

# Mars mission opens India for space business (Update)

September 24 2014, by Katy Daigle

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Screens show Indian Prime Minister Narendra Modi greeting Indian Space Research Organisation scientists and other officials after the success of Mars Orbiter Mission at their Telemetry, Tracking and Command Network complex in Bangalore, India, Wednesday, Sept. 24, 2014. India triumphed in its first interplanetary mission, placing a satellite into orbit around Mars on Wednesday morning and catapulting the country into an elite club of deep-space explorers. (AP Photo/Aijaz Rahi)

India celebrated putting a spacecraft into orbit around Mars on

Wednesday, hoping the rare feat will show the world it is open for business in space exploration and inspire a new generation of homegrown scientists to help drive growth.

Those motivations help explain why India, a poor country of 1.2 billion, even invests in a space program when so many of its people lack access to proper toilets, electricity and health care.

For one, boosting its space business has always been a key selling point of the country's program.

More than half of the world's missions to Mars so far have failed. In proving it can pull off a complex space mission, India becomes one of the world's few reliable ferrymen to the stars. That can attract investors, commercial launch orders and customers to hire Indian rockets and satellites for their scientific research.

But the program also is a source of pride and motivation for the country's burgeoning ranks of young professionals. India's robust scientific and technical education system has already produced millions of software programmers, engineers and doctors who have helped grow the country's growing middle class.

"Mars, of course, captures the imagination of the world. What better goal is there to reach for, to prove we can accomplish our goals?" said B.N. Raghunandan, the engineering dean at the Indian Institute of Science in Bangalore, India's tech hub.

Every time India launches another rocket, he said he is bombarded by students asking how they can get into the school's aerospace engineering program.

India's credibility also gets a huge boost, he said. "These kinds of

successes put India in a better bargaining position, reassuring investors that we can perform."

India joined an elite club when it successfully guided its Mars Orbiter Mission, affectionately called MOM, into orbit around the red planet Wednesday morning. Only the U.S., former Soviet Union and European Space Agency have been able to do that before.

In scenes broadcast live on TV, scientists at the Indian Space and Research Organisation's command center in Bangalore erupted into cheers as orbiter's engines completed 24 minutes of burn time to maneuver the spacecraft into place. MOM had traveled some 666 million kilometers (414 million miles) and more than 300 days since breaking from Earth's gravitational pull.

"Our scientists have achieved this in the first attempt," Prime Minister Narendra Modi said from the command center. "We have dared to reach out into the unknown and have achieved near impossible."



Indian school children pose for photographs with a poster of Mars Orbiter Mission satellite as they celebrate its success in Chennai, India, Wednesday, Sept. 24, 2014. India triumphed in its first interplanetary mission, placing a satellite into orbit around Mars on Wednesday and catapulting the country into an elite club of deep-space explorers. (AP Photo/Arun Sankar K)

India was particularly proud that MOM was developed with homegrown technology and for a bargain price of about \$75 million—a cost that Modi quipped was lower than many Hollywood movie budgets. NASA's much larger Maven mission, whose satellite went into orbit around Mars on Sunday, cost nearly 10 times as much, at \$671 million.

The country's business sector applauded the mission, with the Federation of Indian Chambers of Commerce and Industry saying "it will encourage Indian industry to invest in the research and innovation."



In this Nov. 5, 2013 file photo, Indian Space and Research Organization Chairman, K. Radhakrishnan, poses for the media with a model of the Mars orbiter after its successful launch at Sriharikota, India. With home-grown technology and a remarkably low budget of about \$75 million, India could become the first nation to conduct a successful Mars mission on its first try. If the Mars Orbiter Mission, or MOM, settles into orbit in the morning, Wednesday, Sept. 24, 2014 as planned, the country will join the U.S., European Space Agency and the former Soviet Union in the elite club of Martian explorers. (AP Photo/Arun Sankar K, File)

India's success shows the world that "they are now a force of capability ... that can be taken very seriously," said space expert Roger Franzen, the technical program manager at the Australian National University's Research School of Astronomy and Astrophysics.

"India has an extremely well-developed space industry that manufactures everything from the components to the spacecraft to the instrumentation to the launch vessels," he said.

In the realm of scientific space research, India also could soon join in collaborative missions with NASA or ESA, he suggested.



Indian Space Research Organisation scientists and officials cheer as they celebrate the success of Mars Orbiter Mission at their Telemetry, Tracking and Command Network complex in Bangalore, India, Wednesday, Sept. 24, 2014. India triumphed in its first interplanetary mission, placing a satellite into orbit around Mars on Wednesday morning and catapulting the country into an elite club of deep-space explorers. (AP Photo/Aijaz Rahi)

India has already conducted dozens of successful satellite launches, including sending up the Chandrayaan-1 lunar orbiter, which discovered

key evidence of water on the moon in 2008. And it plans new scientific missions, including putting a rover on the moon.

But the focus for the space agency, which operates on an annual budget of \$1.1 billion, will remain on developing technologies for commercial and navigational satellite applications, the agency's chief K. Radhakrishnan said Tuesday. Those services could bring in significant revenues from companies or governments seeking to place their own satellites or research equipment in space.

"If we're going to earn money, we're going to do it on that," said D. Raghunandan of the Delhi Science Forum, a group that promotes the study of science. "India's portfolio is likely to be somewhat limited because we can't afford to spend that much money in pure science exploration and in an exercise of the imagination."

Still, India hopes to gather scientific data to deepen our understanding of Mars and the wider universe.



Indian Space Research Organisation scientists watch screens display the graphics explaining Mars Orbiter Mission at their Telemetry, Tracking and Command Network complex in Bangalore, India, Wednesday, Sept. 24, 2014. India triumphed in its first interplanetary mission, placing a satellite into orbit around Mars on Wednesday morning and catapulting the country into an elite club of deep-space explorers. (AP Photo/Aijaz Rahi)

MOM will circle the planet for at least six months, with solar-powered instruments gathering scientific data that may shed light on Martian weather systems as well as what happened to the water that is believed to have existed once on Mars.

It also will search Mars for methane, a key chemical in life processes on Earth that could also come from geological processes. Experts hope data gathered will help them better understand how planets form and what conditions might make life possible.

"Mars is gradually unveiling its secrets to science and humanity and the Indian mission is yet another means of unveiling this enigma that Mars presents," said Franzen.

Even though India wrestles with many problems from poverty to hunger, that shouldn't stop the country from forging ahead in science and space, said B.N. Raghunandan, of the Indian Institute of Science.





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"I don't think we can afford to lag behind. We can't sacrifice frontier research for the sake of solving old-world problems," he said. "These technological advances have their own spinoffs and benefits."

For 12-year-old Mansha Khanna, who was visiting the Nehru Planetarium in New Delhi for Mars-themed learning activities and games, the mission's success gave her something to dream about—becoming "a scientist or an astronaut."



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For another student, Kashish, also 12, who uses only one name, the sky was the limit.

"I am proud to be born in a country that can do anything and succeed," he said.



In this Sept. 11, 2013, file photo, Indian engineers work on the Mars orbiter spacecraft at the satellite center of Indian Space Research Organization (ISRO) in Bangalore, India. The Indian spacecraft is due to slip into Martian orbit Tuesday, Sept. 23, 2014 (Wednesday morning in India). It's India's first interplanetary mission, and no nation has been fully successful getting to the red planet on its first try. (AP Photo/Aijaz Rahi, File)

**More information:** Indian Space and Research Organization:  
[www.isro.org/](http://www.isro.org/)

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Citation: Mars mission opens India for space business (Update) (2014, September 24) retrieved 15 August 2024 from  
<https://phys.org/news/2014-09-india-successfully-spacecraft-mars-orbit.html>

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