

Rewriting India’s farm story: A decade of Transformation

-SHRI SHIVRAJ SINGH CHOUHAN

When Honorable Prime Minister assumed office in 2014, agriculture and farmer welfare were placed at the heart of India’s development agenda. Since 2015, this commitment has increasingly translated into a broader transformation from improving production and farm incomes to building an agriculture sector that is productive, resilient, technology-driven and sustainable. The Prime Minister has repeatedly emphasised that “For a Viksit Bharat, Indian agriculture must also be developed.” He has also called for India not merely to meet its own food requirements but to emerge as a global food supplier. Adding to Lal Bahadur Shastri’s call of “Jai Jawan, Jai Kisan” and Atal Bihari Vajpayee’s “Jai Vigyan”, the Prime Minister gave the nation “Jai Anusandhan”. With that phrase he placed research and innovation at the heart of India’s farm future. Those words were more than a statement of policy direction; they embodied a pragmatic vision whose wisdom and foresight were unmistakably vindicated by the evidence that emerged a decade later.

From Food Security to a New Agricultural Paradigm

This vision represents a decisive shift in the way we must look at Indian agriculture. The Green Revolution gave India food security. Today, our responsibility is to build the foundations of nutritional security, farmer prosperity, resource security and global competitiveness. India’s agricultural journey is one of remarkable achievement. From a country once dependent on food imports, India became self-sufficient in staple cereals within a few decades. The Green Revolution was powered by science, improved seeds, irrigation, infrastructure, institutional credit, extension and policy support. It demonstrated what can happen when scientific capability and political commitment converge around a national objective. But agriculture cannot remain frozen in the priorities of the past. The aspirations of our farmers have changed, the consumption patterns of our citizens have changed, markets have changed and the climate itself is changing.

A Decade of Broad-Based Agricultural Growth

The transformation underway since 2015 is therefore significant. The years 1995–96 and 2014–15 have been marked as structural break-points because they mark distinct phases in the evolution of Indian agriculture. The first reflects

the gradual impact of economic liberalisation, greater market integration, changing consumption patterns and the slowdown in cereal productivity growth, while the second marks the emergence of a more diversified, technology-enabled and resilience-oriented agricultural system driven by irrigation expansion, digital platforms, market reforms and increasing focus on sustainability and climate adaptation. Agricultural growth, which averaged about 2.7 per cent during 1967–1995 and about 3.0 per cent during 1996–2014, accelerated to around 4.5 per cent during 2015–2025 (Food grains at 8.4MT/annum, Fruits and Vegetables at 7.6MT/annum and Milk at Mt/annum). The last two years have witnessed an exceptional increase in food grain production, with the increase recorded at 22.1MT per annum, significantly higher than that observed during the preceding years.. This achievement reflects the combined impact of stronger Centre–State coordination, effective convergence of programmes, adoption of climate-resilient technologies, focused investments, and enhanced support to farmers. More importantly, this growth has become broader, drawing strength not only from cereals but also from horticulture, dairy, fisheries, poultry and other high-value activities. This is the agriculture that will power the next phase of India’s development.

Our objective must no longer be defined simply as producing more. We must produce more with lessless water, less land, less energy and fewer avoidable inputs while producing better quality, safer and more nutritious food. The transformation in Indian consumption itself provides a powerful signal. In rural India, cereals accounted for about 57 per cent of food expenditure in 1972–73; by 2022–23, this had fallen to around 11 per cent. At the same time, the share of milk and milk products, fruits, vegetables, eggs, meat and fish rose from about 20 per cent to nearly 48 per cent. Urban consumption has followed a similar trajectory. Our farms must respond to this new India. This means greater emphasis on pulses, oilseeds, fruits, vegetables, dairy, fisheries, poultry and other high-value commodities. It means moving from a narrow concept of food security towards nutrition security. It means enabling farmers to participate in value chains where the real economic opportunity increasingly lies in grading, processing, packaging, branding, logistics and exports.

Building the Architecture for Farmer-Centric Growth



The Government of India has already created an important architecture for this transition. The Pradhan Mantri Krishi Sinchayee Yojana is promoting efficient water use. The Soil Health Card initiative has placed soil testing and balanced nutrient management at the centre of farm decision-making. PM-KUSUM is linking agriculture with renewable energy. Farmer Producer Organisations are strengthening aggregation and bargaining power. e-NAM is connecting agricultural markets digitally, while the Agriculture Infrastructure Fund, PM Kisan SAMPADA Yojana and PMFME are strengthening post-harvest infrastructure and processing. These initiatives must now converge into a single farmer-centric value chain from seed to soil, farm to market and laboratory to livelihood. Technology will be central to this transformation. Indian agricultural research has already moved beyond the traditional objective of simply increasing yields. Between 2014 and 2025, 3,236 crop varieties were released, compared with 1,540 during 2003–2014. A large proportion of recent varieties have been designed with climate resilience in mind, while biofortification is receiving greater attention. The next agricultural revolution must therefore be a revolution of precision, resilience and knowledge. Artificial intelligence, remote sensing, drones, genomics, biotechnology, digital advisory systems and geospatial technologies can help farmers make better decisions about sowing, irrigation, nutrients, pests, weather and mar-

kets. Digital Agriculture initiatives, AgriStack and AI-enabled advisory platforms can make agricultural services more targeted and accessible. But technology will deliver results only when it reaches the farmer in a simple, affordable and locally relevant form.

From Laboratory to Last Mile

The role of research and extension is consequently becoming even more important. Every rupee invested in agricultural research generates substantial economic returns, while extension converts scientific knowledge into practical improvements on farms. We must strengthen the connection between our laboratories, universities, Krishi Vigyan Kendras, startups, private innovators and farmers. At the same time, we must confront the resource challenge. India cannot indefinitely expand agricultural production by expanding the use of water, fertiliser, energy and land. Groundwater depletion, soil degradation, climate variability and extreme weather events demand a new production paradigm. The evidence shows that the recent phase of agricultural growth has combined higher productivity with greater stability, reflecting the growing importance of diversification, resource efficiency, risk management and climate resilience. This is why sustainability is not an environmental luxury; it is an economic necessity for the farmer.

Our policies must encourage efficient use of every unit of water, nutrient and energy. Research should prioritise climate-resilient varieties, water- and nutrient-efficient crops, improved soil biology, integrated pest management, conservation agriculture and precision farming. Pulses and oilseeds deserve particular attention because increasing their productivity is essential for strengthening India’s nutritional and economic self-reliance.

Efficient Markets and global value chains

A farmer who produces efficiently must also be able to sell profitably. Agricultural markets, storage, cold chains, logistics, grading, processing and digital platforms must grow alongside production. The expansion of agricultural output and diversification into perishable commodities have created new requirements for efficient aggregation and market connectivity. Farmer collectives, cooperatives and FPOs can play a transformative role by reducing transaction costs, improving bargaining power and enabling farmers to participate in organised value chains. India must increasingly look beyond the mandi to the marketplace of the world.

Our ambition should be to develop Indian agricultural products with globally recognised quality, traceability, safety and branding. The next phase must connect farmers not merely with domestic consumers but with international value chains. This will create employment, encourage rural entrepreneurship and enable a greater share of the value generated by agriculture to remain in rural India. But this transformation cannot be delivered by the Union Government alone. Agriculture is a shared national responsibility. States, local governments, research institutions, FPOs, cooperatives, private enterprises, financial institutions and civil society must work together. The future requires convergence across agriculture, water, energy, food processing, nutrition, climate, trade and rural development.

This is also where the spirit of cooperative federalism becomes critical. India’s agro-ecological diversity demands solutions that are local in implementation but national in vision. The journey from Viksit Krishi to Viksit Bharat will ultimately be measured not merely by tonnes produced, but by the quality of life of our farmers. A prosperous farmer is the foundation of a prosperous rural economy. A resilient farm is the foundation of resilient food systems. And a competitive agricultural value chain is the foundation of a globally competitive Bharat. We therefore need to move confidently from the paradigm of “how much can we produce?” to “how efficiently, sustainably and profitably can we produce?”

The Green Revolution secured India’s food future. The next agricultural transformation must secure India’s prosperity, nutrition, natural resources and global leadership. Honorable Prime Minister has given the nation a clear direction: Indian agriculture must become an important pillar of Viksit Bharat. Our task is to turn that vision into action through science, innovation, infrastructure, markets, institutions and, above all, by placing the Indian farmer at the centre of every agricultural policy. As we move towards Viksit Bharat 2047, the farmer must not merely be a beneficiary of development. The farmer must be an architect of India’s developed future. That is the agricultural transformation India must now pursue and that is the foundation on which the India of 2047 will stand.

(Author is Union Minister of Agriculture & Farmers Welfare, and Rural Development, Government of India. Views are personal)

India Needs Its Own Elon Musk, But Is It Ready for One?

ELON MUSK’S IMPATIENCE WITH INDIA’S REGULATORY MACHINERY EXPOSES A DEEPER CONTRADICTION IN THE COUNTRY’S ECONOMIC AMBITIONS. INDIA WANTS WORLD-CLASS INNOVATION AND GLOBAL TECHNOLOGICAL LEADERSHIP, YET ITS INSTITUTIONS OFTEN STRUGGLE TO ACCOMMODATE THE INDEPENDENCE, URGENCY AND APPETITE FOR RISK THAT PRODUCE DISRUPTIVE ENTREPRENEURS. THE CHALLENGE IS NOT MERELY TO ATTRACT FOREIGN INVESTMENT, BUT TO CREATE AN ENVIRONMENT WHERE INDIAN INNOVATORS CAN CHALLENGE CONVENTION WITHOUT BEING CONSTRAINED BY IT.

EARTH NEWS POLITICAL DESK

The uneasy relationship between Elon Musk and India is about much more than the entry of Starlink into the country’s satellite internet market. Beneath the occasional public confrontation lies a larger question about India’s economic future: Can a nation aspiring to become a global technological powerhouse afford an institutional culture that often regards entrepreneurial impatience as an inconvenience rather than an asset?

Musk represents an unusual combination of ambition, technological audacity and impatience with established conventions. India, by contrast, represents an administrative tradition built around procedure, institutional caution and regulatory oversight. Neither approach is inherently flawless. Yet their collision offers an instructive glimpse into the contradictions confronting a country determined to compete with the world’s most innovative economies.

The controversy surrounding Starlink is particularly revealing. Musk has accused powerful business interests of obstructing its entry into India, suggesting that commercial rivalries have influenced regulatory decisions. Such allegations require evidence and cannot substitute for an examination of legitimate policy concerns. Nevertheless, the episode raises a question that extends beyond any individual company: Are India’s regulatory institutions sufficiently agile to accommodate technologies evolving faster than the rules governing them?

India’s economic ambitions demand an answer.

The Cost of Institutional Caution
India has spent decades attempting to reconcile economic liberalisation with an adminis-

trative machinery inherited from an era of extensive state control. The reforms of 1991 dismantled much of the licence-permit system, opening industries to competition and private investment. Yet the underlying bureaucratic instinct — that economic activity must pass through elaborate layers of scrutiny — has proved remarkably resilient.

Regulation is indispensable in a modern economy. It protects consumers, safeguards national security, prevents monopolistic behaviour and ensures fair competition. The difficulty arises when regulation becomes indistinguishable from delay, or when procedural compliance assumes greater importance than the public purpose it is intended to serve.

For entrepreneurs operating at the frontiers of technology, time is not merely money. It can determine whether an innovation succeeds, becomes obsolete or migrates to a more receptive jurisdiction.

Consider satellite-based internet connectivity. For a geographically vast country such as India, with remote Himalayan settlements, difficult border terrain and underserved rural communities, satellite broadband offers considerable possibilities. In regions such as Ladakh, where conventional telecommunications infrastructure faces formidable geographical and climatic obstacles, reliable satellite connectivity could improve education, healthcare, disaster response and economic participation.

But the security implications are equally substantial. Satellite networks controlled by foreign private entities raise questions about strategic dependence, lawful interception, data governance and operational sovereignty. Their use in the Ukraine conflict has demonstrated both their military importance and the vulnerabilities arising when critical communications depend on decisions made by commercial operators.

India, therefore, has every reason to regulate Starlink carefully. What it must avoid is confusing regulatory thoroughness with institutional inertia.

The distinction matters. A sovereign state need not surrender its authority to accommodate innovation. Equally, it need not sacrifice innovation to demonstrate its authority.

Innovation Cannot Wait for Permission
Musk’s entrepreneurial record illustrates the transformative possibilities of pursuing ideas that established industries initially dismiss as impractical.

Tesla helped accelerate the global transition towards electric mobility. SpaceX challenged conventional assumptions about the economics of space exploration through reusable launch vehicles. Starlink demonstrated the commercial potential of large satellite constellations. His ventures into artificial intelligence, robotics and

autonomous systems reflect an ambition to connect digital intelligence with machines operating in the physical world.

These achievements do not make Musk infallible. His business decisions, political interventions and public pronouncements have frequently invited legitimate criticism. Nor should entrepreneurial success confer immunity from democratic accountability.

Indeed, the concentration of technological capabilities in the hands of a few private corporations presents its own dangers. When a businessman exercises considerable influence over communications infrastructure, artificial intelligence platforms and space-based systems, questions of public oversight become unavoidable.

Yet recognising these concerns should not obscure the broader lesson of his success. Technological breakthroughs often emerge when individuals are prepared to challenge accepted wisdom, invest heavily in uncertain outcomes and persist despite institutional scepticism.

Such entrepreneurs require more than capital. They need an environment in which failure is tolerated, unconventional ideas are examined on merit and the state functions as a facilitator rather than an omnipresent supervisor.

India has made considerable progress in nurturing start-ups, expanding digital infrastructure and encouraging domestic manufacturing. Its achievements in digital payments, space technology and pharmaceutical innovation demonstrate substantial technological capacity.

But isolated successes cannot conceal structural weaknesses. Complex compliance requirements, unpredictable regulatory interpretations, limited patient capital and the fear of commercial failure continue to discourage ambitious experimentation.

A country cannot consistently produce revolutionary enterprises if its institutions remain uncomfortable with revolutionary thinking.

The Indian Paradox
Perhaps the most striking contradiction is that Indian talent flourishes in some of the world’s most competitive technological environments.

Indian-origin executives have led global corporations, managed enormous technological ecosystems and shaped developments in artificial intelligence, computing and digital commerce. Their achievements undermine any suggestion that India lacks the intellectual capacity, managerial competence or entrepreneurial temperament necessary to produce globally influential enterprises.

The more difficult question concerns the environment in which that talent operates.

An engineer or entrepreneur working in Silicon Valley often benefits from access to venture

capital, specialised research institutions, experienced mentors and a commercial culture that treats failure as part of experimentation. An equally capable innovator in India may confront fragmented funding, bureaucratic uncertainty and social expectations that favour predictable professional advancement over uncertain entrepreneurial ventures.

This difference should not be exaggerated into a simplistic comparison between an innovative West and a restrictive India. The United States also imposes substantial regulatory obligations, and American entrepreneurs frequently clash with public authorities. Its technological leadership owes much to public investment, university research, defence procurement and government-supported scientific programmes.

The lesson is not that governments must withdraw from innovation. Rather, governments must understand where intervention is necessary and where restraint produces better results.

India’s challenge is to develop that institutional judgement.

Beyond the Cult of the Entrepreneur

There is, however, a danger in romanticising Musk’s impatience. Not every regulatory obstacle is bureaucratic obstruction, and not every entrepreneur challenging government policy is necessarily defending the public interest.

Private corporations pursue commercial advantage. Their demands for regulatory flexibility must be evaluated against competition, consumer welfare and national security.

India should neither allow established domestic companies to use regulation as a shield against competition nor permit powerful foreign entrants to portray legitimate scrutiny as hostility towards innovation.

The same rules must apply fairly, transparently and predictably to everyone.

This is particularly important in emerging sectors where technological dominance can quickly translate into market concentration. Encouraging innovation without ensuring accountability may merely replace bureaucratic power with corporate power.

What India needs, therefore, is not a system designed to satisfy impatient billionaires, but one capable of making timely, reasoned and defensible decisions.

Clear regulatory timelines, transparent licensing criteria, independent oversight and effective mechanisms for resolving disputes would benefit domestic entrepreneurs and foreign investors alike.

More importantly, they would reduce the uncertainty that often proves more damaging than regulation itself.

The Real Test of India’s Ambition

India’s aspiration to become a developed economy by 2047 cannot rest exclusively on infra-

structure expansion, manufacturing incentives or the size of its domestic market. It will depend increasingly on whether the country can generate original technologies, build globally competitive enterprises and retain individuals capable of transforming entire industries.

That requires a change not only in government policy but also in institutional and social attitudes.

Entrepreneurship cannot be celebrated merely through conferences, investment announcements and start-up rankings. It must be supported through dependable institutions, research funding, access to capital and a willingness to accept that genuine innovation frequently challenges existing interests.

India must also recognise that entrepreneurial independence is not necessarily an expression of hostility towards the state. Disagreement can be productive. Competition can strengthen domestic industry. Uncomfortable questions can expose weaknesses that administrative consensus might otherwise conceal.

The ultimate measure of an innovation-friendly economy is not how enthusiastically it welcomes successful entrepreneurs, but how confidently it accommodates those whose ideas are still uncertain, disruptive or unpopular.

India does not need to manufacture an imitation of Elon Musk. Its next transformative entrepreneur may emerge from artificial intelligence, clean energy, biotechnology, advanced manufacturing or an entirely unforeseen field. That individual may possess a different temperament, a different worldview and a more measured public persona.

What matters is whether the surrounding ecosystem allows such talent to pursue extraordinary ambitions without being exhausted by ordinary obstacles.

The question, then, is not whether India possesses the intelligence to produce its own Elon Musk. The country has repeatedly demonstrated that it does.

The question is whether India can build institutions confident enough to encourage exceptional ambition without fearing the disruption it inevitably brings.

A nation aspiring to lead the technological future cannot afford to remain excessively attached to the administrative habits of its past. Its entrepreneurs must learn patience where public interest demands it. But its institutions must learn urgency where national progress requires it.

India’s next great innovator may already be at work. Whether that person builds a world-changing enterprise in Bengaluru, Hyderabad or Silicon Valley will depend less on individual genius than on the opportunities — and obstacles — the country places in its path.