



INNOVATION HEADLINES VS. IMPLEMENTATION REALITY: ARE WE MEASURING THE RIGHT THING?

Every year, engineering institutions across India - including IITs, private universities, and state technical colleges - announce that engineering students have developed a breakthrough prototype - a robotic sewer-cleaning device, an AI-driven waste segregation system, a low-cost assistive machine designed to eliminate hazardous manual labour. The images are familiar: a campus lab, a sleek device, confident young innovators. For a moment, it feels as though technology has finally outrun one of India's most persistent social failures.

And then the story fades.

India is not short of innovation. According to the World Intellectual Property Organization's (WIPO) *Global Innovation Index 2025*, India ranks 38th globally, up from 81st in 2015 - one of the fastest improvements among large economies. The Department for Promotion of Industry and Internal Trade (DPIIT) reports over 1,97,692 recognised startups as of 31st October 2025. Patent filings in India reached to 1,10,375 applications in 2024-25 annual report, nearly doubling in a decade. University incubation centres and technology transfer offices have multiplied across IITs, NITs, and private institutions.

On paper, the innovation ecosystem is thriving.

Yet the conversion of prototypes into scaled, public-facing solutions remains uneven.

Consider sanitation - a sector that regularly inspires student engineering projects. The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013, outlawed hazardous manual cleaning of sewers and septic tanks. The government's NAMASTE (National Action for Mechanised Sanitation Ecosystem) scheme, launched in 2022, and to approved to run for four years from 2022-23 to 2025-26 and aims to promote full mechanisation and provide safety equipment and training to sanitation workers.

And yet, according to data presented in Parliament and reported by the Ministry of Social Justice and Empowerment (MoSJE), sewer and septic tank deaths continue to be recorded annually across multiple states. Independent civil society estimates suggest that hundreds of workers have lost their lives in hazardous cleaning operations over the past decade.

The gap between invention and implementation is not technical alone. It is institutional.

Deploying a robotic cleaning system across municipalities requires:

- procurement approvals across state and local bodies;
- budget allocations for acquisition and maintenance;
- operator training and certification;
- integration into existing sewage infrastructure;
- long-term servicing and liability frameworks.

A successful campus prototype does not automatically navigate these layers.

Globally, this phenomenon is well documented. According to studies by the OECD and the U.S. National Science Foundation, only a small fraction of university-developed technologies transition successfully from proof-of-concept to sustained commercial deployment. Attrition rates between laboratory validation and market scaling are high, even in advanced innovation ecosystems with mature venture capital networks.

India faces additional structural hurdles: fragmented municipal governance, budget constraints at the urban local body level, and inconsistent technical capacity for adoption. In such an environment, the announcement of a prototype is a beginning - not a conclusion.

Yet public discourse rarely distinguishes between the two.

Prestigious institutions naturally command greater media amplification. Their research announcements are trusted, amplified, and widely circulated. That visibility reflects decades of reputation-building and academic excellence. But visibility can sometimes create a perception of transformation before transformation has occurred.

Meanwhile, lesser-known institutions attempting similar work may face skepticism or limited coverage - not necessarily because the engineering differs, but because reputational capital shapes public reception.

The deeper question is how we measure success.

- 1a. Do we track the number of prototypes unveiled?
- 1b. Or the number of municipalities that adopt them?

- 2a. Do we count patent applications?
- 2b. Or licensing agreements and field deployment?

- 3a. Do we celebrate demonstration days?
- 3b. Or five-year survival and usage metrics?

India's startup ecosystem demonstrates that scaling is possible. Companies in fintech, e-commerce, and digital payments have achieved rapid adoption when policy, capital, and infrastructure align. The Unified Payments Interface (UPI), for instance, grew from pilot stage to processing billions of transactions monthly within a few years - not because the technology alone was impressive, but because institutional alignment enabled adoption.

Social infrastructure innovation requires similar alignment.

The issue is not that universities are failing. On the contrary, they are generating ideas at unprecedented scale. The issue is that our evaluation frameworks remain announcement-driven rather than outcome-driven.

Innovation that remains inside campus boundaries is aspiration. Innovation that survives procurement cycles, budget scrutiny, regulatory compliance, and real-world stress-testing becomes impact.

India does not lack talent. It does not lack prototypes. What it must strengthen is the institutional bridge between the laboratory and the locality.

Innovation announcements inspire optimism. But innovation impact requires endurance.

Until we close that gap, we risk confusing visibility with victory.

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