

From Labs to Living Rooms: A Multidisciplinary Blueprint for Everyday Science and Technology in Viksit Bharat @ 2047

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abstract

As India approaches the centenary of its independence in 2047, the national vision of "Viksit Bharat" aims to transition the country into a developed, self-reliant, and sustainable economy. Central to this transformation is the democratization of Science and Technology (S&T). This paper proposes that achieving Viksit Bharat requires a paradigm shift: moving technological innovation from isolated laboratories into the everyday living rooms of its citizens. Utilizing a multidisciplinary blueprint that intersects Science, Technology, Commerce, and the Humanities, this study examines how macro-innovations translate into micro-level societal benefits. Through a detailed case study of India's Digital Public Infrastructure (DPI)—specifically the Open Network for Digital Commerce (ONDC)—the research demonstrates the necessity of integrating technical scalability with economic viability and human-centric design. The findings indicate that future S&T policies must prioritize digital inclusivity, indigenous deep-tech commercialization, and socio-cultural adaptability to realize an equitable and developed India by 2047.

Keywords: Digital Public Infrastructure, Everyday Technology, Multidisciplinary Innovation, Socio-Technical Systems, Open Network for Digital Commerce, Viksit Bharat 2047.

I. Introduction

The vision of "Viksit Bharat@2047" represents India's definitive roadmap to emerging as a developed global power. While economic metrics such as a projected \$30 trillion GDP are frequently highlighted, the true measure of a developed nation lies in the quality of everyday life experienced by its

citizens. The Government of India has anchored this vision on four primary demographic pillars: Yuva (Youth), Garib (Poor), Mahilayen (Women), and Annadata (Farmers).

Historically, technological breakthroughs have often remained confined to academic laboratories, corporate R&D centers, or elite urban enclaves. The central thesis of this paper is that for India to achieve its 2047 developmental goals, Science and Technology (S&T) must transcend these boundaries and become ubiquitous, everyday utilities. This transition from "labs to living rooms" cannot be achieved through engineering alone. It requires a robust, multidisciplinary blueprint where Science generates foundational knowledge, Technology engineers applicable solutions, Commerce creates scalable delivery models, and the Humanities ensure these tools are ethically sound, culturally accepted, and socially inclusive.

II. Theoretical Framework: The Multidisciplinary Nexus

The adoption of technology in everyday life is not a linear process; it is a complex socio-technical phenomenon. This paper relies on a four-pillar multidisciplinary framework to analyze the pathway to 2047:

1. **Science and Technology (The Engine of Capability):** Foundational research in deep-tech, artificial intelligence, quantum computing and bio-manufacturing creates the raw potential for societal upgrade. Initiatives like the Anusandhan National Research Foundation (ANRF) reflect the shift toward homegrown scientific capability.
2. **Commerce (The Engine of Scale):** A scientific breakthrough only reaches the living room if it is economically viable. Commerce—through startup ecosystems,

supply chain innovations, and market-driven pricing—bridges the "valley of death" between prototype and mass-market product.

3. **Humanities (The Engine of Context and Adoption):** Technologies fail when they ignore human behavior, linguistic diversity, and cultural nuances. The Humanities provide the framework for digital literacy, ethical AI governance, and behavioral economics, ensuring that technology serves the human condition rather than alienating it.

III. Sectoral Pathways: S&T in Everyday Indian Life

To contextualize this multidisciplinary blueprint, it is essential to examine how S&T is currently restructuring everyday life across critical sectors in India.

3.1. Healthcare: Democratizing Diagnostics and Care

The health of the individual directly correlates with national economic productivity. S&T is shifting healthcare from reactive clinical visits to proactive, at-home management. The Ayushman Bharat Digital Mission (ABDM) has laid the groundwork for interoperable health records. Coupled with affordable, indigenously developed wearable biosensors and telemedicine platforms, rural citizens can now access specialized diagnostics from their living rooms, drastically reducing out-of-pocket medical expenditures.

3.2. Agriculture: "Phygital" Ecosystems for the Annadata

For the Indian farmer, S&T is transforming agriculture from an unpredictable, labor-intensive pursuit into a precision science. The integration of "AgriStack" (a digital foundation for agriculture) with physical farming allows for real-time, AI-driven weather forecasting, localized soil health mapping, and drone-assisted resource management. Commerce integrates here by linking farmers directly to commodity markets, bypassing predatory middlemen.

3.3. Climate and Energy: Mission LiFE at Home

By 2047, climate resilience will dictate everyday survival. Technological solutions for renewable energy must be brought into the household. Subsidized rooftop solar initiatives and the commercialization of smart-grid

technologies are turning ordinary households from passive energy consumers into active "prosumers." Here, the Humanities play a crucial role through Mission LiFE (Lifestyle for Environment), using behavioral nudges to promote circularity and waste reduction at the individual level.

IV. Detailed Case Study: Digital Public Infrastructure (Dpi) And The Ondc Paradigm

To fully illustrate the multidisciplinary "Labs to Living Rooms" framework, this section analyzes India's Digital Public Infrastructure (DPI), with a specific focus on the Open Network for Digital Commerce (ONDC).

4.1. Context: The Monopolization of Digital Commerce

Prior to the full rollout of ONDC, digital commerce in India was dominated by a few large, proprietary platform aggregators. While these platforms brought e-commerce to millions, they created a bottleneck. Small-scale merchants, local grocers (kirana stores), and rural artisans were often excluded due to high commission rates (often 20-30%), algorithmic biases, and digital illiteracy.

4.2. The Scientific and Technological Intervention

Developed as an extension of India's DPI—which began with the Aadhar identity layer and the Unified Payments Interface (UPI) payment layer—ONDC is not an application, but a set of open-source network protocols. Technologically, it unbundles the e-commerce supply chain. It separates the buyer application, the seller application, and the logistics provider into distinct, interoperable micro-services. This represents a monumental leap in computer science and network architecture, shifting the paradigm from platform-centric to protocol-centric models.

4.3. The Commercial Viability and Scaling

From a Commerce perspective, ONDC fundamentally alters unit economics. By breaking monopolies, it reduces customer acquisition costs and slashes network fees to single digits. A local weaver in rural Assam can list their products on a localized seller app, and a consumer in Mumbai can discover those products via a mainstream buyer app. This democratizes the market, allowing micro,

small, and medium enterprises (MSMEs) to compete globally from their local living rooms and workshops.

4.4. The Humanistic Impact: Inclusivity and Language

The true success of ONDC lies in its socio-cultural integration—the Humanities in action. India is a linguistically diverse nation. ONDC integrates with Bhashini, an AI-driven national language translation mission. This allows a user to perform voice-based searches in their native regional dialect, breaking down the English-language barrier that traditionally gated e-commerce. By fostering financial independence for women entrepreneurs and marginalized communities, ONDC acts as an applied tool for social equity and justice, proving that technology is most effective when it is human-centered.

V. Strategic Imperatives and Challenges

While the trajectory is promising, achieving the Viksit Bharat 2047 vision requires addressing several systemic challenges at the intersection of these disciplines:

- **Bridging the R&D Funding Gap:** India's Gross Expenditure on R&D (GERD) must scale significantly from its historical average of ~0.7% of GDP to align with developed nations (2-3%). Public-private partnerships are essential to commercialize lab research.
- **The Digital Divide and Algorithmic Bias:** As S&T becomes everyday infrastructure, those without digital access or literacy risk severe disenfranchisement. Furthermore, AI models trained on Western datasets may fail to contextualize Indian socio-economic realities. The Humanities must guide the development of ethical, unbiased AI frameworks tailored to the Global South.
- **Skilling the Youth Dividend:** The rapid integration of automation and generative AI necessitates a massive overhaul of the education system. A multidisciplinary STEM+H (Science, Technology, Engineering, Mathematics + Humanities) curriculum is required to build a workforce that is not only technically proficient but creatively and ethically grounded.

VI. Conclusion

The journey to Viksit Bharat@2047 is an unprecedented socio-economic endeavor. As this paper demonstrates, relying solely on

isolated scientific breakthroughs is insufficient for national development. True progress is achieved when technology leaves the laboratory and fundamentally improves the everyday living room—enhancing how citizens heal, farm, trade, and communicates. By embracing a multidisciplinary blueprint that leverages Science for capability, Technology for application, Commerce for scale, and the Humanities for context, India can ensure that its path to 2047 is not only technologically advanced but fundamentally equitable, inclusive, and human-centric.

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