

# Investment in STEM: the Vaccine for Tariffs

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Over the past several years, the global trading system has entered a period of rising protectionism. Major economies, particularly the United States, have increasingly relied on tariffs as instruments of strategic competition, industrial policy, and geopolitical pressure. India has not been immune to these developments. Various rounds of tariff increases on Indian exports — ranging from metals and manufactured goods to broader reciprocal tariff measures — have created uncertainty for exporters and investors alike. Although the overall impact on the Indian economy has remained moderate rather than catastrophic, the effects have nevertheless been significant enough to warrant serious reflection.

India's economy is large, diversified, and increasingly driven by domestic demand, which has helped cushion the immediate effects of external tariff shocks. However, even a limited rise in tariffs can affect export competitiveness, reduce investor confidence, and disrupt supply chains in sensitive sectors. Small and medium-sized enterprises, in particular, often face disproportionate challenges because they possess fewer resources to adapt to changing international trade conditions. Furthermore, uncertainty itself can become economically damaging, as businesses hesitate to expand production or make long-term investments when market access appears unstable.

The recent tariff episodes offer an important lesson for India. In the twenty-first century, economic resilience cannot rely solely on low-cost manufacturing or dependence on a few export markets. Nations that remain vulnerable to tariff pressure are typically those whose exports are easily substitutable. By contrast, countries that dominate advanced technologies, critical infrastructure, pharmaceuticals, scientific instruments, aerospace systems, and cutting-edge research possess greater strategic insulation. Their products are not easily replaced, and therefore become more resistant to political fluctuations in global trade.

India must therefore adopt a forward-looking strategy centered on technological depth and scientific capability. Diversification of export destinations is one necessary step. Expanding trade relations with Southeast Asia, Africa, the Middle East, Europe, and Latin America can reduce excessive dependence on any single market. Simultaneously, India

should continue strengthening domestic manufacturing ecosystems, logistics networks, semiconductor capabilities, renewable energy systems, and advanced research infrastructure.

Most importantly, India must recognize that investment in science, technology, engineering, and medicine (STEM) is not merely an educational or developmental priority — it is an economic security imperative. Scientific research generates intellectual property, high-value products, and industries with strong global demand. Engineering excellence supports sophisticated manufacturing and infrastructure development. Advances in medicine and biotechnology create exports that remain essential regardless of political tensions. Technological leadership transforms a nation from a replaceable supplier into an indispensable partner.

India already possesses several natural advantages in this direction, including a large technical workforce, globally respected scientific institutions, a thriving pharmaceutical industry, and an expanding startup ecosystem. What is now required is sustained long-term investment. Public and private expenditure on research and development must increase substantially. Universities, laboratories, startups, and industries should be integrated into coordinated national innovation missions. Young students should be encouraged to pursue careers in mathematics, engineering, medicine, computing, and the natural sciences.

Ultimately, tariffs are symptoms of a changing world economy. The most durable protection against them is not retaliation, but capability. A nation that exports advanced knowledge, scientific innovation, and critical technologies becomes far more difficult to isolate. Investment in STEM, therefore, is not simply a path to growth — it is the vaccine against future tariff shocks.