

# **Deception and Dual-use: India's Complicated History with Rockets**

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HIST SCI 150 - DIS 317

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"For sweetest things turn sourest by their deeds"  
William Shakespeare

What can send men to the moon can also turn a city to ashes. Missile and rocket technology has been everpresent and it's no secret that there was overlap in its development and use. The Soviet Union and the United States discovered these intersections during the Space Race, a time of accelerated development. Silently there was another country watching and building programs for a similar dual-use purpose: India. The Indian government laid the foundations for the Indian Space Research Organisation (ISRO) and started launching rockets in the 1960s, using building blocks given by the international community including rocket designs from NASA which also trained Indian scientists, and key information from France and Germany. However, to the horror of the international community, the information given was used to advance the weapons program with striking similarities in India's missiles and NASA's rockets and developed by the same scientists NASA trained. The resources given to help a space program were now the foundation for what would become one of the world's nuclear superpowers.

However this deceit may be justified, not because of how India protected itself, but because of how ISRO would evolve and become a beacon for space exploration and a source of national pride among Indians, highlighting how despite its controversial origins, the dual-use of technology has brought an influential player to space exploration with ISRO becoming the first space program to reach Martian orbit on the maiden attempt as well as an inspiration for the people of India. Nevertheless, it is important to understand these troubling origins before justifying them.

India was ambitious to touch the stars, but also desperate to arm itself. Precursors to ISROs formation in 1969 were the 1962 Sino-India war with China, the 1965 Indo-Pakistani war, and China's successful nuclear weapons test in 1964, all of which amplified the need for better defense. Even though India's first missile Prithvi would not come until the 1980s, India had an interesting history of rocketry, more specifically Mysorean rockets<sup>[1]</sup> which were used in warfare by the Kingdom of Mysore on the British East India Company during the Anglo-Mysore wars in the late 1700s. Unfortunately, India's rich history would not help them much in developing modern rockets so they turned to the rest of the world.

In the 1960s, India sent scientists to work under NASA<sup>[3]</sup> to learn about rocket technology to lay the foundations for the Indian space program. The American incentive was the Thumba launching station in India where NASA launched rockets between 1963 and 1975<sup>[3]</sup>. The Scout rocket was one of many developed and India wanted to use that technology to develop its rockets. Even though there were suspicions about India's intentions, NASA handed over technical reports on Scout's design<sup>[4]</sup>, a decision that would lay the foundations for India's space program and later, its missile development. The USA was not the sole

contributor as the Germans provided critical knowledge in guidance, and the use of composite materials, and the French in liquid propulsion<sup>[4]</sup>, all provided under the assumption they were for the space program

The SLV-3, India's first satellite launcher, launched four times between 1979 and 1983, was created under the leadership of Dr. Abdul Kalam, one of the Indian scientists trained by NASA, and the design of the vehicle was similar to Scouts<sup>[5]</sup>. The dual use of the Scout technology emerged with India's development of the Agni ballistic missile in 1989, whose first stage was the same as that of the SLV-3<sup>[6]</sup> and it is no coincidence one of the leaders in Agni's development was Dr. Kalam. NASA's technology that placed satellites in orbit now found itself in Indian missiles built by the same hands that built the Indian space program. The domino effect of India's endeavors over three decades resulted in the consolidation of India as a global superpower in the 21st century. India is also not a signatory to the Non-Proliferation Treaty whose objective is to curb the spread of nuclear weapons, a sign of hostility further exemplifying the volatile situation in Southern Asia between India and Pakistan, with India on the brink of launching during the 2019 Indo-Pakistani crisis<sup>[7]</sup>. Technology to explore was now one to explode.

ISRO, however, is more than a space agency, it is a source of national pride. As a high school student, I had the opportunity to tour an ISRO launch pad, and something I learned from talking to the scientists was the immense pride everyone had in working for ISRO. Every time ISRO launched a rocket, they were held on a pedestal, and when they failed, the people of India stood in support. ISRO is also a pioneer in space technology and research, gaining recognition for its low-cost yet successful missions with its Mars mission costing \$74 million compared to NASA's \$671 million<sup>[8]</sup>, a feat that helped restore faith in space programs among those who believed space programs were no less than a hole in governments pockets.

In my opinion, India finds itself in a position the United States found itself in decades ago during the Space Race, with a sense of national pride throughout the country and overwhelming support for both the military and space program. Despite its militaristic origins, India's potential with its dual-use technology is immeasurable and I believe the success of ISRO compounded with India's necessity to defend itself justifies how India built its rockets and missiles. One can only look to the future to see if this once-sour fruit will remain sweet.

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