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MONETARY IMPACT OF SPACE EXPEDITION AND PRIVATE SPACE TOURISM

Abstract: space exploration, or rather commercial space travels, has grown from being a government venture into an industry blooming with private corporations. More investment, technological advancement, and popular demand are changing these economies but also pose tough financial challenges and opportunities.

Keywords: space exploration, space tourism, private sector investment

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ФИНАНСОВЫЕ ПОСЛЕДСТВИЯ КОСМИЧЕСКИХ ЭКСПЕДИЦИЙ И ЧАСТНОГО КОСМИЧЕСКОГО ТУРИЗМА

Аннотация: исследование космоса, или, скорее, коммерческие космические путешествия, превратились из государственного предприятия в индустрию, процветающую благодаря частным корпорациям. Увеличение инвестиций, технический прогресс и общественный спрос меняют экономику стран, но также создают серьезные

финансовые проблемы.

Ключевые слова: освоение космоса, космический туризм, инвестиции частного сектора

The cost of space exploration and government expenditures previously used to be carried by space agencies themselves only: NASA, ESA, or ISRO.

Touted for billions, even a solitary Mars rover like NASA's Perseverance may qualify as but one mission. For example, in 2024, the United States provided NASA with approximately \$25.4 billion, illustrating the magnitude of public investment required [2].

The private companies SpaceX, Blue Origin, and Rocket Lab are changing the game for space exploration. While they save by using reusable rockets and creative designs, the cost associated with initial R&D and infrastructure development is still pretty steep [1]. For example:

- Space X Falcon 9 - \$390 million to make.

- The Blue Origin -New Shepard program has accounted for billions privately funded.

A New Frontier Economic Opportunities Commercial space travel has opened lucrative markets, such as:

Space Tourism: Virgin Galactic and SpaceX sell tickets for suborbital and orbital flights for \$250,000 to tens of millions.

Satellite Deployment: Increased demand for satellite internet services has led companies such as Amazon (Project Kuiper) and SpaceX (Starlink) to spend billions.

Space Mining: Though still theoretical, asteroid mining promises access to rare minerals, potentially worth trillions [2].

While promising, commercial space travel involves high entry costs. Building an operational space travel company requires billions and is therefore a high entry cost industry [7].

The extra cost includes the additional restraints of international space laws and safety requirements. Space exploration, commercial travel have led to employing

individuals in almost all sectors due to the rise in engineering software development, aerospace manufacturing. About 370,000 people employed worldwide in space industry stated a 2021 study report [5].

Spillovers Investments in space technology often yield innovations that can provide excellent spinoffs to other industries, for example:

- Satellite technology has revolutionized global communication and navigation systems.
- Material science and robotics, which were once pioneering technologies for missions to space, are now applied in medicine and construction.
- National Prestige and Strategic Benefits: Countries that heavily invest in space gain geopolitical influence and foster technological leadership. Such investments spur economic growth and inspire STEM education and careers.

The collaboration between the government-private entity helps share the costs and risks[8]. For example:

- NASA's Commercial Crew Program partnered with SpaceX and Boeing for the development of human spaceflight capabilities.

Venture Capital and Crowdfunding This consequently opened space race doors for startups with private investments and crowdfunding. For example, Rocket Lab used venture capital in its small satellite launch services [3].

Companies diversify sources of revenues by launching of satellites for thirds party. In discovery missions, scientific data is sold. Accusing space tourism of indulging the ultra-wealthy few on resources that might have otherwise been put into ending other global problems, like poverty and climate change. Rockets create atmospheric pollution and carbon. Overcoming these problems will need tremendous investments in green technologies. Over-enthusiasm may lead to some space investment speculatively as with other new industries like cryptocurrencies [6].

The financial implications of space exploration and commercial space travel are deep, holding immense opportunities but significant challenges. As the sector grows, careful financial planning, international collaboration, and sustainable practices will be crucial to ensuring its long-term viability. By balancing economic ambitions with

ethical considerations, humanity can unlock the full potential of the final frontier [4].

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