**Cosmic Capitalism**

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In the 21st century, which once saw the cosmos exclusively reserved for government agencies, the final frontier is undergoing a seismic transformation. Today, an unprecedented confluence of private capital and disruptive innovation is reshaping space as we know it, giving rise to what we now call “cosmic capitalism.” This transformation is not just a matter of commercial interests rather it carries profound implications for our world and beyond. The global space industry today involves over 10,000 companies from 90 nations, with an estimated 5,000 investors participating.

At the heart of this transformative journey are major players like SpaceX, Amazon, Blue Origin, and Virgin Galactic, alongside a myriad of innovative start-ups. Together, they are igniting a disruptive space race that is redefining the rules of engagement. SpaceX, for instance, has already launched a staggering 3,000 satellites into orbit for its Starlink broadband constellation, with plans to unleash an additional 40,000. Meanwhile, Amazon’s Project Kuiper is pursuing its ambitions with over 3,000 planned satellites, and even tech giant Apple has invested a substantial $450 million in Global Star’s satellite network.

However, the significance of these ventures extends beyond conquering space; it’s about revolutionising our connectivity on Earth. Large Low-Earth Orbit Satellite (LEO) networks promise fast and resilient internet access worldwide. Their proximity to the surface reduces launch costs and enhances the quality of data received. SpaceX’s reusable Falcon 9 rockets alone have reduced expenses by 30%, enabling companies to launch thousands of satellites, aiming for global coverage. The space economy’s tripling in size to over $1 trillion by 2040 has sparked renewed interest in space exploration.

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Yet these developments resonate far beyond marketable interests. Space power competition, which includes economic and military advantages like intelligence gathering, surveillance, enhanced communications, and force projection, is rapidly evolving alongside these commercial endeavours. The reliance on space assets, from GPS to satellite communications, makes them coveted targets during conflicts. Recent threats to the International Space Station and anti-satellite missile tests by Russia and India underscore the vulnerability of space infrastructure. Inspired by the use of Starlink terminals in Ukraine, Taiwan is now seeking investors for its domestic satellite network. Meanwhile, companies like Indian Dhruva Space focus on small satellites, and Bellatrix Aerospace specialises in satellite propulsion systems.

This rise of dual-use small satellite constellations for both commercial and military purposes adds a new dimension to space power rivalries. Leading this high-stakes game are the United States and China, with both developing dual-use small satellites for defence objectives. China is expanding its satellite launch capability with the mass production of medium-lift rockets. Notably, Europe’s top satellite and aerospace companies are teaming up to bid for the $6.4 billion IRIS satellite project, spearheaded by the European Union, which could include up to 170 satellites in LEO between 2025 and 2027.

Looking into the future, the prospect of more than 100,000 satellites orbiting Earth by the end of the decade looms large, representing a twentyfold increase from early 2022.

However, amidst this dynamic transformation of the space industry and the interests of developed nations, a pertinent question arises: how can countries like Pakistan harness the opportunities presented by cosmic capitalism? In this era of an increasingly open and commercially driven space race, Pakistan, like many others, finds itself at a unique crossroads. While the challenges are formidable, it possess the potential to leverage the burgeoning space economy through strategic innovation, investment in space-related technologies, and education. Notably, projects like Pakistan’s National Aerospace Science and Technology Park (NASTAP) and the National Incubation Centre for Aerospace Technologies (NICAT) exemplify such initiatives, fostering collaborative partnerships with established public and private players in the global space race. In the last two decades, Pakistan has also collaborated with the Chinese Space Agency launching Pakistan’s first communications satellite in 2011, and then a joint remote-sensing system in 2018. In a welcome sign of further cooperation, a CubeSat (a miniaturised satellite) from Pakistan, ICUBE-Q, is expected to be on board China’s 2025 Chang’e 6 sample return mission from the lunar South Pole.

Nonetheless, with a lack of space regulatory framework, there exists the perilous potential for space to devolve into a “Wild West” of unbridled competition and chaos. The once exclusive dominion of nation-states over the final frontier now demands a delicate equilibrium between economic prosperity and security in an increasingly crowded domain.

In this 21st-century space race, characterised by the ascendancy of private capital in achieving milestones once solely attributed to superpowers, the possibilities appear limitless. However, with the cosmos as our next frontier, there is an urgent need for new regulatory frameworks to guide humanity’s next giant leap.

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