national appropriation, and states must bear international responsibility for national activities in space carried out by governmental institutions or non-governmental structures and ensure the implementation of the principles set out in the 1963 Declaration (Declaration, 1963). The principle of responsibility is the implementation of state control over objects launched into space to ensure order during this launch, and in the event of unexpected consequences, the state must compensate for damage caused by its object. Declaration of 1963 unequivocally established the international consensus that the exploration and use of outer space are carried out "following international law" – a fundamental principle later reiterated in the Outer Space Treaty of 1967 (Treaty, 1967). At the time of their adoption, the 1963 Declaration and the 1967 Outer Space Treaty were filled with great power and significance based on previous experience and established principles. New ideas for regulating legal relations in the space sector are required today. It is important to note that the current general principles do not require radical changes but only new clarifications under the conditions and challenges of today.

The history of space governance begins with the adoption of space law treaties and institution building: the UN Committee on the Peaceful Uses of Outer Space (UN-COPUOS), founded in 1959, adopted the Basic Principles and then the Constitutional Treaty, the 1967 Space Treaty (Treaty, 1967). Subsequently, regulations on the rescue of astronauts and spacecraft, responsibilities, and the registration of space objects were developed and implemented. We should also note the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Agreement, 1979). From this, we can see that the UN-COPUOS is the center of decision-making in space activities, and space management has a reasonably monocentric

system. The international system is decentralized, lacking a sovereign and developing international law in a horizontal rather than vertical manner. The monocentric system of space governance is thus a part of the decentralized global governance system, which may explain its deficiencies (Tepper, 2019).

A decentralized form of government is becoming increasingly important and necessary in global affairs. A complex, monocentric government will not produce the desired results in space activities. There are numerous benefits to decentralized governance. It is adaptable and flexible, which is especially important in the face of rapid technological development. Decentralized governance allows for the participation of more stakeholders and experts. This system enables us to cover and explore a broader range of space. Due to various intergovernmental space organizations (European Space Agency, Intelsat, Inmarsat, Intersatellite, ARABSAT) engaging an essential role in the advancement of the space industry and the further improvement of "space" legislation, the range of subjects of international space law has significantly expanded.

In the early 1990s, 130 rocket and space industry enterprises were on Ukrainian territory (design bureaus, research institutes, production associations, and test centers). Unfortunately, this scientific and technological potential is largely untapped. Initially, independent Ukraine found itself in a difficult economic situation as a result of the collapse of the USSR. Inflation was rapidly increasing, eventually leading to hyperinflation. Furthermore, decades-long production ties had been severed, and final, with the moment of secession, the level of production sharply decreased and, as a result, the number of tax revenues to the budget and theonomy stagnated, causing all other spheres of state life to stagnate (Okladna & Korchevskaya, 2021: 87).

As we can see, Ukraine's enormous potential was gradually eroded by government changes and economic crises. In the context of state transformations, space activity reduced its activity. Unfortunately, the lack of decentralization and the possibility of specific agencies and institutions interested in the development of this area resulted in a weakening of the space state's forces. However, many space enterprises and scientific institutes are concentrated in the Ukrainian SSR. The Russian Federation has invaded Ukraine, and the primary forces and expenditures are devoted to military support. However, we must not forget to support space activities so that our adversary does not pause. For example, despite a slew of sanctions, the Russian Federation maintains its space activities and maintains contacts with European and American representatives in the international community. In these challenging times for the country, preserving and expanding what we have is critical. That is why it is essential to continue working on decentralizing space governance.

Towards decentralized regulation of space activities

It is critical today to study and comprehend the evolution of space administration from its inception to the present. Furthermore, decentralization in space activities and the destruction of the monocentric structure of space management are required. Today, we see that space activity administration is at a crossroads; the attempt to establish centralized administration of space activities has many flaws that prevent proper development in space activities. Today, it is crucial to identify and implement a governance model allowing space administration's evolution and rapid development within the international system.

As we witness the disastrous consequences of Russia's invasion of Ukraine, it is more important than ever to establish a clear framework, rules, principles in space activities, and sanctions for noncompliance. Today, we believe that the ability to prevent specific offenses is

the most important. Any errors in space activities can have catastrophic consequences. Today, scientists, lawyers, and government officials must consider space management from a global perspective. From the late 1950s to the mid-1970s, there was a period of successful space governance, including institution building and space law treaties, but the space governance developed by these institutions remained largely stagnant. This prolonged stagnation results from a decline in major institutions' rule-making capacity compared to the general trend in global affairs. The decline in rule-making capacity is partly caused by a lack of interest, political intention, or a shift in state attitudes, as well as structural issues in space governance. As a result, even the most pressing issues, such as space debris, militarization, and the use of space natural resources, remain unresolved. In our opinion, scientists, lawyers, and government officials' primary task is to implement an effective, dynamic model of space governance that will allow further development in this field. The only way to achieve remarkable success in administration is to make space governance polycentric, allowing for a decentralized, gradual evolution of space governance. In our opinion, each area of space activity requires its own experts and active stakeholders. Polycentric governance is distinguished by flexibility and adaptability, which are critical given the anticipated changes and disruptions in technologies and commercial models. We must not fight against and correct their monocentric system. It is critical to promote decentralization in space, i.e., rely on the work of separate governance centers; and redirect governance-building efforts (Tepper, 2019). Decentralized governance has numerous advantages. The first and foremost is the feasibility of achieving governance under anarchy. It enables incremental evolution of governance by introducing partial regimes – partial in terms of the issues they cover and the parties to the formation of the regimes. Over time and in the aggregate, they cover larger swaths of space governance and actors. Decentralized governance is flexible and adaptable, especially when rapid technological developments are concerned. Significantly, decentralized governance, and polycentric governance, in particular, enable meaningful participation of stakeholders and experts in governance, which, as empirical studies have demonstrated, results in rules that better match the circumstances and conditions of what they apply to and greater adherence to those rules. Decentralized governance has adverse effects, which include redundancy and inconsistency. It raises concerns of regulatory oversight deficit and questions about participation, accountability, and bias toward powerful states and other actors. Nevertheless, the multiplicity of actors participating in decentralized governance provides balance. Furthermore, the advantages of decentralized governance can be maximized, and its adverse effects can be mitigated if governance centers meet Ostrom's "design principles for effective institutions, if institutional deference is practiced, and possibly if the standards of "global administrative law" (GAL) or the law of global governance are applied. In actuality, polycentric space governance entails that rather than top-down, issue-specific forums (such as one on militarization) led by stakeholders (the active actors/users thereof) and experts (as part of epistemic communities), who would establish rules for that issue, space governance will develop bottom-up, through numerous, issue-specific forums. Adopting polycentric governance entails promoting and supporting the development of distinct governance centers in each sub-issue area: one for weaponization and militarization, one for space debris, one for the use of space's natural resources, and a fourth for space traffic control. The basis of polycentric governance is the users' self-governance, or the ability to create, change, and perhaps enforce the rules themselves. Users tend to follow their own rules more closely than those imposed above since they are more tailored to their circumstances and requirements. In space governance, the parties concerned with a particular problem will take

the initiative in developing the necessary regulations. The experience with space governance demonstrates that despite the failure of the attempt to develop a generally agreed code of conduct, rules on the mitigation of space debris were adopted by an inter-agency forum of stakeholders, whose progress should be tracked over time. There are high possibilities to establish a governance system that is continuously evolving and meeting the changing needs if space governance is divided into sub-issue-areas and has a forum that is predominate with users/stakeholders, who have a vested interest in establishing some rules and have relevant knowledge of the issue area, and with experts (Tepper, 2019).

According to the Plan of Priority Actions of the Government for 2021, approved by the Decree of the Cabinet of Ministers of Ukraine dated 24.03.2021 No. 276, paragraph 133 states the need to develop and submit to the Cabinet of Ministers of Ukraine a draft law on the transformation of state unitary enterprises of the space industry into joint-stock companies. Such corporatization, as the transformation of state unitary enterprises into joint-stock companies, is not a method of privatization. Corporatization helps to change the organizational and legal form of the business entity, but the form of ownership does not change. As a result of corporatization, state property is transferred to the created company. At the same time, the state has corporate rights regarding this company and the ability to manage and receive dividends from the company's activities.

The purpose of corporatization is the reorganization of the state enterprise aimed at increasing the efficiency of its activities as a result of improving the management system (Bondarenko et al., 2020). Taking such steps makes sense because, under the conditions of European integration, the joint-stock form of entrepreneurship is a powerful means of building an economic system based on non-state forms of social responsibility. At the same time, the comprehensive development of shareholder forms contributes to the approval of the fair nature of appropriation of the means and results of production, namely, the alienation of direct employees of enterprises from ownership is overcome (Semenyuk, 2018). In transforming state unitary enterprises of the space industry into joint-stock companies, we will receive an update on the economic system, creating an innovative environment, destroying non-working structures, and opening the way to essential transformations.

Conducting space activities in the interest of national security and of Ukraine

The beginning of the space age was similar to the competition between the Soviet Union and the United States in the scientific and military spheres. Already over time, both states realized that their interests and the ability to explore and use space required cooperation and some generally accepted rules, resulting in the Treaty on the Prohibition of Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water adopted. Tests of nuclear and ballistic missiles in the 1950s and early 1960s demonstrated the detrimental impact of such military activities on the functioning of satellites and the safety of space flights, primarily due to the resulting debris and electromagnetic pulses (Cheng, 1997: 224-225). Satellite imagery technology allowed both nations to observe each other's military operations on the ground and later proved essential in providing intelligence and as a technical means of verifying compliance with arms control treaties. However, the fear that another state will gain a military monopoly on space as a new "height" and the desire to maintain safe access to space for civilian purposes forced the two Cold War superpowers to agree on the importance of the

international rule of law for governance, and in many ways to limit activities, in particular, military activity in space. Guiding principles for the peaceful use of outer space were adopted through the multilateral forum of the UN Committee on the Peaceful Uses of Outer Space. The general role of the rule of law is emphasized in Article III of the Outer Space Treaty, according to which all space activities must be conducted "following international law, including the Charter of the United Nations." Following the provisions of Article IV of the Outer Space Treaty, the States Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other types of weapons of mass destruction, to install such weapons on celestial bodies or to place such weapons in space by any other means. The Moon and other celestial bodies must be used by all States parties to the Treaty exclusively for peaceful purposes. The creation of military bases, installations, and fortifications, the testing of any weapons, and the conduct of military maneuvers on celestial bodies are prohibited. The use of military personnel for scientific research or other peaceful purposes is not prohibited. The use of any equipment necessary for the peaceful exploration of the Moon and other celestial bodies is also not prohibited. Therefore, legal disputes about whether open space can use a military component for its peaceful purposes have long since reached a consensus about the impossibility of using aggressive military measures. However, there are many non-aggressive military uses of space for which clear rules must be established, especially given the pace at which new space technologies and programs are developing.

The space industry is significant in the world. Today, as Ukraine suffers heavy losses due to the Russian Federation's invasion, many reforms in the public administration sector are underway. At the forefront of the state is the provision of the military, and most other sectors receive only a minimal supply. Regarding space activities, some scientists have begun to write about the need to develop this sector in the postwar period. For example, S.P. Koshova, in her work "Peculiarities of the space industry in the postwar period of Ukraine," notes that the critical issue for further development of the space industry in Ukraine is to build an effective management structure of enterprises in this industry and the formation and implementation of state-space policy. The author argues that in recent years there has been development in Ukraine's space sector; therefore, after the war, the Ukrainian government must create all possible conditions for developing private space business (Koshova, 2022). Definitely yes. However, we cannot make any pause in ensuring the activities of the space sector. Any gaps would relegate Ukraine to the space industry for decades. Today, it is essential to fight corruption with all our might and allocate funds to support the space industry.

The market for space technologies is developing rapidly. Participation in the supply of products and services is a crucial component of any country's scientific and technological development. However, we must understand that space activities cannot be compared in effectiveness despite the considerable potential for development. This is due to the large scale of financial costs and efforts required to implement such an industry. Therefore, it is essential not to stop the development of the space industry during the hostilities in Ukraine. A short break of one to two years will have painful consequences for the state.

Nevertheless, it is essential to preserve Ukrainian space. Given the migration issues that arose during the Russian invasion of Ukraine, it is also important to provide jobs, working conditions, and earnings for Ukrainian scientists and researchers in the space area. Because the inability of the state to pay wages and keep the space industry in working order will lead to the loss of Ukrainian brains. Along with the problem of the difficult start and launch of space activities, in the event of a temporary cessation, there will be a problem of a lack of

scientists and experts in space. Since space power continues to operate at high speed, minor pauses will have serious consequences. It should also be noted that, despite the significant number of sanctions, the Russian Federation continues its space activities and continues in the international community with European and American representatives.

Today, the prestige of a state and its power determine its participation in space activities. The main problem with the development of this industry is the need for significant investment because it requires high costs and a certain level of technological development in the country. This, in turn, complicates the entry of underdeveloped countries into the space goods and services market while highly developed countries are still developing (Nemeschuk, 2011). Historically, space activities arose and developed to solve major national problems, mainly in full financial, organizational, and administrative responsibility and with state support. In the process of the evolution of astronautics, the urgency of such tasks as:

- Reducing the cost of space programs;
- The use of space systems to solve applied tasks of public tasks;
- Implementation of space industry results in other industries;
- Providing access to space technologies for all interested organizations and individuals. For a long time, the openness of space activities and the availability of space technologies were objectively hampered by several factors, the main of which was the involvement of astronautics in solving national defense problems. The space industry is vital in Europe and has new perspectives and projects, such as new rocket technologies, new fuel, new engines, and launch vehicles; technologies of minimization, processing of waste, garbage, cleaning the environment; non-jet, non-rocket flight technologies, space travel on new physical principles; silent aircraft; the clean, complete life cycle of space technology and activities; fundamentally new technologies to ensure human life and safety in space; solar space power plants (Koshova, 2022).

In the leading space governments, the space industry has a rather complex structure, including peaceful, commercial, and military space activities. Military and space activities are related to access to space in the interests of defense and military security (Atamanenko & Fedonyuk, 2014). The key directions of the military-space state are:

- Orders and works related to the development of military rockets and space technology,
- Space infrastructure facilities,
- Eployment and maintenance of orbital groups of space systems and communication complexes in proper composition and working condition, and
- Solving specific tasks of combating aggression in space and from space in the event of a threat to national interests.

Following the national target scientific and technical space program of Ukraine for 2021–2025, the set tasks include: conducting space activities in the interests of national security and defense; creating space observation systems of the Earth and its constituent parts; introducing space technologies into the market of services; creation of rocket and space technology; basic and applied space research; legal, scientific and technical information support of the program activities. The program provides three options for solving the tasks: maintaining the previous (pre-war) approaches and reducing funding with the subsequent collapse of the space industry; conducting space activities on a commercial basis with an exclusively regulatory function of the state; and the third option (optimal) is to create conditions to ensure the realization of state

interests at the national and international levels (The National, 2021). Thus, implementing the third and best option will allow for the completion of priority state tasks, the development of innovative technologies, and expanding international cooperation. During these difficult times when the invasion of Russian troops into Ukraine is actively continuing, space activities must survive and intensify with the help of international projects. Moreover, at this time, European countries are opening their doors to Ukraine, actively implementing programs for the development of Ukrainian startups (ESA Business Incubator for Ukrainian space startups, for example) (ESA, 2014), and providing every opportunity for joint space projects.

Integration of Ukraine into the European Space Agency

The Ministry for Strategic Industries of Ukraine, taking into account the proposals submitted by the State Space Agency of Ukraine, has developed and submitted for approval to the concerned state bodies a draft order of the Cabinet of Ministers of Ukraine "On approval of the Action Plan for Ukraine's integration into the European Space Agency." An Action Plan for Ukraine's integration into the European Space Agency of Ukraine aims at implementing all components of ESA membership, namely the following tasks: ensuring the negotiation process with ESA to expand cooperation at this stage; building the image of Ukraine as an active partner of ESA, the E.U. and the Member States and States associated with ESA in the implementation of projects in the field of space activities; approximation of Ukrainian and E.U. legislation in the field of space activities and project implementation procedures; preparation for the conclusion of the Agreement of the state cooperating with ESA; preparation for Ukraine's membership in ESA (The National, 2021).

Following paragraph 135 of the Government's Priority Action Plan for 2021, the development of an action plan for Ukraine's integration into the European Space Agency is indicated. The ultimate goal of these actions is to determine Ukraine's full membership in the European Space Agency. According to the Plan, The Ministry for Strategic Industries of Ukraine is responsible for implementing this step. A corresponding decision of the Cabinet of Ministers of Ukraine on such a plan should be adopted in December 2021. According to the Plan, the expected results state the use of the E.U.'s "space" potential in the interests of Ukraine's economy and security; access to the tender system of the European Space Agency, and full participation in the implementation of large-scale European space projects and research programs; access to advanced European space technologies to improve domestic rocket and space technology further; deepening the process of Ukraine's integration into the E.U. economy and promoting Ukraine's political integration into the E.U.

The European Space Agency (ESA) is an international intergovernmental organization of 22 Member States and a model of international cooperation in exploring and using outer space. States cooperate through ESA, and ESA cooperates with other partners. In the first case, ESA can be considered a mechanism of international cooperation between its Member States. In the second case, ESA is an actor in international cooperation (The European, 2018).

In ESA, around 2,200 employees from all the Member States work. These are scientists, engineers, information technology, and administrative staff. These individuals are in an employment relationship with ESA. Public administration of ESA is carried out by collective (ESA Council, assisted by the Bureau of the Agency Council) and individual (Director-General and staff members) subjects. Aside, experts, who are not directly members of ESA, but perform certain functions, have specific administrative rights and responsibilities that

should be distinguished (Dolanská & Halunko, 2019).

The activities of the Agency include mandatory activities, in which all Member States participate, and optional activities, in which all Member States participate apart from those that formally declare themselves not interested in participating. The foundation of will and the exercise of assigned competencies of an IGO materialize through at least one organ, traditionally two: an executive organ and a collegial department. ESA has its parts in the Member States, namely: the European Astronauts Centre in Germany; the European Space Astronomy Centre (Spain); the European Space Operations Centre (Germany), the Centre for Earth Observation (Italy), the European Space Research and Technology Centre (Netherlands), the European Centre for Space Applications and Telecommunications (U.K.), the European Space Security and Education Centre (Belgium), as well as liaison offices in Belgium, USA, and Russia. ESA's main object is a launch base in French Guiana and ground/tracking stations in various parts of the world. (ESA, 2019). ESA is a mechanism of international cooperation in outer space activities, taking the form of an international intergovernmental organization with an international legal personality recognized by its Member States and many other States of the international community. The ESA system allows for the necessary flexibility of taking into account the particular interests of its Member States while at the same time guaranteeing the necessary stability of a core European space program. Therefore, the leading form of management in the European Space Agency is horizontal. Therefore, striving to achieve the status of a member of the European Union and to integrate into the European Space Agency, Ukraine must comply with the outlined forms of government and management principles in space activities.

Conclusions

The paper examines the decentralization of public administration in space activities. We investigated historical aspects of space administration and noted the importance and necessity of decentralization in space activities in the conditions of the martial time. Support for space activities during wartime should be on par with support for the Armed Forces of Ukraine because such an industry requires much effort to start-up and work. In no case can we suspend such activity. The suspension or inconsistency of the plan of strategic actions in space activities can worsen Ukraine's national security state. In martial law conditions, all efforts should be directed to developing the space industry, technology, and space weapons within the framework of international legislation and implementing legislative acts that will protect the state from invasions by enemy forces. The introduction of decentralization, a horizontal form of government, will help maintain the space industry in a state of war.

In addition, within the decentralization framework, the reform of outdated forms of government is taking place, which is extremely important in the integration issue into the European Space Agency. Today, this topic is even more relevant when Ukraine is a candidate for membership in the European Union. Thus, we can reorganize the state enterprise when implementing, for example, corporatization. Such reorganization is aimed at increasing the efficiency of its activities as a result of improving the management system. Under the conditions of European integration, the joint-stock form of entrepreneurship is a powerful means of building an economic system based on non-state forms of social responsibility. In the case of the transformation of state unitary enterprises of the space industry into joint-stock

companies, we can get an update on the economic system and the creation of an innovative environment. Such an update is essential in integrating the State Space Agency into the European Space Agency.

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