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ISRO: Challenges and Opportunities

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This article is based on editorial “Expanding India’s share in global space economy” that appeared in The Hindu on 5th July 2019. It talks about the challenges and opportunities for ISRO in the new space age.

Today, the Indian Space Research Organisation (ISRO)’s success has made India to be inducted in an elite group of countries, where India is rightfully acknowledged as a space power in the world. Space technology is dual-use technology, in this feat, apart from space research, ISRO has delivered many projects serving military as well as socio-economic needs of India.

However, demand for space-based services in India is far greater than what ISRO can supply. Therefore private sector investment is critical, for which a suitable policy environment needs to be created.

What is the current status of ISRO?

ISRO was established in 1969 and has been guided by a set of mission and vision statements covering both the societal objectives and the thrust areas.

- The first area was of **satellite communication**, which sought to address the national needs for telecommunication, broadcasting and broadband infrastructure.
 - **INSAT and GSAT** are the core of satellite communication
- The second area of focus was **earth observation** and using space-based imagery for a slew of national demands, ranging from weather forecasting, disaster management and national resource mapping and national security.
 - Beginning with the **Indian Remote Sensing (IRS)** series in the 1980s, today the **RISAT, Cartosat and Resourcesat series** provide wide-field and multispectral high-resolution data for land, ocean and atmospheric observations.
 - With higher resolution and precise positioning, **Geographical**

- **Information Systems'** applications today cover all aspects of rural and urban development and planning.
- The third and more recent focus area is **satellite-aided navigation**.
 - The **GPS-aided GEO augmented navigation (GAGAN)**, a joint project between ISRO and Airports Authority of India, augmented the GPS coverage of the region, improving the accuracy and integrity, primarily for civil aviation applications and better air traffic management over Indian airspace.
 - This was followed up with the **Indian Regional Navigation Satellite System (IRNSS)**, a system based on seven satellites in geostationary and geosynchronous orbits. In 2016, the system was renamed **NavIC (Navigation with Indian Constellation)**.
- **Deep space probes**
 - The most notable of these have been the **Chandrayaan** and the **Mangalyaan** missions, with a manned space mission, **Gaganyaan**, planned for its first test flight in 2021.
 - These missions are not just for technology demonstration but also for expanding the frontiers of knowledge in space sciences.
- None of this would have been possible without mastering the **launch-vehicle technology**.
 - Beginning with the Satellite Launch Vehicle (SLV) and the Augmented Satellite Launch Vehicle (ASLV), ISRO has developed and refined the Polar Satellite Launch Vehicle (PSLV) as its workhorse for placing satellites in low earth and sun-synchronous orbits.
 - The Geosynchronous Satellite Launch Vehicle (GSLV) programme is still developing with its **MkIII variant**, having undertaken three missions, and is capable of carrying a 3.5 MT payload into a geostationary orbit.

What are the potential areas and challenges for ISRO?

- Today, the value of the global space industry is estimated to be \$350 billion and is likely to exceed \$550 billion by 2025.
 - Despite ISRO's impressive capabilities, India's share is estimated at \$7 billion (just 2% of the global market) covering broadband and Direct-to-Home television (accounting for two-thirds of the share), satellite imagery and navigation.
 - Already, over a third of transponders used for Indian services are leased from foreign satellites and this proportion will rise as the demand grows.
- Developments in Artificial Intelligence (AI) and big data analytics has led to the emergence of '**New Space**'
 - **New Space entrepreneurship** has emerged in India with many start-ups which seek value in exploring end-to-end services in the Business-to-Business and Business-to-Consumer segments using new space. However, these startups

have yet to take off in the absence of regulatory clarity.

- So they need an enabling ecosystem, a culture of accelerators, incubators, venture capitalists and mentors that exists in cities like Bengaluru which is where most New Space start-ups have mushroomed.
- Also, the New Space start-ups discern a synergy with government's flagship programmes like Digital India, Startup India, Skill India and schemes like Smart Cities Mission.

What is New Space?

- The term New Space is used to refer to a global sector of new aerospace companies and ventures working independently of governments to develop faster, better, and cheaper access to space and spaceflight technologies, driven by commercial ends as distinct from political or socio economically-oriented ends.
- New space ventures may include: Space tourism, Asteroid mining, Satellite servicing etc.
- SpaceX, Blue origin are some examples of companies involved in New Space.
- Another revolution underway is the small satellite revolution.
 - Globally, 17,000 small satellites are expected to be launched between now and 2030.
 - ISRO is developing a small satellite launch vehicle (SSLV) expected to be ready in 2019.
 - It is a prime candidate, along with the proven PSLV, to be farmed out to the private sector.
 - In this context, The Assembly, Integration and Testing (AIT) role, which is restricted to ISRO must now be outsourced.
- Also years ago, ISRO launched the idea of Village Resource Centres to work in collaboration with local panchayats and NGOs but only 460 pilots have begun. Expanding this for rural areas is a formidable challenge but has the potential to transform rural India if properly conceived as a part of the India Stack and the Jan Dhan Yojana.

What is India stack?

- India Stack refers to the ambitious project of creating a unified software platform to bring India's population into the digital age.
- India Stack is a set of APIs that allows governments, businesses, startups and developers to utilize a unique digital infrastructure to solve India's hard problems towards presence-less, paperless, and cashless service delivery
- Aadhaar forms the core of India stack.

Further, with the Ministry of Defence now setting up a Defence Space Agency and a

Defence Space Research Organisation, ISRO should now actively embrace an exclusively civilian identity.

So with increasing competition, complexity and demand for space-related activities, there is a growing realisation that national legislation is needed to ensure overall growth of the space sector. A New Space law for India should aim at facilitating growing India's share of the global space economy to 10% in the coming decade.

The government now has an opportunity to give priority to a new Bill that can be welcomed by the private sector, both the larger players and the start-ups alike.

Drishti Input:

ISRO's role has been impeccable in making India a global space power, however, there are many challenges and opportunities in the new space age that ISRO needs to address. Discuss.
