Dr. Syama Prasad Mookerjee
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The Nationalist

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India On The Moon – Triumph of New India Under Modi

PROF. P. KANAGASABAPATHI

More than a century ago, the well-known national poet from Tamil Nadu Subramania Bharathi wrote: *"வானை அளப்போம்; கடல் மீனை அளப்போம்; சந்திர மண்டலத்தூ இயல் கண்டூ தளிவோம்"* (We will measure the sky and harvest the seas; will find out the nature of the lunar region). Bharat, under the leadership of Prime Minister Shri Narendra Modi, has fulfilled the dream of Bharathi on Aug. 23,2023, when Chandrayaan-3 landed on the Lunar south pole. Thus, we became the first nation in the World to land on the hitherto unexplored south pole, besides being the fourth nation to land on the moon.

After the successful landing, the PM noted: "This moment is unforgettable. This moment is unprecedented. This moment is the victory cry of a developed India. This moment is the triumph of the new India. This moment is about crossing the ocean of difficulties. This moment is about walking on the path of victory. This moment holds the capability of 1.4 billion heartbeats. This moment signifies new energy, new belief, and new consciousness in India. This moment is the call of India's ascending destiny," and called it the "first light of success in the dawn of Amrit Kaal".

On this historic achievement, PM said: "We took a pledge on Earth, and we fulfilled it on the Moon…. Today, we have witnessed the new flight of New India in space." Besides, he noted: "When we see such a history being made before our eyes, life becomes blessed. Such historical events become the eternal consciousness of a nation's life."

Thanks to the dedication and commitment of the scientists and engineers at ISRO, the success of Chandrayaan- 3 was remarkable in many ways. This mission was built and launched at an estimated cost of Rs.615 crores, far less than the budgets of films like Adipurush. Moreover, this is one of India's most cost effective space missions, cheaper than its predecessor Chandrayaan -2. The use of indigenous technology and components and the higher participation of women add more value to it.

The success has resulted in India being recognized at the global as the nation with a high potential in space science and technology. Over the past nine years, our Prime Minister has been taking several steps to encourage science,

technology and innovation at all levels. In the field of space, the establishment of IN-SPACe as an autonomous body under the Department of Space in 2020 to create an eco-system of industry, academia and start-ups and to attract higher share in the global space economy was a significant step. Now it has become a vehicle for enhancing India's performance in space.

Chandrayaan – 3 has so far sent us several details which have to be analyzed by the experts. Besides giving us very valuable scientific insights, there is going to be opportunities for home-grown start-ups and MSMEs, leading to creation of lakhs of jobs and paving ways for new inventions. The naming of the two historic points on the moon as Tiranga Point (foot-print of Chandrayaan-2) and ShivShakti Point (landing spot of Chandrayaan-3) connects our civilizational heritage with the New India emerging at the global level.

Our civilization has taught us look at the whole world as one family. Hence, the PM has pointed that India's moon-mission is based on a human-centric approach and noted that the "success belongs to all of humanity".

This success has enabled us to realize the potential of our nation in the field of space and "propel India's journey beyond the moon's orbit" To quote PM: "We will test the limits of our solar system, and we must work to realize the infinite possibilities of the universe for humans."

The entire nation feels proud of Chandrayaan-3 and the achievements of ISRO. Surely it heralds the beginning of a New India in the world of space.

(The writer is Secretary & Trustee, Dr Syama Prasad Mookerjee Research Foundation, New Delhi)

Salient Points of PM Narendra Modi on success of Chandrayaan-3

» I was impatient and eager to visit and salute you for your diligence, dedication, courage, devotion and passion

» India is on the moon! We have our national pride placed on the moon

» This New India will provide solutions to the big problems of the world in the 21st century

» The moment of touchdown is one of the most inspiring moments of this century

» Today, the entire world is witnessing and accepting the strength of India's scientific spirit, our technology and our scientific temperament

» Our 'Moon Lander' has firmly set its foot on the Moon like 'Angad'

» The point where the moon lander of Chandrayaan-3 landed will now be known as 'Shiv Shakti'

» The point where Chandrayaan 2 left its footprints will now be called 'Tiranga'

» In the success of Chandrayaan-3 lunar mission, our women scientists, the country's Nari Shakti have played a big role

» In the journey from 'third row' to 'first row', institutions like our 'ISRO' have played a huge role

» From Southern part of India to the South of the Moon, this was not an easy journey

» Now onwards, every year, 23rd August will be celebrated as the National Space Day

» New generation should come forward to scientifically prove the astronomical formulas in the scriptures of India and to study them anew

» In this period of the 21st century, the country which takes the lead in science and technology, will move ahead

Mission Moon: A watershed moment

Dr Anirban Ganguly

The success of Chandrayaan-3 mission is a culmination of India's deep-rooted scientific temper which has defied all attempts aimed at subduing it.

This last week has been an action-packed week in many respects, clearly indicating that the India of Amrit-Kaal rises driven by determination, confidence and a resolve to forsake and dissolve the colonial-mindset. As Chandrayaan-3 landed, finally placing India on the moon, it became evident that India had made a giant leap of decades and finally achieved one of the most defining feats in Amrit-Kaal. In his address to the ISRO scientists, Prime Minister Modi rightly said that this was one of the defining moments of this century, a moment that has become immortal in the collective memory of humankind, and of India in particular.

From being stonewalled once with an acute and motivated technology denial, from being kept out of a self-ordained elite club of tech-powers who monopolized and controlled technology growth and dissemination, from being treated as a country which could not be trusted with technology, India has emerged with great aplomb on the global science-tech scene as a country to look forward to, as a reliable partner in technology dissemination in line with Prime Minister Modi's call, of the need for knowledge-sharing so that future global challenges could be jointly tackled and resolved.

Prime Minister Modi also dedicated the success of Mission Chandrayaan and its achievements and discoveries to the countries of the "Global South', which for long have had to face denial and control, despite yearning to emerge out of their colonial strait-jacket and wanting to push behind their past of exploitation and exaction. Like her philosophy and civilisational values, which has always been for the benefit of humankind, India's science and her scientific discoveries and achievements are also dedicated to that same global ideal and aim, as PM Modi reminded the BRICS leaders and also reiterated in his thanksgiving address at ISRO.

Indeed, in mindset transformation and alteration, we have come a long way in the last decade. When PM Modi spoke of naming the Chandrayaan's landing spot as "Shiv Shakti Point" – a nomenclature with a deeply philosophical essence, it became evident that these terms, expressions and words which carry a profound and positive essence, were no longer to be shunned in our public and governance discourse.

The Visva Bharati University Bill debate in Parliament in May 1951 came to mind. It was the first case on how an independent India, as a constitutional republic, under the Nehruvian dispensation, displayed

an aversion, an allergy to any allusion to India's philosophical core and essence. Maulana Abul Kalam Azad, as Union Education Minister, while piloting the Bill wanted to do away with Gurudev Rabindranath Tagore's defining motto for the University which said, "In the name of one Supreme Being who is Shantam, Shivam, Advaitam." Taken from the Mandukya Upanishad, Tagore wanted to signify that his educational experiment – Visva Bharati – which spoke of the world gathering in a nest, was a university which was different from the rest, in that it espoused shaping of minds that would also look and connect to the core, to the soul, to the essence of subjects and of fields of study, reflecting India's civilisational and spiritual world-view.

In fact, these words were chanted before every meeting, gathering and programme at Visva Bharati, and now, independent India's first education minister wanted to do away with them. An intense debate ensued, MV Kamath, in a well-reasoned intervention, lamented that a 'fetish' was being made out of secular state, and Dr Syama Prasad Mookerjee, who had a special relationship with the University and with Gurudev for over decades, while participating in it, made a point which remained strikingly resonant for all these years, 'What was the hesitation', he asked, 'in putting those words in the Act? I have not been able to discover any reason. Again, while you put it in the schedule, you deliberately omit the last few words. Why have you done it? I have been asking myself, and I would appeal to Maulana Sahib to look into the matter more carefully and if possible, revise the decision which he has taken on behalf of the Government. What is it that we are afraid of? Is it because we have said that ours is a secular State, we should not mention Supreme Being anywhere in any constitutional document?'

When PM Modi spoke of naming the Chandrayaan's landing spot as "Shiv Shakti Point" – a nomenclature with a deeply philosophical essence, it became evident that these terms, expressions and words which carry a profound and positive essence, were no longer to be shunned in our public and governance discourse.

That ambivalence has now eroded, from placing the Sengol in the new Parliament, to the Adheenam's blessing in its reinstatement, to the revision of British era laws and introducing Bharatiya nomenclatures, to the Prime Minister liberally citing from the scriptures, I believe we are seeing the coming of an era, which was fairly common and accepted in India's public life in the past but which had been demonised, post-independence, because of the pressures of Nehruvian secularism and its idiosyncrasies and fetishes.

The Mission Chandrayaan's success, PM Modi's call of 'Jai Vigyan, Jai Anusandhan', also brings to mind the struggles of the past of India's leading scientific minds to rekindle India's scientific tradition and mindset amidst colonial subjection.

The inspiration imparted to Jamsetji Tata by Swami Vivekananda to set-up a 'Research Institute of Science for India' is well-known. Jamsetji Tata had requested Swami Vivekananda to take the lead in rousing public opinion in its favour. The Swami had to decline any express involvement because of his preoccupation with building the monastery at Belur and because of indifferent health, but he indicated his full support behind the idea.

Tata, along with his assistant Burjorji Padshah, writes author Kunal Ghosh, in his 'Unsung Genius: a Life of Jagadish Chandra Bose', then met Lord Curzon, the Viceroy of India in 1898, for discussing the proposal. Curzon, as was his wont, "summarily shot down the project on the specious ground that Indians were incapable of achieving real mastery in science". Curzon had the gumption to say this knowing well of Jagadish Chandra Bose's recognition in Europe, as 'an eminent scientist' three years prior to this and of his first scientific tour of three European countries, two years before this meeting took place. In fact, William Ramsay, who would go on to win the Nobel Prize in Chemistry in 1904, had derisively told Bose, "You are an exception. One swallow does not make a summer." Ramsay, then, a dominant mind in the Western scientific world, who had much say in shaping colonial scientific policy, exuded a race prejudice and sided with Curzon in his rejection of the scheme.

A deeply disappointed Jamestji sent his sister and Padshah to meet Swami Vivekananda in 1899 in Calcutta to discuss the issue. "They sought help from the Swami and it was given in full measure." Prabuddha Bharata, the flagship English newsletter of the Ramakrishna Mission which was already being widely acclaimed, then published from Madras, carried an appeal by Swami Vivekananda himself in support of "Jamestji's decision to defy Lord Curzon's will" and to go ahead with the project to promote, nurture and rekindle India's scientific talent.

In his appeal, Swami Vivekananda spoke of not being "aware if any project at once so opportune and so far-reaching in its beneficent effects was ever mooted in India, as that of the Post-Graduate Research University of the Tata." It was a scheme, the Swami argued, which, "grasps the vital point of weakness in our national well-being with a clearness of vision and tightness of grip, the masterliness of which is only equal by the munificence of the gift with which it is ushered to the public…" Vivekananda's appeal concluded with the following words forcefully articulated in print in defiance of the attitude of the colonial masters, "We repeat no idea more potent for the good of the whole nation has seen the light of the day in modern India. Let the whole nation therefore, forgetful of class or sect or interests join in making it a success." Swami Vivekananda's appeal in support of Indian science thus, generated waves across the Indian intelligentsia and the thinking public.

Following this, Sister Nivedita, one of the most active advocates of India's scientific prowess, a pillar who stood by and supported the scientific endeavours and struggles of the likes of Jagadish Chandra Bose, "wrote several articles in the Statesman supporting the Tata project

and wrote to many British educationists. There were also others who bolstered the campaign." The points and counterpoints continued with forceful advocacy for the scheme and for allowing India's scientific spirit the scope for emerging. This phase was symbolic and marks the beginning of India's struggle, in modern times, to achieve parity, independence, equity and power in the quest for science and knowledge. The national education movement that soon followed this episode gave further boost to that demand and aspiration.

In a sense, with Chandrayaan-3's landing in the south pole of the Moon, a region which has never been frequented before, another phase of that struggle has achieved successful and victorious completion. It is also a tribute to the likes of Bose, Raman and PC Ray, who through decades of struggles kept up the hope of India's scientific triumph alive, who insisted on projecting India's past civilizational scientific achievements and also of proving her capacities in modern science through repeated scientific experiments and success in various fields.

"If I could, for a moment command the organ-voice of Milton," once wrote Acharya Prafulla Chandra Ray, one of the fathers of India's modern scientific quest, "I would exclaim that we are of a Nation not slow and dull, but of a quick, ingenious and piercing spirit, acute to invent, subtle and sinewy to discourse, not beneath the reach of any point the highest the human capacity can soar to. Therefore, the students of learning in her deepest science have been so ancient and so eminent among us that writers of a blest judgment have been persuaded that even the School of Pythagoras took the cue from the old Philosophy of this land…"

Sister Nivedita, one of the most active advocates of India's scientific prowess, a pillar who stood by and supported the scientific endeavours and struggles of the likes of Jagadish Chandra Bose, "wrote several articles in the Statesman supporting the Tata project and wrote to many British educationists. There were also others who bolstered the campaign." The points and counterpoints continued with forceful advocacy for the scheme and for allowing India's scientific spirit the scope for emerging. This phase was symbolic and marks the beginning of India's struggle, in modern times, to achieve parity, independence, equity and power in the quest for science and knowledge. The national education movement that soon followed this episode gave further boost to that demand and aspiration.

India's Moon-landing has demonstrated that India's achievements are indeed "not beneath the reach of any point the highest the human capacity can soar to."

(The writer is a Member, National Executive Committee (NEC), BJP and Chairman of Dr Syama Prasad Mookerjee Research Foundation. Views expressed are personal)

India's Chandrayaan Mission: Coming True of a Global Dream

Amit Priyadarshan & Anandh Mathew

India's foray into space exploration has been truly remarkable. The Indian Space Research Organisation (ISRO) has made tremendous progress over the years, establishing itself as a prominent player in the global aerospace industry. A shining testament to India's capabilities is the Chandrayaan mission, which has not only enhanced our knowledge of the Moon but also embodies the vision of a self-reliant India - Atmanirbhar Bharat. The Chandrayaan mission shows that India is capable of developing and launching its own spacecraft, without relying on foreign technology.

India, led by Honorable Prime Minister Narendra Modi, achieved unprecedented global recognition through its active participation. On August 23, 2023, India accomplished a significant milestone by successfully landing the Chandrayaan-3 spacecraft in the Moon's southern polar region. With this achievement, the Indian Space Research Organisation (ISRO) solidified India's position as a prominent player in the realm of space exploration.

Chandrayaan: Exploring Moon

The Chandrayaan mission is India's lunar exploration program, comprising two successful missions: Chandrayaan-1 and Chandrayaan-2. Chandrayaan-1, launched in 2008, was India's maiden mission to the Moon and played a pivotal role in the discovery of water molecules on the lunar surface. This groundbreaking revelation opened up new possibilities for future lunar exploration.

Chandrayaan-2, launched in 2019, was an even more ambitious project, aimed at landing a rover on the Moon's surface. Although the lander, Vikram, encountered some technical issues and failed to land as planned, the orbiter continues to send valuable data and images, furthering our understanding of Earth's celestial neighbor. The mission showcased India's determination to explore uncharted territories and marked a significant milestone in the nation's aerospace journey. It also opened up new verticals for innovation and new technology applications.

Opening Up of Indian Space Sector

The success of the Chandrayaan missions is not an isolated incident but rather part of a broader trend that underscores India's rapid rise in the space sector. ISRO's achievements

have garnered global attention, leading to collaborations with space agencies and private companies worldwide. India's cost-effective yet reliable launch services have made it a preferred partner for launching satellites, cementing its reputation as a reliable player in the global satellite launch market. The global space economy is estimated to be worth $440 billion and India India is renowned internationally for its low-cost satellites and launch vehicles.To enhance India's part of the global market, the government has begun space sector reforms to encourage, support, regulate, and authorise private businesses and startups to engage in space activities. Startups play a crucial role in India's space sector, benefiting from favorable policies that facilitate the formulation and development of innovative ideas into tangible products. These initiatives empower startups to contribute towards India's journey of achieving greater milestones in the global space industry.

Startups have emerged as pivotal players in the dynamic landscape of India's space sector. Their presence has not only injected fresh ideas and cutting-edge technologies into the industry but has also acted as a catalyst for innovation. These startups are pioneering novel solutions across a spectrum of space applications, encompassing satellites, launch systems, and ground infrastructure. Moreover, they are introducing transformative services that range from satellite imagery and data analytics to the nascent yet promising field of sustainable space manufacturing. Startups are even exploring the potential applications of Biotechnology and Microbiology in space manufacturing, and ISRO (Indian Space Research Organisation) is lending its support to these initiatives by recognizing the opportunities that lie ahead in the coming years.

Startups are actively engaging in collaborative efforts with ISRO and IN-SPACe. In a historic move, the Union Cabinet, under the leadership of the Prime Minister, made a significant decision in June 2020 to open up the space sector, allowing the active involvement of the Indian private sector in all aspects of space activities. To facilitate this participation, the government established the Indian National Space Promotion and Authorisation Centre (IN-SPACe) as an independent, single-window agency within the Department of Space (DOS). Positioned as a nodal agency, IN-SPACe plays a vital role in promoting and advancing the private space sector economy in India. In essence, startups are the vanguards of change in the Indian space sector. They are pioneering advancements that hold the promise of expanding the horizons of space exploration while simultaneously driving economic growth and technological progress. Their presence underscores India's commitment to being a formidable player in the global space industry.

The future of India's aerospace industry shines brightly, bolstered by strong government support. The nation boasts a formidable talent pool comprising skilled engineers and scientists, and it is channeling substantial investments into space research and development. In the forthcoming years, India, driven by robust governmental backing, is poised to embark on a series of ambitious missions to explore the Moon, Mars, and extend its reach even further into the cosmos.

Self-Reliance in Space sector: Vision for Atmanirbhar Bharat

The Chandrayaan missions and ISRO's broader achievements are not just about scientific discovery; they represent a significant step toward realizing the vision of Atmanirbhar Bharat, or a self-reliant India. India's space program has increasingly focused on developing indigenous technologies, reducing dependence on foreign nations, and promoting self-sufficiency. One of the key aspects of this self-reliance is the development of launch vehicles such as the Polar Satellite Launch Vehicle (PSLV) and the Geosynchronous Satellite Launch Vehicle (GSLV). These launch vehicles are the backbone of India's satellite launch capabilities and have significantly reduced the cost of reaching space. With recent advancements like the GSLV Mk III, which can carry heavier payloads, India has strengthened its position as a competitive player in the global satellite launch market.

Chandrayaan: The Future

The aerospace industry in India has received a significant uplift with the successful Chandrayaan mission. This accomplishment has not only raised India's prominence in the global space community but has also attracted increased investments in the sector. The Atmanirbhar Bharat initiative has further bolstered the growth of India's aerospace industry. The government's financial support for research and development, coupled with the encouragement to utilize domestically manufactured components, has been instrumental in this progress. The expansion of India's aerospace industry is expected to generate new job opportunities and provide a substantial boost to the economy. The country is poised to emerge as a key player in the global space market.

The future of India's aerospace industry appears promising, driven by a talented workforce and robust government support. With these advantages, India is well positioned to establish itself as a leading nation in space exploration in the years ahead.

As an Indian startup dedicated to the Indian space sector and an active member of the Indian Space Association, our focus lies in developing sustainable space building materials using microbes for extraterrestrial bodies like the Moon and Mars. We strongly believe that the Indian space sector is poised to make a significant global impact in the coming years. As startups, our focus is on building systems that are tenable in decades to come, as this mission has proven that the future is ours to build. The Indian space sector is experiencing rapid growth, presenting numerous investment and business opportunities. Various agencies such as IN-SPACe and ISpA, along with national and international events, are laying the foundation for growth and expanding opportunities within the space sector in India.

The visionary leadership and support of Prime Minister Narendra Modi in his endeavor to make India a global power cannot be understated, with the space sector playing a vital role in this pursuit.

(Authors are co-founders of an Industrial deep tech Indian startup - Caliche, and have ongoing projects in the space sector. Views expressed in the article are those of the authors)

चंद्रयान-3 : अमृतकाल में अंतरिक्ष की आकांक्षाओ का चंद्रोदय

अजय धवले

हमारे भारत 23 अगस्त 2023 को इसरो के महत्वाकांक्षी तीसरे चंद्रमा मिशन के रूप में इतिहास रच दिया है चंद्रयान-3'एस लैंडर मॉड्यूल(एलएम) चंद्रमा की सतह पर सफलतापूर्वक उतरा, जिससे वह ऐसा करने वाले हम चौथे देश बन गए है, और पृथ्वी के एकमात्र प्राकृतिक उपग्रह के अज्ञात दक्षिणी ध्रुव पर पहुंचने वाले हम पहले ही है ।

प्रधानमंत्री नरेंद्र मोदी जी ने दक्षिण अफ्रीका से राष्ट्र को संबोधित किया एवं मिशन के वैज्ञानिकों से बात की वे उस समय ब्रिक्स शिखर सम्मेलन में भाग ले रहे थे किन्तु राष्ट्र की इस महत्वपूर्ण उपलब्धि पर उन्होंने अपने व्यस्ततम समय में समय निकलकर वही से देशवासियो को संबोधित किया। प्रधानमंत्री जी ने अपने सम्बोधन में कहा कि "हम सभी चंद्रमा और उससे आगे की आकांक्षा कर सकते हैं। ग्लोबल साउथ ऐसे कारनामे करने में सक्षम है। चांद अब कहानियों से आगे निकल सकता है। उन्होंने कहा की, 'ऐसी घटना राष्ट्रीय जीवन की चिरंजीवी चेतना बन जाती है। ये क्षण विकसित भारत के शंखनाद का है। हम अब हमारे सौर मंडल की सीमाओं का सामर्थ्य परखेंगे, हम मानव के लिए ब्रह्मांड की अनेक संभावनाओं को साकार करने के लिए जरूर काम करेंगे। जल्द ही इसरो सूर्य के विस्तारित अध्ययन के लिए आदित्य एल-1 लॉन्च करेगा। इसके बाद शुक्र (ग्रह) भी हमारे लक्ष्यों में है।' कुछ यही बात इसरो अध्यक्ष एस सोमनाथ ने भी कही। उन्होंने सफल अभियान के बाद अपने संबोधन में कहा, 'चंद्रयान-3 की सफलता देखकर हम सभी बहुत खुश हैं। हम सभी यह देखकर उत्साहित हैं कि हम अब उस स्थिति में पहुंच गए हैं जिससे हम आगे और प्रयोग कर सकें।'

निश्चित रूप से यह हमारे वैज्ञानिकों के लिए एक महत्वपूर्ण अवसर है जो चार वर्षों में दूसरा प्रयास कर रहे थे। अमेरिका, चीन और तत्कालीन सोवियत संघ के बाद हमारा भारत अब चंद्रमा की सतह पर सॉफ्ट-लैंडिंग की तकनीक में सफलता प्राप्त करने वाला करने वाला चौथा देश है।

चंद्रयान-3, चंद्रयान-2 का अनुवर्ती मिशन है और इसका उद्देश्य चंद्रमा की सतह पर सुरक्षित और सॉफ्ट-लैंडिंग प्रदर्शित करना, चंद्रमा पर घूमना और इन-सीटू वैज्ञानिक प्रयोगों का संचालन करना है।

भारतीय अंतरिक्ष अनुसंधान संगठन (इसरो) ने अपने अतंरिक्ष कार्यक्रम की शुरुआत 60 के दशक में बेहद सीमित संसाधनों के साथ की थी। भारत ने अपना पहला

प्रधानमंत्री नरेंद्र मोदी जी ने दक्षिण अफ्रीका से राष्ट्र को संबोधित किया एवं मिशन के वैज्ञानिकों से बात की वे उस समय ब्रिक्स शिखर सम्मेलन में भाग ले रहे थे किन्तु राष्ट्र की इस महत्वपूर्ण उपलब्धि पर उन्होंने अपने व्यस्ततम समय में समय निकलकर वही से देशवासियो को संबोधित किया। प्रधानमंत्री जी ने अपने सम्बोधन में कहा कि "हम सभी चंद्रमा और उससे आगे की आकांक्षा कर सकते हैं। ग्लोबल साउथ ऐसे कारनामे करने में सक्षम है। चांद अब कहानियों से आगे निकल सकता है। उन्होंने कहा की, 'ऐसी घटना राष्ट्रीय जीवन की चिरंजीवी चेतना बन जाती है। ये क्षण विकसित भारत के शंखनाद का है।

रॉकेट 21 नवंबर 1963 को लॉन्च किया था जिसके 45 साल बाद मिशन मून पर बड़ी कामयाबी हासिल की थी। अतंरिक्ष कार्यक्रम की शुरुआत के करीब 50 साल बाद भारत ने मंगल यान भेजा। भारत ने जब अपने अंतरिक्ष कार्यक्रम की शुरुआत की थी, तब शायद ही किसी ने सोचा होगा कि देश का अंतरिक्ष यान एक दिन चांद और मंगल पर भी जा पाएगा।

भारत ने 22 अक्टूबर 2008 को अपना पहला चंद्रयान भेजा था। यह करीब 10 महीने यानी 22 अक्टूबर 2008 से 30 अगस्त 2009 तक चंद्रमा के चारों तरफ घूमता रहा। वैज्ञानिकों ने चंद्रयान में मून इम्पैक्ट प्रोब (MIP) नाम की डिवाइस लगाई थी। यह 14 नवंबर 2008 को चांद की सतह पर उतरा और भारत का अंतरिक्ष विज्ञान के क्षेत्र में भारत ने धाक जमा लिया। इस मामले में भारत चौथा देश बन गया। इससे पहले अमेरिका, रूस और जापान ने यह कामयाबी हासिल की थी। इस डिवाइस ने ही चांद की सतह पर पानी को खोजा था। इस बड़ी खोज के लिए नासा ने भी भारत की तारीफ की थी, क्योंकि इसरो को पहली बार में यह सफलता मिली थी।

इस उपलब्धि ने इसरो को सामान्य अंतरिक्ष अनुसंधान प्रौद्योगिकी के अलावा सुदूर अंतरिक्ष अनुसंधान प्रौद्योगिकी के मामले में अव्वल दर्जे में पहुंचा दिया है। इससे भारत के आगामी सुदूर अंतरिक्ष कार्यक्रम जैसे आदित्य, गगनयान आदि को बल मिलेगा। वैज्ञानिकों समेत सरकार को इसरो की दक्षता और क्षमता के प्रति जो भरोसा जगा है, उससे नये उत्साह का संचार होगा। बीते अनुभव बताते हैं कि ऐसी सफलता अंतरिक्ष प्रौद्योगिकी के जरिए व्यवसाय के भी नए द्वार खोलती है। गौरतलब है कि इसरो को किफायती लागत पर उपग्रह लॉन्च करने के लिए दुनिया भर में जाना जाता है। अब इसे तमाम देशों से संचार, मौसम आदि से संबंधित उपग्रह लॉन्च करने के ऑर्डर बहुतायत में प्राप्त होंगे। उल्लेखनीय है कि इसरो अब तक 34 विभिन्न देशों के करीब 434 सैटेलाइट को कक्षा में स्थापित कर चुका है। इतना ही नहीं, इस बात की प्रबल संभावना है कि आने वाले वर्षों में कई विकासशील देश अपने अंतरिक्ष अनुसंधान को आगे बढ़ाएंगे और इस क्रम में वे भारत से प्रौद्योगिकी और विशेषज्ञता की खरीदना चाहेंगे। नागरिक जीवन में भी इस अंतरिक्ष प्रौद्योगिकी की उन्नति का कम उपयोग नहीं है। मून और मार्स मिशन के अंतरिक्ष यानों में लगने वाले पेलोड की अनुकृति (रेप्लिका) का उपयोग बाद में मौसम, संचार, सामरिक उपकरणों, मिसाइल आदि में किया जाता है। इससे आम लोगों को आने वाले समय में बेहतर संचार और आईटी सेवाएं उपलब्ध होंगी। इन प्रौद्योगिकी के इस्तेमाल से स्थलाकृति की मैपिंग में मदद मिलती है जिसकी बहुमुखी उपयोगिता संभव है। मौसम पूर्वानुमान से लेकर खनिजों की खोज में भी ये तकनीक भविष्य में काफी लाभदायक सिद्ध होगी।

भारत ने 22 अक्टूबर 2008 को अपना पहला चंद्रयान भेजा था। यह करीब 10 महीने यानी 22 अक्टूबर 2008 से 30 अगस्त 2009 तक चंद्रमा के चारों तरफ घूमता रहा। वैज्ञानिकों ने चंद्रयान में मून इम्पैक्ट प्रोब (MIP) नाम की डिवाइस लगाई थी। यह 14 नवंबर 2008 को चांद की सतह पर उतरा और भारत का अंतरिक्ष विज्ञान के क्षेत्र में भारत ने धाक जमा लिया। इस मामले में भारत चौथा देश बन गया। इससे पहले अमेरिका, रूस और जापान ने यह कामयाबी हासिल की थी। इस डिवाइस ने ही चांद की सतह पर पानी को खोजा था। इस बड़ी खोज के लिए नासा ने भी भारत की तारीफ की थी, क्योंकि इसरो को पहली बार में यह सफलता मिली थी।

चंद्रयान 3 की सफलता से भारत के वैज्ञानिकों का विज्ञान व तकनीकी में वर्चस्व, हमारी मेधाशक्ति व मस्तिष्क की शक्ति आज समूचा विश्व मान रहा है, भारत के अमृतकाल में नई अंतरिक्ष यात्रा भारत की खगोलीय महत्वाकांक्षाओं को नई ऊंचाइयों पर ले जाती है, जिससे यह अंतरिक्ष परियोजनाओं के लिए दुनिया के लॉन्चपैड के रूप में स्थापित होने का कार्य करेगी ।

(लेखक कॉर्पोरेट लॉयर हैं. प्रस्तुत विचार उनके निजी हैं)

From Chandrayaan to Samudrayaan: India's Pivotal Shift

Pathikrit Payne

On 23rd August 2023, when Chandrayaan-3 successfully landed in the South Pole region of the moon, history was created in more than one way. That day is significant not just because India became the first country to have successfully landed in the Southern Pole region of the moon in its first attempt, but also because it vindicated what any organization can achieve when the top leadership of the nation puts all its weight behind it.

In the aftermath of 2019, when Chandrayaan-2 was barely at a striking distance from creating history, but missed out by a whisker, Prime Minister Narendra Modi not just consoled the ISRO team, but also assured full support of his Government for the next mission to moon. In barely four years' time, ISRO went ahead with another mission, which was even more complex, and got success.

The enormity of the success should be understood from the perspective of what was at stake. For any mission like this, chances of it going awry at the last moment because of many extraneous factors, even beyond the control of ISRO team, in spite of best of preparations, can never be undermined. There was also the political credibility of top leadership at stake. Naysayers, cynics, detractors from domestic and foreign arena, would have spared no stone unturned to criticize and question the Prime Minister, had the mission gone wrong in some way or the other way. Yet, keeping in mind the necessity of going ahead with scientific endeavors, in spite of the inherent challenges and risks involved, Prime Minister Modi not only made sure that funds were no more a problem for ISRO, in its quest to acquire the best talents and equipment for its missions, but also brought a new vigor and zeal for the quest of knowledge, science, research and innovation in the country. The nation in unison was celebrating the feats of ISRO, after the success of Chandrayaan-3, and after a long time, quest for glory in the field of fundamental science was once again igniting young minds of the nation.

Interestingly, during the landing phase of Vikram, not only the Prime Minister remained connected to the ISRO team through video conferencing from South Africa, where he had gone for BRICS Summit, but also made sure that during his return, he went to meet and congratulate the ISRO officials, even before returning to Delhi.

PM Modi's Pivotal Push for Innovation

Herein, it is important to understand that for any nation, if it has to be among the top league of the world, in the realm of economic prowess or military might, then it has to have its own technological base and industrial proficiency. For long, because of various factors, India remained a service sector driven economy with more than 50% of its GDP emanating from that sector.

It was only in the recent past after Prime Minister Modi came to power that a concerted effort is now being made to enhance the share of manufacturing sector in the GDP matrix, through various measures including Production Linked Incentive (PLI) Schemes for various industrial sectors, rationalizing taxes, as also relaxing norms for contract manufacturing in India. Today, the wheel has started turning, and as India continues its journey to cross the $5 trillion economy mark in the next few years, it is for sure that the share of industry in the same would be proportionately much higher than what it was a decade back.

On the issue of having, one's own technological base, reality is that for long, India has been a net importer of technology, with less than proportionate application of funds, both from the state and private sector for development of indigenous technologies. One cannot deny though that some organisations in some specific fields did indeed strive hard to build indigenous capabilities, especially in areas where India faced a reign of technology denial from the West. However, the harsh reality remains that for long, India had lacked the strategic intent in the realm of technology development or building on domestic industrial proficiency to pioneer new innovations. Over the last 8-9 years, PM Modi's push for Atmanirbharta is changing much of that.

PM Modi Prioritized Strategy Driven Research on a Mission Mode

In areas of defense for example, barring the development of ballistic missiles, in a wider spectrum, it is an unfortunate saga that India for decades remained dependent on imports even as successive governments in the past restricted entry of India's private sector into the sphere of defense technology development and equipment production. It took the emergence of Shri Narendra Modi as Prime Minister of India to bring about some fundamental changes in the manner in which India perceived the importance of research and development.

In the first place, under the initiative of Prime Minister Modi, as part of the 'Atmanirbhar Bharat Abhiyan' initiative, India came out with a negative list for defense equipment imports in four instalments over a period of two years that comprised an estimated 411 different categories of weapon systems, which would henceforth be made only in India, and mostly by Indian companies. Of these, a whopping 2700 items have already been indigenized by middle of 2022, while the rest is being done in phases. Today, India has a rapidly growing and a vibrant domestic defense industrial sector that is capable of producing most kinds of

weapon systems on its own or through collaborations. From various kinds of drones, to bullet proof jackets, to artillery, combat vehicles and even rifles, are now being designed and manufactured in India. Interestingly, most are now being manufactured by companies which were hitherto denied access in this sector for decades in the past.

In the realm of space sector as well, as part of PM Modi's 'Atmanirbhar Bharat Abhiyan' initiatives, the space sector got liberalized as well, with the Indian private sector now being allowed to make their own satellites as well as launch them. As things stand today, not only ISRO is making giant strides in terms of its success with Chandrayaan-3 , Aditya-L1 launch or the innumerable satellite launches in which success of ISRO has been 'normalized', what is also interesting is that India's space sector now has around 140 startups working on different dimensions of space technology development, and it is only a matter of time when launch of small and medium range satellites in India would be done entirely by private sector, while ISRO would focus on deep space, or outer space exploration missions, much like future missions on moon or to other planets.

ISRO's Success: A Catalyst for Reorienting Indian Youth Towards Fundamental Research Again

In this realm, it is important to understand as to how much the success of Chandrayaan-3 or missions like Adtiya-L1 can play the role of catalyst to inspire a whole generation to not just pursue scientific research as a profession, but also dream of starting their own innovation based startups in India to fulfill their dreams, instead of relocating to Western Hemisphere for better opportunities. The Startup India initiative of Prime Minister Modi or the Technology Development Fund (TDF) Scheme of DRDO, as subset of the same, have been playing critical roles in nurturing a whole new generation of young enterprises in India.

Herein it is important to mention as to how Modi Government massively enhanced the budget of ISRO over the last few years along with provision for supplementary funds to make sure that fund was no more a problem while developing equipment and scouting, followed by training, of best of the talents.

PM Modi's Push for Making Innovation a Key Aspect of India's Education System

While it is no doubt that India's success in space sector is now an inspiring factor for the young generations of India, over the last few years, a sustained effort has been made by India under the leadership of Prime Minister Modi to not just revamp its education structure through National Education Policy but also, an incredible amount of effort has been put by PM Modi to reprioritize research and innovation.

The Atal Innovation Mission (AIM), for example, has been initiated by Modi Government to revitalize and foster the culture of innovation and

entrepreneurship in India. Today there are 10,000 Atal Tinkering Labs (ATL) in which 75 lakh students are 'actively engaged' and 69 Atal Incubation Centre (AIC) that has supported more than 2900 startups. Further Atal Innovation Mission has engaged 6100 'Mentors of Change' to guide students under Atal Tinkering Labs in the path of innovation. Additionally, there are 14 Atal Community Innovation Centers. These can be termed as building blocks to shape up the next generation of innovators, entrepreneurs and job creators.

The National Deep Tech Startup Policy

Apart from the Startup India initiative, one major and critical initiative of PM Narendra Modi led NDA Government has been the creation of the National Deep Tech Startup Policy or NDTSP. The draft of the policy was released in July 2023.

The Executive Summary of NDTSP reads as follow:

The National Deep Tech Startup Policy serves as a comprehensive framework to address the challenges faced by deep tech startups and provide definitive policy interventions to enhance the ecosystem. India's deep tech Vision encompasses four key pillars: securing India's economic future, progressing towards a knowledge-driven economy, bolstering national capability and sovereignty through the Atmanirbhar Bharat imperative and encouraging ethical innovation. The policy recognizes the evolving nature of the definition for a deep tech startup, based on various attributes such as maturity levels, applicability to different sectors, time frames and geographical boundaries and contextual relevance.

As per data from the website of the Principal Scientific Advisor to Government of India, India already has more than 10,000 recognized deep tech based startups. The fact that Modi Government is working on a specific policy to develop a specialized ecosystem to facilitate deep tech development in India, shows the enormous amount of important PM Modi gives to innovation and research as foundation for future growth of India.

The National Research Foundation

Further, The Anusandhan National Research Foundation Bill 2023, introduced and passed in the Parliament in August 2023, creates for the first time a robust and forward looking apex body in India that would work on a mission mode to give strategic direction to research and innovation in the country in the following domains:

1. Natural Sciences including Mathematics
2. Engineering and Technology
3. Environmental and Earth Sciences
4. Health and Agriculture

5. Scientific and Technological Interfaces of Humanities and Social sciences.

Source PRS Legislative Research

On National Research Foundation or NRF, PRS Legislative Research states the following,

Key functions of NRF include: (i) preparing short-term, medium-term, and long-term roadmaps and formulating programs for research and development (R&D), (ii) facilitating and financing the growth of R&D and related infrastructure in universities, colleges, and research institutions, (iii) providing grants for research proposals, (iv) supporting translation of research into capital intensive technology, (v) encouraging international collaboration, (vi) encouraging investments in the Foundation by private and public sector entities, and (vii) undertaking annual survey of scientific research, outcomes, and spending.

Therefore, in the broader spectrum, if one looks at it, what Prime Minister Modi has been striving to create is a vibrant ecosystem for research, innovation and entrepreneurship in India, coupled with ensuring that all the policy lacunae that impeded Indian companies from gaining foothold in the global supply chain, are removed.

Innovation, Self-Sufficiency & Entrepreneurship: The Three Pillars of PM Modi's Atmanirbhar Bharat Abhiyan

PM Modi's Atmanirbhar Bharat Abhiyaan is a pioneering initiative to provide Indian entrepreneurs and industries, the level playing field in hitherto restricted domains such as defense. It is path breaking and the results are there for everyone to witness how India is gradually evolving as a key player in domestic and global defense market. This, coupled with Production Linked Incentive (PLI) Scheme, Start-Up India scheme, as well as Pradhan Mantri Mudra Yojana and Pradhan Mantri Vishwakarma Yojana, are aimed at promoting innovation-based entrepreneurship throughout the entire spectrum of the economic strata and regions, be it city, towns, suburbs or rural India.

Eventually, India has to churn out job creators, instead of job seekers, in millions. For long, India lacked the ecosystem that could make India become a place for innovation. For long, India's creative minds with ideas, but no capital of their own, had to exit the country for greener pastures, and support systems elsewhere, where they thrived and created wealth for their host country. The fault lied with India's policymakers of the past.

But now, much of that is changing from the core. That India is now the fifth largest economy of the world, that India now has the industrial scale proficiency

to manufacture vaccines in hundreds of crores for her own requirement, and then send to other countries too, that India now has the third largest ecosystem for startups, that India could create 8 crore new entrepreneurs through Mudra Yojana, that India has been termed as 'a bright spot on the dark horizon', that India is heavily investing on infrastructure now, that India is creating a new template of human centric development, that India has revolutionized digital payments as part of its rapidly evolving digital economy, and that India is focusing on innovation now, none of these are by fluke but outcome of meticulous planning and execution by Prime Minister Modi and his team. All these are building blocks in PM Modi's quest to make India a developed country by 2047.

Putting Research on Next Generation Technologies as Foremost Priority

Another critical aspect of PM Modi's vision for a developed and research driven Indian economy, is how Modi Government has firmly focused on allocating money on development next generation technologies and industries. From a dedicated fund and strategic direction towards research on hydrogen as one of the next generation preferred fuel alternatives, through National Green Hydrogen Mission with an outlay of Rs 19,744 crore between FY23-24 to FY 2029-30, to National Quantum Mission for building a similar ecosystem to scale up industrial & scientific R&D in the country for making of quantum computers, to National Biopharma Mission to develop an ecosystem for enhancing India's industrial scale capabilities to innovate and produce biopharmaceuticals, to Indian Semiconductor Mission for development of long-term strategy for creation of an industrial ecosystem for making semiconductors and display manufacturing facilities in India, in each of these cases, one witnesses a mission-mode approach by Modi Government that was hitherto lacking in many of the previous dispensations. Also, the approach herein primarily focuses on development of an ecosystem for entrepreneurs to thrive, either through their own endeavors or in collaboration with state entities. The objective is not to keep these as exclusivity of the state but to make the state act as a facilitator for these sectors to thrive.

The Deep Ocean Mission: PM Modi's Focus on Exploring the Last Frontier

While the success of Chandrayaan-3 and the on-going mission of Aditya-L1 towards the Lagrange point to study patterns of solar flares, continue to enthrall Indians of all age, next year, i.e., the year 2024 may witness India breaking another glass barrier, by being one of the first countries that would be venturing into research in deep oceans.

The Samudrayaan Project is aimed at deep sea explorations of India's continental shelf and Exclusive Economic Zone (EEZ). The explorations would identify areas which has abundance of polymetallic nodules imbued with precious minerals such as nickel, cobalt, copper, iron hydroxide and manganese among others, which have diverse

applications in manufacturing of all kinds of digital devices, batteries, solar panels and different kinds of electronic devices. Most of these explorations would be happening in the 75,000 sq km in the Central Indian Ocean Basin. Successful exploration and extraction of such critical minerals may have major positive impact in development of India's Blue Economy and fundamentally alter the pace of India's economic growth rate.

At the core of India's Samudrayaan Project is the indigenously made submersible with ability to go to potential depth of up to 6000 meters. This is a pathbreaking and momentous development not only from the perspective of venturing into such deep levels for exploration of minerals, but also from the perspective of metallurgical marvel since at such depth of the ocean, the level of pressure of water is immensely high. As a reference point, one must understand that most of the combat submarines can go at most at depths of 300-500 meters. In certain respect, it is said that humans have more knowledge about the surface of moon than the sea beds. Mission Samudrayaan of India may contribute a lot to alter than notion.

Therefore in 2024, while the first uncrewed orbital test flight at Low Earth Orbit (LEO) would be conducted of Gaganyaan-1 by ISRO, the year would also witness the first sea trials at depth of around 500 meters, of Matsya 6000, India's submersible for deep sea missions. From the perspectives of crossing major scientific milestones as well as inspiring a nation, on both counts, it is for sure that 2024 would be a logical and justified continuation of the scientific endeavors achieved in 2023.

Connecting Back to India's Roots in Research and Innovation

As things stand, the last one decade has witnessed India under leadership of PM Modi, taking pioneering initiatives in the realm of spearheading technology missions with a strategic objective of making India self sufficient in various domains that can be termed as building the foundation of once again making India the cradle of research and innovations.

Since time immemorial, India's sages were pioneers in seeking solutions to various challenges that humans were battling. Unfortunately, a thousand year of invasions, plunder, loot, colonization and enslavement destroyed most of that culture. Today, India stands at a critical inflexion point where it is at the cusp of a pivotal shift from being a net recipient of technology, to a net developer and provider of the same. It today has a strong economy, powerful military and deep-rooted cultural ethos, embedded with a powerful leadership, to revive that very culture of research, innovation, and development of solutions for greater good. Under Prime Minister Modi's leadership, the seeds have been sown for that renaissance. It is now the collective responsibility of all Nationalists to take it forward in attaining the common goals of Amritkaal.

(Pathikrit Payne is a New Delhi based Geopolitical Analyst and Senior Research Fellow, SPMRF. Views expressed are his own)

चंद्र पर शिव-शक्ति संकल्प

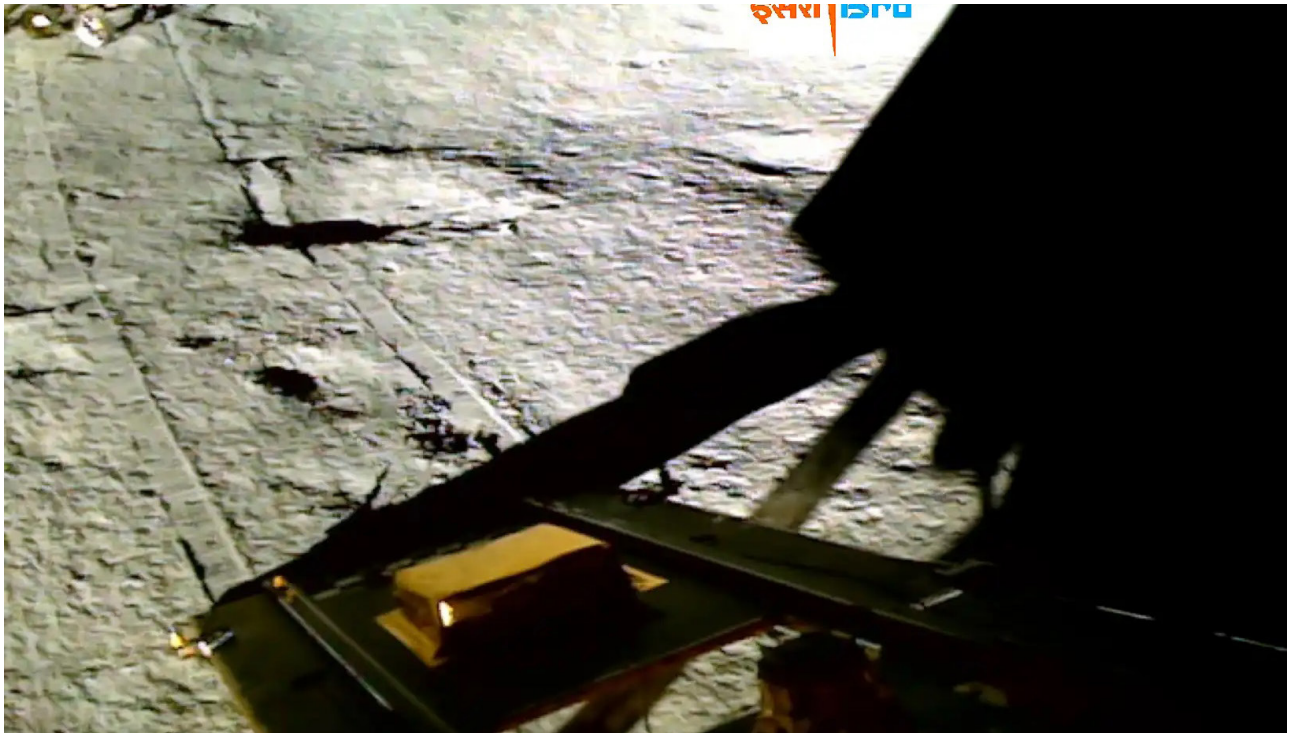
डॉ दिलीप अग्निहोत्री

नए भारत की विकास यात्रा में चन्द्रयान का सफल अभियान भी शामिल हुआ. प्रधानमंत्री नरेंद्र मोदी ने चंद्र के उस स्थल का शिव-शक्ति नामकरण किया. यह विश्वगुरु का उद्घोष है. जिसे दुनिया ने स्वीकार किया है. आत्मनिर्भर भारत का यह अभूतपूर्व अध्याय है. नरेंद्र मोदी सरकार के प्रयासों से संकल्प सिद्ध हो रहे हैं. इसके पहले करोना की दो वैक्सीन बना कर भारत ने अपनी प्रतिभा का दुनिया को प्रमाण दिया था. सैकड़ों देशों तक भारतीय वैक्सीन पहुंची थी. पिछले दिनों अमृत रेलवे-स्टेशन निर्माण कार्य का शुभारंभ हुआ था. डिजिटल अभियान में भारत की प्रगति शानदार है. यह सब अमृत काल की गरिमा बढ़ा रहे हैं. इसी अवधि में भारत जी ट्वेंटी का अध्यक्ष बना. दुनिया भारत के विचारों से परिचित हो रही है. प्रधानमंत्री नरेंद्र मोदी इस समय दक्षिण एशिया में है. उन्होंने चन्द्रयान की चन्द्र यात्रा का सजीव प्रसारण दक्षिण अफ्रीका से देखा. वहीं से राष्ट्र को संबोधित किया. कहा कि भारत की इस उपलब्धि से दुनिया भी लाभान्वित होगी. पहले अभियान की विफलता पर मोदी ने ही वैज्ञानिकों का हौसला बढ़ाया था.

उन्होंने कहा था कि हमारे संस्कार, हमारा चिंतन, हमारी सोच, इस बात से भरी पड़ी है, जो हमें कहते हैं- वयं अमृतस्य पुत्राः। हम अमृत की संतान हैं जिसके साथ अमरत्व जुड़ा हुआ रहता है। अमृत के संतान के लिए न कोई रुकावट है, ना हो कोई निराशा। हमें पीछे मुड़कर निराशा की तरफ नहीं देखना है, हमें सबक लेना है, सीखना है, आगे ही बढ़ते जाना है और लक्ष्य की प्राप्ति तक रुकना नहीं है। हम निश्चित रूप से सफल होंगे। मिशन के अगले प्रयास में भी और उसके बाद के हर प्रयास में कामयाबी हमारे साथ होगी। 21वीं सदी में भारत के सपनों और आकांक्षाओं को पूरा करने से पहले हमें कोई भी क्षणिक बाधा रोक नहीं सकती. उनका कथन सत्य साबित हुआ.

सफ़लता पर मोदी ने देश के वैज्ञानिकों की जमकर तारीफ की है। चंद्रयान-3 की चांद पर सफलतापूर्वक लैंडिंग होते ही प्रधानमंत्री मोदी ने तिरंगा लहराया. कहा कि जब हम ऐसे ऐतिहासिक क्षण देखते हैं तो हमें बहुत गर्व होता है। ये नए भारत का सूर्योदय है। हमने धरती पर संकल्प किया और चांद पर उसे साकार किया। भारत अब चंद्रमा पर है। ये क्षण मुश्किलों के महासागर को पार करने जैसा है। ये क्षण जीत के चंद्रपथ पर चलने का है। ये क्षण 140 करोड़ धड़कनों के सामर्थ्य का है। ये भारत में नई ऊर्जा, नई चेतना का है। अमृतकाल की प्रथम प्रभा में सफलता की ये अमृतवर्षा हुई है। पीएम मोदी ने कहा कि हमने धरती पर संकल्प लिया और चांद पर उसे साकार किया। अब हम चांद पर हैं। जब हम अपनी आंखों के सामने इतिहास बनते देखते हैं तो जीवन धन्य हो जाता है। यह पल विकसित भारत के शंखनाद का है। इससे पहले कोई भी देश चंद्रमा के दक्षिणी ध्रुव तक नहीं पहुंचा है। हमारे वैज्ञानिकों की मेहनत से हम वहां तक पहुंचे हैं। भारत का सफल चंद्रमा मिशन अकेले भारत का नहीं है.यह सफलता पूरी मानवता की है।

प्रधानमंत्री नरेंद्र मोदी ने नए भारत का रोडमैप बनाया था। जिसमें भारत को विकसित देशों की श्रेणी में पहुंचाने का लक्ष्य निर्धारित किया गया था.अंतरिक्ष क्षेत्र में क्षमता का वाणिज्यिक रूप से उपयोग के लिये न्यू स्पेस इंडिया लिमिटेड नाम से नए सार्वजनिक उपक्रम का गठन किया गया है, इसका मकसद इसरो के लाभ का पूरा उपयोग करना है.यह संकल्प सिद्ध



हुआ. भारतीय चन्द्रयान सफ़लता के साथ चंद्रमा की सतह पर पहुँचा. प्रधानमंत्री नरेन्द्र मोदी के न्यू इंडिया विजन में विकास और लोक कल्याण का समावेश है। भारत को विकसित बनाने का संकल्प है। संकल्प को सिद्ध करने की इच्छाशक्ति है। उनकी नौ वर्ष की यह यात्रा यही प्रमाणित करती है। भारत के वैज्ञानिकों ने दो-दो वैक्सीन का निर्माण करके दुनिया को चौका दिया था। दुनिया में भारत की प्रशंसा हो रही थी। ब्राजील के राष्ट्रपति ने तो हनुमान जी द्वारा संजीवनी लाने के प्रसंग से इसकी तुलना की थी। सैकड़ों देश भारत से कोरोना लेने की लाइन में लग गए। लेकिन भारत का विपक्ष इस राष्ट्रीय गौरव से अलग रहा। उसके लिए यह भी मोदी विरोध का अवसर था। दूसरी तरफ विपक्ष के गठबंधन ने शब्दों के जुगाड़ से अपने लिए इंडिया नाम गढ़ लिया है। लेकिन उनकी कल्पना के इस इंडिया में विकास की कोई बात नहीं होती। प्रधानमंत्री मोदी के नेतृत्व में भारत विकसित बनने की दिशा में अग्रसर है। इसकी कार्ययोजना पर कार्य प्रगति पर है। इस नये भारत का रेलवे भी नया है, क्योंकि रेलवे में विकास की दृष्टि से भी नौ साल बेमिसाल हैं। प्रधानमंत्री मोदी ने कहा भी कि भारत विकसित होने के लक्ष्य की तरफ कदम बढ़ा रहा है। इसमें रेलवे का विकास का शामिल है। सरकार ने स्टेशनों को शहर और राज्यों की पहचान से जोड़ने के लिए वन स्टेशन,वन प्रॉडक्ट योजना भी शुरू की है। इससे पूरे इलाके के लोगों, कामगारों और कारीगरों को लाभ होगा। जिले की ब्रांडिंग भी अमृत रेलवे स्टेशन विरासत के प्रति गर्व की अनुभूति कराने वाले होंगे। इन स्टेशनों में देश की संस्कृति और स्थानीय विरासत की झलक दिखेगी। देश के विभिन्न ऐतिहासिक स्थलों और तीर्थ स्थानों को जोड़ने के लिए इन दिनों देश में भारत गौरव यात्रा ट्रेन और भारत गौरव टूरिस्ट ट्रेन भी चल रही है। रेलवे का कायाकल्प हो रहा है।

प्रधानमंत्री नरेन्द्र मोदी विश्व कल्याण के द्रष्टिगत दुनिया को भारतीय विरासत से परिचित करा रहे है। उनके प्रयासों से अन्तरराष्ट्रीय योग दिवस मनाया जा रहा है। योग प्रत्येक व्यक्ति के शारीरिक और मानसिक स्वास्थ्य हेतु बहुत उपयोगी है। नरेन्द्र मोदी के नेतृत्व में भारत ऐसे हो मानवीय तथ्यों को दुनिया में स्थापित कर रहा है। दुनिया में शांति और सौहार्द की अभिलाषा रखने वालों को भारतीय विरासत में ही समाधान दिखाई दे रहा है। अन्य कोई विकल्प है भी नहीं। यह विषय दुनिया को युद्द मुक्त करने तक ही सीमित नहीं है। भारत ने

पृथ्वी सूक्त के माध्यम से मानवता को पर्यावरण संरक्षण और प्रकृति संवर्धन का भी संदेश दिया। कोरोना काल में भारतीय जीवन-शैली और आयुर्वेदिक को दुनिया में पुनः प्रतिष्ठित किया है। उस समय अपने को विकसित समझने वाले देश भी लाचार हो गए थे।

कुछ वर्ष पहले तक यह कल्पना भी मुश्किल थी कि भारत इस संगठन का अध्यक्ष होगा। आज यह सहज रूप में सम्भव हुआ है। नरेन्द्र मोदी ने इसे भारत के लिए एक बड़ा अवसर माना है।

इसके माध्यम से वह विश्व कल्याण के तथ्यों लोगों को अवगत करा रहे हैं। शिखर सम्मेलन का लोगो अपने में एक विचार को अभिव्यक्त करने वाला है। नरेन्द्र मोदी ने भारत की मेजबानी में अगले वर्ष आयोजित होने वाली शिखर वार्ता का प्रतीक चिन्ह, मुख्य वाक्य और वेबसाइट का अनावरण किया। विश्व की प्रमुख अर्थव्यवस्था वाले देशों के मंच की शिखर वार्ता भारत में पहली बार आयोजित होगी। इसके प्रतीक चिन्ह में सात पंखुड़ियों वाले कमल के फूल पर गोलाकार विश्व स्थित है। इसके नीचे भारतीय संस्कृति का प्रसिद्ध ध्येय वाक्य 'वसुधैवअंकित है। साथ ही वन अर्थ,वन फैमिली और वन फ्यूचर को स्थान दिया गया है। मोदी ने कहा कि इस लोगो और थीम के माध्यम से एक संदेश दिया गया है। हिंसा के प्रतिरोध में महात्मा गांधी के जो समाधान हैं। इस के जरिए भारत उनकी वैश्विक प्रतिष्ठा को नई ऊर्जा दे रहा है।

नरेन्द्र मोदी ने संयुक्तराष्ट्र महासभा में भी कहा था कि भारत युद्ध नहीं बुद्ध का देश है। प्रतीक चिन्ह में कमल का फूल भारत की पौराणिक धरोहर, हमारी आस्था और हमारी बौद्धिकता को चित्रित करता है। प्रतीक चिन्ह के कमल की सात पंखुड़ियां दुनिया के सात महाद्वीपों और संगीत के सात स्वरों का प्रतिनिधित्व करती हैं। प्रतीक चिन्ह इस आशा को जगाता है कि दुनिया एक साथ आगे बढ़ेगी।

ये लोगो केवल एक प्रतीक चिन्ह नहीं है। ये एक संदेश है। ये एक भावना है, जो हमारी रगों में है। ये एक संकल्प है, जो हमारी सोच में शामिल रहा है।

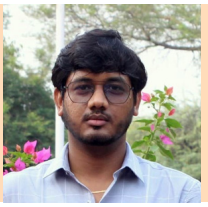
प्रधानमंत्री नरेंद्र मोदी ने नए भारत का रोडमैप बनाया था। जिसमें भारत को विकसित देशों की श्रेणी में पहुंचाने का लक्ष्य निर्धारित किया गया था.अंतरिक्ष क्षेत्र में क्षमता का वाणिज्यिक रूप से उपयोग के लिये न्यू स्पेस इंडिया लिमिटेड नाम से नए सार्वजनिक उपक्रम का गठन किया गया है, इसका मकसद इसरो के लाभ का पूरा उपयोग करना है.यह संकल्प सिद्ध हुआ. भारतीय चन्द्रयान सफ़लता के साथ चंद्रमा की सतह पर पहुँचा. प्रधानमंत्री नरेन्द्र मोदी के न्यू इंडिया विजन में विकास और लोक कल्याण का समावेश है। भारत को विकसित बनाने का संकल्प है। संकल्प को सिद्ध करने की इच्छाशक्ति है। उनकी नौ वर्ष की यह यात्रा यही प्रमाणित करती है।

इसमें वसुधैव कुटुम्बकम' के मंत्र की भावना हैं। इसमें पृथ्वी, एक परिवार और एक भविष्य के मुख्य वाक्य में प्रतिबिंबित हो रहा है। प्रतीक चिन्ह में कमल इन विपरीत परिस्थितयों में आशा जगाता है। चाहे कितनी भी विपरीत परिस्थितियां हों कमल खिलता रहता है।आजादी के अमृतकाल में देश के सामने इसकी अध्यक्षता का बड़ा अवसर है। यह भारत के लिए गर्व और गौरव की बात है। यह ऐसे देशों का समूह है जो विश्व के सकल घरेलू उत्पाद जीडीपी में पच्चासी प्रतिशत की भागीदारी रखता है।

इन देशों में दुनिया की दो तिहाई जनसंख्या रहती है। विश्व व्यापार में इसकी पचहत्तर प्रतिशत की भागीदारी है। भारती का प्रयास रहेगा कि विश्व में दुनिया में कोई 'पहली दुनिया' या 'तीसरी दुनिया' न हो, बल्कि एक दुनिया' हो। कांग्रेस ने इस विषय को भी अपनी राजनीति का अवसर मान लिया है। लोगो के माध्यम से भारतीय विरासत का दुनिया को संदेश दिया गया। यह पूरे देश के लिए गर्व का विषय है।

(लेखक हिन्दू कॉलेज में एसोसिएट प्रोफ़ेसर हैं. प्रस्तुत विचार निजी हैं)

Chandrayaan-3 Success: Bridging Science and Society



Priyank Chauhan

India's space exploration endeavors have consistently showcased its aspiration to stand alongside global giants. By being the first country to soft-land near the moon's south pole region, India has made a bold departure from earlier missions that primarily focused on the equatorial areas. The mission's success is not just about landing on the moon; it's about resilience, innovation, and the relentless pursuit of knowledge. India's dedication to re-attempting this challenging mission showcases the nation's determination to push boundaries. The success brought valuable data about the lunar surface, paving the way for further explorations and potentially future lunar settlements. Moreover, the indigenous development of technology fostered an environment of innovation, research, and inspiration for future generations of scientists, engineers, and ordinary citizens.

But we should not celebrate and understand Chandrayaan-3 only as a scientific achievement, but also as a national and civilizational moonshot. This moment is an invitation to reflect on the intricate relationship between science and the society out of which it emerges, with many valuable lessons to offer.

Inspiring Young Minds

The success of Chandrayaan-3 reverberated through classrooms and homes across India, with countless young eyes glued to screens, witnessing a historic moment. The mission's success, though grand, is symbolic of more profound implications. With a burgeoning youth population, India stands on the precipice of a new era of innovation. The world's largest youth demographic resides here, and Chandrayaan-3 has offered them more than just a scientific marvel; it has provided them with a vision of what's achievable.

The engagement of the youth in the mission's success points to the untapped potential in these young minds. Schools and universities now have a golden opportunity to channel this interest. Curricula emphasizing space science, astrophysics, and aerospace engineering could propel India to the forefront of global space research in the coming decades. Moreover, the mission, by capturing the imagination of the young, might steer them toward careers in STEM fields including fundamental research in subjects such as materials science, astronomy, and

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communications, ensuring India's continued growth and leadership in global science and technology sectors.

National Integration

In a vast and diverse nation like India, moments that unify the masses are invaluable. Chandrayaan-3 provided such a moment. With an astonishing 8 million concurrent viewers during its landing, the mission showcased more than India's technological capabilities; it demonstrated the country's unity in diversity.

At a time where the digital space often amplifies divisions, the shared enthusiasm and pride for Chandrayaan-3 transcended boundaries, be they geographical, linguistic, or cultural. This unity, founded in a collective achievement, underscores the importance of positive nationalism. While regional and cultural identities are vital, national successes, like the Chandrayaan-3 mission, provide an overarching sentiment of unity and pride that binds the country.

Long-term Thinking

ISRO's journey, culminating in the success of Chandrayaan-3, is a story of visionary thinking. From its inception, ISRO harbored ambitions that went beyond the immediate horizon. While it began with modest resources, its vision was always grand, looking at space exploration as a means to propel India onto the world stage.

The Chandrayaan and Mars Orbiter missions are not isolated feats but part of a consistent trajectory that speaks volumes of India's commitment to long-term growth in space exploration. The foresight to invest in such ventures, understanding their potential implications, and persevering despite

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challenges showcases a blend of ambition and pragmatism. Chandrayaan-3, following the lessons learned from its predecessors, has instilled in the nation a belief in the importance of persistence, resilience, and vision. The mission's success illustrates that setbacks are but stepping stones to grand achievements when underpinned by a long-term perspective.

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Economic Impact and Global Stature

Beyond societal implications, Chandrayaan-3 carries substantial economic and international significance. The mission accentuates India's capability to execute complex projects, enticing global collaborations and investments. The technological advancements and innovations arising from such projects foster an ecosystem conducive for startups and industries in satellite technology, space exploration, and allied sectors.

Internationally, India's endeavors position it as a significant player in space exploration. This stature isn't just symbolic; it facilitates partnerships, trade agreements, and collaborative missions, opening avenues previously unexplored. Moreover, this leadership role in space endeavors enhances India's influence in global policy-making, reinforcing its stature in international consortiums and councils.

Conclusion

India's Chandrayaan-3 success isn't merely a triumph of technology; it's a testament to human spirit, collaboration, and the timeless pursuit of knowledge. It emphasizes the symbiotic relationship between science and society. While science propels society forward with innovations, society provides the foundation, resources, and ethos for these scientific endeavors. Chandrayaan-3's success, while an astronomical feat, resonates deeply within societal, economic, and global contexts. It kindles the aspirations of the youth, exemplifies national unity, showcases the results of visionary thinking, and underscores India's growing economic and global influence. Such milestones remind us that space exploration, while an outer-world endeavor, has tangible and profound implications on our present and future as a nation. As India charts its future course in space exploration, it's crucial to recognize and harness the potential of such achievements in shaping both science and society.

(Priyank Chauhan is a policy consultant with experience in domains of international relations, Indian politics, and Indian culture. Views expressed are personal.)

इसरो ने छोड़ी अमिट छाप, चंद्रयान की सफलता वैश्विक मंच पर भारत को आदर्श के रूप में करेगी स्थापित

मनीष पुरोहित

बुधवार की शाम करोड़ों भारतीयों एवं भारतप्रेमियों की सांसें अटकी हुई थीं। इसरो के लैंडर का चंद्रमा के दक्षिणी ध्रुव की सतह पर स्पर्श होते ही लोगों ने राहत की सांस ली और उत्साह के साथ इस उपलब्धि के आनंद में डूब गए। इस उपलब्धि की गूंज न केवल भारत के अंतरिक्ष अनुसंधान के पवित्र मंदिर में सुनी गई, बल्कि पूरे विश्व ने संसार में पहली बार भारत को मिली इस अद्भुत सफलता पर उसका नमन-अभिनंदन किया। लैंडर विक्रम के चंद्रमा की सतह पर उतरने के साथ ही अंतरिक्ष अनुसंधान के क्षेत्र में नए ऐतिहासिक अध्याय का आरंभ हुआ। विक्रम की सक्रियता के साथ रोवर प्रज्ञान ने भी अपना कार्य करना शुरू कर दिया। इसरो के इस अभियान ने अंतरिक्ष अनुसंधान पर अपनी ऐसी अमिट छाप छोड़ी है, जो मिटाए नहीं मिट सकेगी।

वास्तव में, चंद्रयान-3 के माध्यम से दक्षिणी ध्रुव पर विजयी लैंडिंग तक की यात्रा मानवीय नवाचार और अटल समर्पण का एक अनुपम उदाहरण है। इसका पूरा श्रेय भारतीय अंतरिक्ष अनुसंधान संगठन यानी इसरो के उस परिवेश को जाता है, जहां ऐसी आकांक्षाओं को संकल्प के पंख लगे। स्मरण रहे कि 1976 से पहले रूस के 24 लूना मिशनों में साफ्ट लैंडिंग सफलता दर लगभग 20 प्रतिशत थी। उस हिसाब से इसरो की सफलता को सहज ही समझा जा सकता है। इसरो की सफलता न केवल चंद्रमा से जुड़े अन्वेषण को नया आयाम देगी, बल्कि वहां स्थायी मानव बस्तियों की बसावट का सपना भी दिखा सकती है।

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भारत का लक्ष्य है कि वर्ष 2030 तक वैश्विक अंतरिक्ष आर्थिकी में नौ प्रतिशत की हिस्सेदारी हासिल करे। चंद्रयान-3 की सफलता इसमें सहायक सिद्ध होगी। यह मिशन वैश्विक अंतरिक्ष मानचित्र पर भारत की क्षमताओं में एक नया आत्मविश्वास उत्पन्न करेगा। इसरो का किफायती, लेकिन प्रभावी दृष्टिकोण दुनिया भर में प्रशंसित है। चंद्रयान-3 जैसे मिशन अपने अनुमानित दायरे से कहीं अधिक प्रभाव छोड़ते हैं। यह संसाधन कुशलता और नवाचार का जीवंत प्रमाण है। इससे इसरो और भारत की अंतरराष्ट्रीय स्वीकार्यता भी बढ़ी है। विभिन्न वैश्विक संस्थान इसरो के साथ काम करने के लिए उत्सुक हैं। जैसे जापान के जाक्सा को अपने ल्युपेक्स मिशन में भी भारत

के विक्रम की मदद महसूस हो रही है।

स्पष्ट है कि भारत विश्व के लिए एक उचित विकल्प के रूप में स्थापित हो रहा है। इस सफलता के पीछे पुरुषार्थ एवं परिश्रम को अनदेखा नहीं किया जा सकता। यदि 2019 के चंद्रयान-2 की असफलताओं से सीख नहीं ली जाती तो इसरो शायद चंद्रयान-3 के रूप में सफलता हासिल नहीं कर पाता। जब 2019 में चंद्रयान-2 का लैंडर अपनी मंजिल से चंद मीटर की दूरी पर क्रैश हो गया था तो तमाम सवाल उठे थे। इसरो की क्षमताओं और भारत की प्राथमिकताओं को प्रश्नांकित किया गया था। असफलताओं से हताश होना तो इसरो जैसे संस्थानों के शब्दकोश में ही नहीं। चंद्रयान-2 से मिले डाटा का इसरो ने गहराई से अध्ययन किया। अपनी गलतियों को परखा। उनके परिमार्जन का खाका तैयार किया। उसे मालूम पड़ा कि कैमरा कास्टिंग फेज में जब विक्रम चांद की सतह की फोटो लेकर उन्हें सीधे साझा करते हुए अपनी मंजिल की ओर बढ़ रहा था तो एल्गोरिदम की कुछ गलतियों के कारण थ्रस्टर (इंजन) की गड़बड़ को पकड़ नहीं पाया था। इसके चलते 38 सेकंड के उस चरण के बाद चंद्रयान-2 नियंत्रण से बाहर हो गया और इसके साथ ही चांद की धरती को चूमने का भारतीय सपना भी ध्वस्त हुआ।

उस नाकामी के बाद इसरो चंद्रयान-3 की तैयारी में जुट गया। इस अभियान के लिए उसने "फेलियर बेस्ड डिजाइन" जैसी एक अनूठी अवधारणा को अपनाया। यह संकल्पना उन गलतियों पर भी नजर रखती है, जिनमें दस लाख में से एक बार गलती की आशंका रह जाती है। अपनी तैयारी में इसरो ने ईंधन किफायत के लिए विक्रम लैंडर से एक इंजन कम करके उसे सिर्फ चार इंजनों से लैस किया। संख्या घटाई तो इंजन की क्षमताएं बढ़ाईं। लैंडर की लेग्स को मजबूत किया। बेहतर कैमरा और सेंसर लगाए। एल्गोरिदम को इतना दुरुस्त किया कि गलती की कोई गुंजाइश ही न रहे। सोलर पैनल का विस्तार कर उसे और समृद्ध किया। लांच से पहले सभी प्रक्रियाओं को इतनी कसौटियों पर कसा कि मायूसी के लिए कोई जगह न रह जाए। उसके बाद जो हुआ उस इतिहास के हम सभी 23 अगस्त को साक्षी बने।

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चंद्रयान-3 का असली काम अब शुरू हुआ है। इस पर लगे पेलोड से हमें चांद से जुड़ी तमाम बारीकियां पता चलेंगी। इसके चार पेलोड को हम चांद की धरती के इतिहास का संग्रहालय भी कह सकते हैं, जिनके माध्यम से हमें तमाम गुत्थियां सुलझाने में मदद मिलेगी। चांद पर आने वाले उन भूकंप के बारे में अहम जानकारियां मिलेंगी, जो भविष्य में मून बेस कैंप के लिए काफी आवश्यक होंगी। इसके पेलोड चांद की मिट्टी में उपस्थित खनिजों की पड़ताल भी करेंगे।

विक्रम और प्रज्ञान 14 दिन तक अपने काम में जुटे रहेंगे। प्रज्ञान विक्रम से सीधी बात कर सकता है, लेकिन पृथ्वी से नहीं। प्रज्ञान, विक्रम के 500 मीटर के दायरे में घूम सकता है। इसे कैमरे की मदद से इसरो ग्राउंड स्टेशन से नियंत्रित किया जाएगा। कुल मिलाकर, अगले करीब एक पखवाड़े के दौरान देश के शीर्ष अंतरिक्ष विज्ञानी इन दोनों के साथ व्यस्त रहकर मानव जाति के लिए चंद्रमा से जुड़ी नई-नई जानकारियां तलाशने और उनकी व्याख्या करने में लगे रहेंगे।

(लेखक इसरो के पूर्व विज्ञानी हैं, प्रस्तुत विचार उनके निजी हैं)

Reaching for the Moon and Beyond: India's Quest for Scientific Endeavours for Greater Good

Ananya Agarwal

There is much to unpack with respect to the outstanding achievement of Chandrayaan-3's mission for India. We reached for the stars, and, quite literally, were extremely successful at landing amongst them on August 22, 2023. Chandrayaan-3 made it to the far end of the moon (the South Pole), a place no one's been before, on a budget smaller than those of intergalactic films produced abroad. It brings glory, gratitude and a new generation of scientific advancement, unanimously for ISRO, India and the Global Village India endorses. However, its waves of impact extend far beyond just scientific progress in the space sector.

The mission's direct importance is two-fold: apart from the fact that it makes India the fourth nation to join the elite and very small club of countries who have made it to the moon, the lunar South Pole is a region of unparalleled importance. The shape of future moon expeditions or a substantial moon colony is highly reliant on what Chandrayan-3 finds here. The moon's South Pole is known to have water ice– a potential source for oxygen, water and even fuel. The leap India took when it continued to have faith in the mission now allows the study of the lunar South Pole. Putting this in words of praise, said Russian President Vladimir Putin, "This is a big step forward in space exploration and of course a testament to the impressive progress made by India in the field of science and technology."

Now that Chandrayaan-3 has successfully completed its 14-day mission, we have learnt valuable knowledge about the moon from it. Chandrayaan-3's lander, Vikram, tested the Moon's ionosphere to find that it had a density of 5-30 million electrons per cubic metre. A low concentration would permit easier movement of radio waves, which is important for facilitating communication and hence a potential lunar colony. Vikram also tested the moon's soil to find that the surface of the moon and 8 cm below the surface had a temperature difference of about 60 degrees Celsius. The temperature was also found to be warmer than what was recorded by NASA during its mission in 2009. The lander also had a seismograph to detect "moonquakes"– in fact, it even detected one lasting about 4 seconds. The robotic rover of the mission called Pragyaan covered 100 metres of the moon's surface and has fallen asleep owing to the night time on the moon till September 22, 2023,

when it will become daytime on the moon again. This is when it is expected to re-awaken. Its most important discovery was the detection of the element of Sulphur. It is possible that this element was found on the lunar surface due to asteroid impacts, though other plausible explanations exist. This data complements what was found in the Apollo missions carried out by NASA and is crucial in understanding the moon's geochemical composition.

While one praises this mission for all it is worth to science, one should step back to look at the bigger picture that is taking place around Chandrayaan-3. Near 2013, in the period when several delays were occurring during the launch of Chandrayaan-2, the mission's budget was set to INR 938 crores. At this point in time, Russia had pulled out of helping India with the mission after its own space-related failures. To understand the context of India's technological advancement at the time, this was when a majority of India's national defence weapons were being imported, and before Tapas BH-201, when India was struggling to make its own military drone system. After the mission did not have the outcome India hoped it would, ISRO and the nation did not give up hope. Another budget of around INR 615 crore was set for Chandrayaan-3, smaller than the second mission, nevertheless a show of faith from the Government of India– and to be used by ISRO in a completely autonomous way. Chandrayaan-3 was not an overnight achievement but a test of faith that began with the approval of Chandrayaan-1 in 2003.

One can only imagine the time, effort and resilience involved which made this mission transform India in more ways than can be viewed superficially. During its journey, as the mission developed, so did our nation. With the revolutionising of transformative policy frameworks, India opened its space sector to the private world via the Indian Space Association and today, it boasts at least 140 registered space start-ups. We placed an order of nearly 2000 drones in recent years from

The mission's direct importance is two-fold: apart from the fact that it makes India the fourth nation to join the elite and very small club of countries who have made it to the moon, the lunar South Pole is a region of unparalleled importance. The shape of future moon expeditions or a substantial moon colony is highly reliant on what Chandrayan-3 finds here. The moon's South Pole is known to have water ice– a potential source for oxygen, water and even fuel. The leap India took when it continued to have faith in the mission now allows the study of the lunar South Pole. Putting this in words of praise, said Russian President Vladimir Putin, "This is a big step forward in space exploration and of course a testament to the impressive progress made by India in the field of science and technology."

the many aerospace and drone start-ups that are mainly of Indian origin, like ideaForge, whose production has seen a ten-fold increase. All of these things occurred during the game-changing time of the Chandrayaan mission, whose success will now encourage more start-ups, and an era of our own Aerospace Tech and MIC, effortlessly syncing with the idea of "Atmanirbhar Bharat".

The success of Chandrayaan-3 is in the space sector but its implications cause ripples far beyond it. It allows the focus to be on ISRO and puts India on the map, yes, but its findings, such as those of rare minerals may alter the ground reality of telecom and other industries on earth. If the moon becomes a source of valuable minerals, there may no longer remain a race for rare earth minerals, but one that is far larger and one that can potentially provide for future generations.

Chandrayan-3 is a symbol of the Indian remix of the Renaissance. India has always been a country of knowledge seekers, and this mission will inculcate in the future generations a thirst for knowing more. This curiosity can be a segway into them taking interest in the stem sciences and in advanced research on fundamental sciences; this may very well result in India one day becoming the epicentre of data-oriented science. The pioneering fleet ISRO has achieved today is one that is for the history books and one that will give the youth of India something to aspire to.

All in all, Chandrayaan-3 definitely makes India's mark in the space sector. But this mission is also a specimen of growth for the nation in many ways. It encourages the youth to partake in discourse around stem sciences. It boosts investments in India, in both private and public sectors. It alters the start-up ecosystem in India. It allows painstaking reforms in the Indian economy. And, inarguably so, it symbolises a moment of immense pride for every Indian as they see the nation's flag on the moon.

(Ananya Agarwal is a student of Economics and Finance of Ashoka University interning at Dr Syama Prasad Mookerjee Research Foundation. Views expressed are personal)

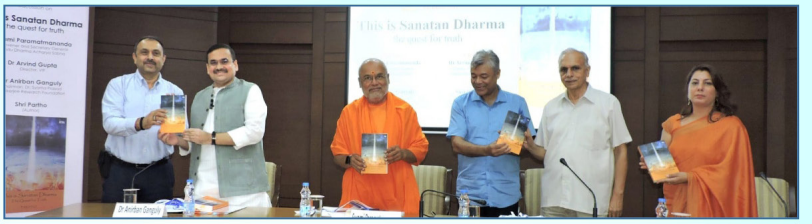
Discussion on "Hindutva & Comparative Religion" (Vivekananda International Foundation, Chanakyapuri, New Delhi) on 23 August 2023

SPMRF, Y20 and Dr SNS Rajalakshmi College of Arts & Science, Coimbatore organised a talk on "Future of Work-Industry 4.0" on on 23 August 2023

Book Discussion: "A Samurai Dream of Azad Hind Rash Behari Bose" (India International Centre, New Delhi) on 21 August 2023

Y20 Final Summit (Varanasi) on 19 August 2023

Book Discussion: "This is Sanatan Dharma – The Quest for Truth" (Vivekananda International Foundation, Chanakyapuri, New Delhi) on 17 August 2023

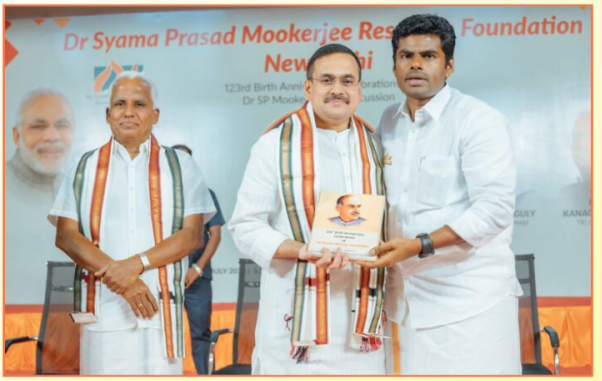


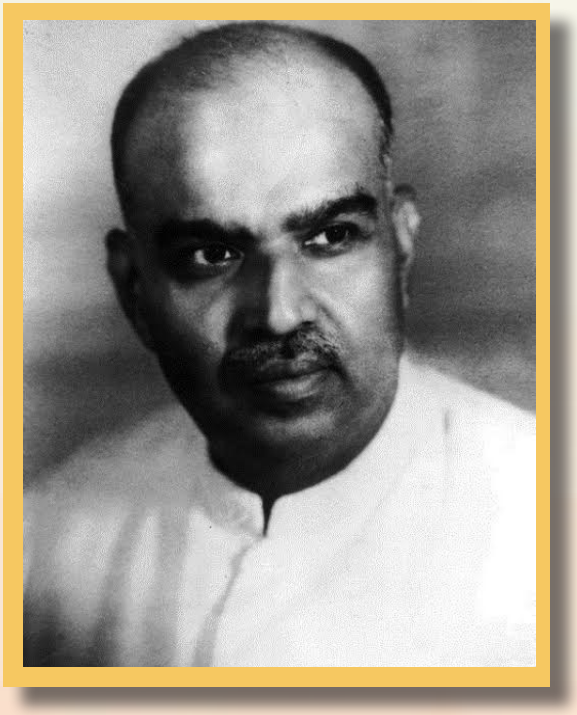
75th Anniversary Celebrations of Shyama Prasad Vidyalaya, Delhi on 05 August 2023

Y20 – Health, Wellbeing & Sports Convention at Satyajit Ray Auditorium, Indian Council for Cultural Relations (ICCR), Kolkata, West Bengal on 19 July 2023

Hony. Director Dr Anirban Ganguly addressed: Dr Syama Prasad Mookerjee Memorial Lecture at Maha Bodhi Society of India, Vihara, New Delhi on 09 July 2023

123rd Birth Anniversary Celebrations of Dr Syama Prasad Mookerjee and a discussion on the "Rise of New India." (Coimbatore, Tamil Nadu) on 06 July 2023





"Freedom consists not only in the absence of restraint but also in the presence of opportunity. Liberty is not a single and simple conception. It has four elements – national, political, personal and economic. The man who is fully free is one who lives in a country which is independent; in a state which is democratic; in a society where laws are equal and restrictions at a minimum; in an economic system in which national interests are protected and the citizen has the scope of secure livelihood, an assured comfort and full opportunity to rise by merit.

-Dr. Syama Prasad Mookerjee
Patna University Convocation
27th November 1937

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