114

ISRO'S Achievements and India's Rising Soft Power

Notwithstanding the Indian Space Research Organisation's (ISRO) commercial arm Antrix Corporation being slapped with damages worth 672 million US dollars for unlawfully cancelling a contract by an international arbitration court, it has notched several milestones in space technology in recent times. Some of its recent achievements exemplify the maturing of the Indian space programme.

32-long years after Rakesh Sharma became the first Indian to travel into space, India has now come closer to realising its dream of sending humans into space with the successful test flight of GSLV (Geosynchronous Space Launch Vehicle) Mark III and the safe splashdown of an unmanned crew module. The capsule performed as expected after re-entry into the atmosphere. The primary objective of the mission was to test the new rocket design, at the time of lift-off and passage through the atmosphere. There was not only little deviation from the flight path during its entire course, the vehicle also withstood the atmospheric loading as it travelled.

Another feather was its Mars Orbiter Mission's successful entry into the Martian orbit on September 24, 2014. In doing so, it became the first country ever to enter Mars' orbit in its first attempt. Before India's Mangalyaan, only the US, the Soviet Union, and Europe had entered the Mars orbit. With a price tag of just $70 million, India's Mars mission is the least expensive inter-planetary mission ever. The US Maven orbiter which entered Mars orbit immediately after Mangalyaan cost NASA a whopping $671 million. The enormous cost difference between Mangalyaan and Maven is because the former is far simpler and smaller than Maven. Mangalyaan continues to send valuable scientific data and images from Mars.

Chandrayaan-1, India's Lunar Exploration Programme, launched on October 2008 on board PSLV XL rocket made the stunning discovery of water on Moon. India's second lunar mission, Chandrayaan-2 is expected to be launched in 2017 aboard the heavy-duty GSLV Mark II rocket. ISRO already has planned to launch its mission to Venus soon.

ISRO's achievements have come largely on its own steam. Following nuclear tests in 1974 and 1998, several Indian research institutions including ISRO came under wide-ranging sanctions dealing a huge setback to ISRO's various programmes. It was denied access to cryogenic engine technology with serious implications for its GSLV project. But such technology denials seem to have pushed its scientists to master space technologies through their own efforts. Its capacity for innovation on a small budget has helped ISRO to reduce the cost of its various projects and programmes.

Again, ISRO is earning revenue too with its lucrative satellite launching services . In 2012–13, Antrix Corporation reported revenue of $216 million which grew by 15 percent in 2014–15. Although ISRO's reliable and cost-effective space products and services have drawn many buyers, India is still not among the major players in the global space launch market.

One principal reason for the same being India having just one satellite launch site with two operational launch pads which restricts the number of launches it undertakes. However, the launch market is moving towards 3–7 ton payloads propelled into the geostationary orbit for telecommunications, broadcasting and weather forecasting services.

India's recent success with the experimental launch of a GSLV Mark III vehicle carrying a Crew-module Atmospheric Reentry Experiment (CARE) as its payload on December 18, 2014 with an indigenously developed cryogenic engine is remarkable as it enables her to take a heavier payload of 4 tonne. Operationalising the GSLV provides India with a larger share of an estimated global market for 1,000 satellite launches by 2020 in both the low earth orbit and the Geosynchronous Transfer Orbit space. Also, ISRO is thinking of taking GSLV to the next level with GSLV Mark4 which will be able to lift 6.5 tons instead of 4 tons of GSLV Mark3.

It will also make ISRO self-reliant in all aspects of launch technology, eliminating the need for the huge payments it currently makes to foreign space agencies to launch its heavier satellites. Adding to this, ISRO has also launched a Reusable Launch Vehicle Technology Demonstrator (RLV-TD) to reduce satellite launch costs. As of now, ISRO's market for launches has been restricted to clients in Europe and Canada. India could easily expand its market by offering its space launch services to developing countries in Asia, Africa and South America.

Indian Prime Minister Narendra Modi has already exhorted ISRO to develop a satellite for India's neighbours in the South Asian Association for Regional Co-operation (SAARC). A SAARC satellite could not only boost regional co-operation, but could also encourage joint tackling of shared problems such as poverty, illiteracy, natural disasters, and so on. India can effectively use its skills in outer space to extend its soft power in its neighbourhood and elsewhere.

ISRO has also started helping the US in the launch of latter's satellite from Sriharikota through India's Polar Satellite Launch Vehicle (PSLV). On July 11, 2015, ISRO launched five British satellites into the orbit from Sriharikota by PSLV C28. ISRO has so far launched over 45 satellites for 20 countries using PSLV. Further, contracts have been finalised to launch 16 satellites from six countries in the coming years.

India's latest earth observation Cartosat-2 was launched using PSLV C-34 for various cartographic and other applications including Land Information System (LIS) and Geographical

Information System (GIS). The images sent by Cartosat-2 will be used for drawing maps, urban and rural applications, coastal land use and regulation, road network monitoring and water distribution.

ISRO successfully launched 'Navic', its seventh consecutive navigation satellite using PSLV from Sriharikota on March 28, 2015. The same was done with IRNSS-1G, which is last of the constellation making India self-sufficient with indigenous navigation system. It is notable that during the Kargil war in 1999, India had sought the help of the US in providing GPS data of the region which the latter denied.

With the launch of Navic, India becomes self-sufficient in accessing vital GPS information for India and its surrounding terrains thereby reducing our dependence on US GPS. Navic or Indian Regional Navigation Satellite System (IRNSS) is an indigenously built constellation of seven satellites which can provide accurate real-time positioning and timing services with an accuracy of less than 20 metres. India joined the likes of US, Japan, and Russia as it successfully launched the Astrostat space observatory which is the country's first dedicated multi-wavelength space observatory that will help in understanding the universe.

ISRO's extra-terrestrial missions and space ambitions have been criticised as a waste of resources, which could be better utilised for tackling rampant poverty, malnutrition, and other problems which is not justified. Unlike the programmes of other nations largely driven by military goals, India's space programmes have always been rooted in developmental objectives.

Indeed, ISRO's satellites have played a huge role in transforming the lives of ordinary Indians through contributions in areas including adult literacy, distance learning programs, prediction of weather patterns, natural disasters and telemedicine. ISRO's expertise can be harnessed for accurate navigation services over the Bay of Bengal, Southeast Asia, the Indian Ocean, Middle East and the African region.

When Cyclone Phailin battered India's east coast in 2013, ISRO satellites had provided vital information which facilitated the government's timely evacuation of over a million people. One may remember that in 1999, a cyclone of similar strength had left more than 10,000 dead compared to just few killed in recent disasters. Indian Railways is also in talks with ISRO for ensuring safety at unmanned railway crossings.

The Union Rural Development Ministry and ISRO have signed a Memorandum of Understanding (MOU) for geo-tagging the assets created under MGNREGA which will help in curbing leakages and for using modern space technology for rural development in planning and execution of projects in a transparent manner.

Salient Points

- ISRO's recent achievements exemplify maturing of the Indian space programme.
- India has come closer to sending humans into space with successful test flight of GSLV Mark III.
- Another feather was its Mars Orbiter Mission's successful entry into Martian orbit on September 24, 2014.
- Chandrayaan-1, India's Lunar Exploration Programme, launched on October 2008 made stunning discovery of water on Moon.

- Technology denials have pushed its scientists to master space technologies through their own efforts.
- In 2012–13, Antrix Corporation reported revenue of $216 million which grew by 15 percent in 2014–15.
- ISRO is thinking of taking GSLV to the next level with GSLV Mark4 which will be able to lift 6.5 tons instead of 4 tons of GSLV Mark3.
- India can effectively use its skills in outer space to extend its soft power in its neighbourhood and elsewhere.
- With the launch of Navic, India becomes self-sufficient in accessing vital GPS information for India and its surrounding terrains thereby reducing our dependence on US GPS.
- Astrostat space observatory, country's first multi-wavelength space observatory, will help in understanding the universe.
- ISRO's satellites have played a huge role in transforming the lives of ordinary Indians through their socio-economic contributions.

Glossary

Arbitration: use of an arbitrator to settle a dispute
Splashdown: alighting of a returning spacecraft on sea
Geosynchronous: denoting an orbit around the earth
Orbit: regular elliptical course of a celestial object around a star or planet
Cryogenic: branch of Physics dealing with production and effects of very low temperature
Lucrative: profitable
Geostationary: movement of an artificial earth satellite in a circular geostationary orbit in the plane of equator thereby making it appear stationary in the sky
Navigation: process of accurately ascertaining one's position
Extra-terrestrial: of or from outside the earth