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| Research Article

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The Economic Impact of Space Research in Uzbekistan

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Annotation: The article analyzes the impact of space research on the economy of Uzbekistan. In particular, it examines the application of space technologies in agriculture, transport and logistics, communications, and environmental monitoring. Furthermore, it highlights the contribution of international cooperation in the development of the space sector to the country's economic growth and innovative progress. The study also emphasizes the strategic importance of space exploration in ensuring sustainable economic development.

Keywords: space research, economic growth, Uzbekistan, innovative development, agriculture, environmental monitoring, transport and logistics, resource management, international cooperation.

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Introduction

In recent years, space research and technologies have been recognized globally as one of the most important directions of scientific and technological progress. According to the reports of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), space technologies are considered among the key tools for achieving the Sustainable Development Goals (SDGs) [1]. Developed countries view the space sector not only as a matter of strategic security but also as a crucial driver of economic growth, and they continue to expand investments in this field [2].

The use of space data provides invaluable opportunities for enhancing agricultural productivity, managing water resources, exploring natural wealth, optimizing transport and logistics networks, and carrying out environmental monitoring [3]. For example, satellite observations have proven effective in monitoring crop fields and controlling water consumption.

For Uzbekistan, this field has become particularly relevant. In recent years, the country has established legal and institutional foundations for the development of space activities. In particular, in 2025, the Law "On Space Activities" was adopted. Furthermore, Uzbekistan's expanding cooperation in the space sector with Russia, the United States, and the European Union opens up opportunities for increasing economic efficiency.

This article provides a comprehensive analysis of the impact of space research on Uzbekistan's economy, highlighting its practical applications, prospects, and economic effectiveness.

Literature review

The issue of the impact of space research and technologies on the economy has been widely studied at the international level. In particular, the reports of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) emphasize that space technologies can be regarded as a strategic factor in achieving sustainable development goals [4]. Likewise, the OECD's report *"The Space Economy"* (2022) provides an in-depth analysis of the contribution of the space sector to the global economy, its interconnection with innovative industries, and mechanisms of international cooperation [5].

In academic literature, the direct and indirect impact of space research on the economy is interpreted in different ways. For example, Devezas and Sarygulov (2021) evaluate space technologies as an essential component of the "Fourth Industrial Revolution," showing their potential to expand opportunities for creating high added value [6]. Other studies focus on the practical applications of the space sector in agriculture, environmental monitoring, and natural resource management.

In Central Asia, scientific research on space technologies has mainly concentrated on ecology and agriculture. For instance, in Kazakhstan, studies have been conducted on monitoring desertification and managing water resources through satellite observations. In Uzbekistan, however, scientific sources on space activities remain relatively limited, with a primary focus on establishing legal and institutional frameworks and expanding international cooperation. At the same time, within the framework of the Space Research and Technology Agency, preliminary studies are being carried out on the use of space data in the real sectors of the economy.

The literature review shows that although the economic significance of space research has been thoroughly examined internationally, in the context of Uzbekistan, a comprehensive scientific analysis of this issue has not yet been fully implemented. This, in turn, defines the scientific novelty and practical significance of the present study.

Research methodology

This study is aimed at identifying the impact of space research on Uzbekistan's economy and assessing its development prospects. To achieve this goal, several scientific methods were applied.

First, the theoretical-analytical method was employed to review international and national scientific literature on space research and its role in economic growth, as well as reports from the UN, OECD, and other international organizations. This approach made it possible to determine the existing conceptual and methodological foundations of the topic[7].

Second, the comparative analysis method was used to compare the experience of developed countries (USA, Russia, China, EU member states) and regional countries (Kazakhstan, Azerbaijan) with the context of Uzbekistan. This method helped to identify similarities and differences in the application of space technologies across various sectors of the economy.

Third, empirical methods were applied to analyze Uzbekistan's legal documents, state programs, official statistical data, and international cooperation projects in the field of space activities. In particular, the activities of the "Uzbekcosmos" Agency, as well as the priority directions defined in presidential decrees and government programs, were taken as the object of study.

Fourth, the systemic approach was applied to analyze the impact of space research on various sectors of the economy (agriculture, transport and logistics, communications, ecology, geology) in an interrelated manner. This method helped to reveal the comprehensive economic significance of space technologies.

Research findings

The results of the study show that the use of space research and technologies in Uzbekistan has a significant positive impact on various sectors of the economy.

First of all, in agriculture, satellite observations expand the possibilities of accurate monitoring of crop fields, efficient distribution of water resources, and forecasting yields. This serves as an important factor in strengthening food security and increasing efficiency in the agricultural sector.

In the transport and logistics system, space navigation technologies are applied to improve the efficiency of freight and passenger transportation, optimize logistics chains, and ensure safety. As a result, by developing transit potential, the country's competitiveness in international transport corridors is increasing[8].

In the field of environmental monitoring and natural resource management, the use of space data plays a vital role in controlling desertification processes, monitoring forests and water bodies. In particular, in the Aral Sea region, space technologies have proven to be an effective tool for monitoring the ecological situation.

The findings indicate that although legal and institutional frameworks for the development of space activities have been established in Uzbekistan, technological capacities have not yet been fully formed. In this regard, expanding international cooperation, developing modern space infrastructure, and training qualified specialists are emerging as important strategic tasks[9].

Overall, the conducted analysis confirms that space research can shape a new stage of innovative development in Uzbekistan's economy and make a significant contribution to sustainable growth and national competitiveness.

The results also show that the application of space research and technologies in Uzbekistan is already yielding practical benefits in several economic sectors[10]. The following table presents the main areas of impact of space technologies:

Table 1. The Impact of Space Research on the Economy

Sector	Direction of Impact	Result
Agriculture	Monitoring crop yields via satellites	Increased efficiency, resource savings
Transport & Logistics	Tracking traffic and cargo flows	Reduced costs, improved efficiency
Communication	Expanding coverage through satellite communication	Enhanced information exchange
Ecology	Environmental monitoring and disaster observation	Achieving sustainable development
Energy	Resource management and consumption forecasting	Improved energy efficiency

Figure 1. The Expected Impact of Space Technologies on Uzbekistan's Economy (in percentages)

This figure illustrates the projected effects of space technologies across various sectors (based on indicative figures):

- Agriculture – 15% increase in efficiency
- Transport and logistics – 12% increase in efficiency
- Environmental monitoring – 10% efficiency gain
- Resource management – 8% efficiency gain

- National security – 5% efficiency gain

Conclusion

The results of the study show that space research and technologies play an important strategic role in the sustainable development of Uzbekistan's economy. In particular, the use of space data creates invaluable opportunities in agriculture for increasing crop yields, managing water resources efficiently, and ensuring food security; and in the transport and logistics system for expanding transit potential and improving freight efficiency. Moreover, the introduction of space monitoring in environmental protection and natural resource management contributes to the early identification of ecological problems and the development of timely response measures.

However, the study also reveals that Uzbekistan's technological and scientific potential in the field of space activities has not yet been fully developed. The development of modern space infrastructure, the training of qualified specialists, and the expansion of international cooperation stand out as key priority tasks in this area.

Overall, the development of space research serves as a decisive factor in strengthening Uzbekistan's innovative progress, economic competitiveness, and national security. Therefore, giving due attention to this field at the state policy level, while expanding investment and scientific research activities, should occupy an important place in the country's long-term economic growth strategy.

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