

# Pathways for government support to promote the smart protein sector

The growth of the smart protein sector in India presents a significant opportunity to address several challenges, such as food security, sustainability, and economic development, through technology-driven solutions. Smart protein (also known as alternative proteins) - which includes plant-based, fermentation-derived, and cultivated proteins, is increasingly being recognised by governments worldwide as an important and upcoming source of nutrition. Smart proteins can be meat, eggs, dairy and seafood and are environmentally sustainable and notably safer for public health, compared to animal-sourced proteins.

While the sector is still nascent in India, coordinated support from the government can help overcome some of the barriers to technological scale-up and wide-spread adoption. Improvements in the taste, price, and nutrition profile of smart protein products require systemic interventions that go beyond the scope of private-sector investments. This brief outlines some of the pathways through which policy support from the government of India can effectively mobilise the growth of the sector and help place India back on the map of this emerging technology.

## Investing in levers to solve for nutrition, taste, and price parity



Popularly used crops for plant-based proteins such as soy, wheat, and peas were predominantly optimised for improving their yield and physical stress tolerance. Ingredients like millets, mycelium, algal proteins, and leguminous crops such as lentils, chickpea, and pigeon pea (grown widely in India) are inherently rich in micronutrients and offer high-quality protein. They can also improve the functional properties of smart protein (solubility, water-holding capacity, gelation, coagulation, oil binding capacity, emulsification, foaming, etc.) Efforts are underway at institutions such as the Indian Council for Agricultural Research (ICAR) - Indian Institute for Millet Research to employ ingredient optimisation in studying

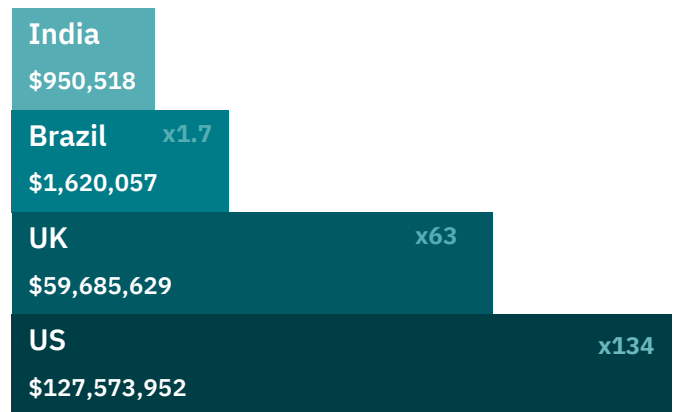
the applications of millets in plant-based products. However, these raw materials are vastly underutilised and underexplored for smart proteins, and the industry continues to rely on the import of high-cost functional inputs. The supply of these indigenous crops is also notably lower than that of cash crops such as rice and wheat. Despite their input-intensive nature, the production and supply of rice and wheat continue to be supported by the government, contributing to various negative externalities while providing comparatively lower nutritive value.

Crop diversification initiatives can increase the supply of crops towards plant-protein production while addressing nutritional deficiencies and sustainability challenges associated with agriculture. For instance, the Ministry of Agriculture and Farmers

Welfare, through ICAR, can institute programmes focused on discovering, breeding, and cultivating cereals, legumes, and pulses with higher nutrient densities. Financial incentives to grow more nutritious and protein-rich crops, along with extension training for farmers and producers, can provide the necessary nudge to transform current production systems.

Researchers at ICAR - Indian Institute of Chemical Technology, have also discovered a [protein-rich micro-algae](#). Such ingredients may be studied further to improve the overall quality [parameters of smart proteins](#). To test such discoveries for product solutions, academic researchers need the support of industry partners. In addition to enhancing nutritional profiles, similar efforts in applied research are needed to develop new processing techniques to improve the taste and texture of smart protein products, which may also [drive down the per-unit costs](#) of smart protein products in the long-run. To help solve industry challenges on taste, price, and nutrition parity while scaling up, there is an immediate need to mobilise funds for research that can be leveraged through industry-academia partnerships.

Recently, a proposal to develop millet-based plant-based egg derivatives with a budget of \$107,919 for two years was submitted as part of the Department of Science and Technology's [Science and Heritage Research Initiative](#). This points to a growing demand for higher budgetary allocations in public funding focused on smart protein.



India's all-time funding for smart protein stands at \$950,518, which is approximately 134 times lower than the US (\$127,573,952), 63 times lower than the UK (\$59,685,629), and 1.7 times lower than Brazil (\$1,620,057), as per publicly available [sources](#).

To bridge this public funding gap in science, the Ministry of Science and Technology can launch smart protein exclusive calls for proposals within broader themes of agro-technology, bioprocessing, microbial, and aqua and marine biotechnology. A crucial aspect of these calls could be to provide opportunities for collaboration and partnerships with a research institution or university as well as an industry partner.

## Moving from bench to pilot scale



To encourage entrepreneurs looking to expand from lab-scale trials towards commercialisation, common infrastructure facilities can provide a promising platform to demonstrate proof of concept. However, a lack of category-specific instruments and equipment needed to manufacture smart protein and having to share space with non-food ventures can often be a roadblock. Recognising this growing demand for incubation spaces tailored to smart proteins, a facility was recently launched by [IKP Knowledge Park in Bangalore](#).

Similarly, the government can support the establishment of nation-wide incubators and science parks to advance early to mid-stage innovators. State governments of regions like Karnataka, Maharashtra, and New Delhi, which are current hotspots for smart protein innovation and entrepreneurship, can take the lead by establishing Centres of Excellence in smart protein.

At the nexus of academic expertise and industry linkages, these centres with dedicated facilities can develop into hubs that foster innovation in developing better end-products.

Companies moving to pilot scale require larger facilities and often look towards contract manufacturing organisations (CMOs). Although CMOs offer better-equipped and well-maintained facilities than bio-incubators, their services can often be cost-prohibitive for companies that have not raised substantial capital yet. The government can ease this burden by incentivising CMOs to accept more pilot-scale orders. Existing platforms, like the Department of Biotechnology's [Fostering High Performance Biomanufacturing](#) initiative and the government of Karnataka's Department of Information Technology and Biotechnology's [Draft Karnataka Biotechnology Policy 2023-2028](#) can be leveraged to encourage CMOs to support smart protein scale-up while subsequently avoiding possible monopolies in the sector.

To promote post-processing and ingredient optimisation for end-product development, the Indian government can institute smart protein processing hubs. In Canada, the

government invested close to [\\$110 million in 2023](#) through the National Research Council's Sustainable Protein Production Programme to expand their processing capabilities for plant-based proteins and help industries move up the value chain. The Program also supports Protein Industries Canada, a [joint initiative](#) led by a supercluster of companies, research institutions, and nonprofits working on plant-based proteins from Canadian indigenous crops. Similar models can be explored in India by utilising the Department of Agriculture's Agriculture Infra Financing Facility scheme and the Ministry of Food Processing Industry's 'Agro-Processing Cluster' initiative to develop farm-to-processing cluster linkages.

Plant-based protein parks, established through a cooperative model can help connect Indian-grown ingredients directly with industry partners for product offtake. This approach would streamline the supply chain through market linkages, and enhance returns for farmers while also promoting the smart protein sector.

## Ramping up large scale production



Most manufacturers of textured vegetarian protein (a key component in several plant-based meat products) hold production plants with an average capacity of up to 1 tonne per day. At that capacity, companies invest around INR 38-40 crore, with over 60% going towards specialised equipment like high-moisture extruders, plant-based meat analysers, spinners, shear cell technology, and 3D printers.

Given these high costs, fiscal support from state governments, along with grants and loan subsidies from the Department of Biotechnology and the Ministry of Food Processing Industries, can help manufacturers reduce their capital expenditure and, consequently, scale up production.

In this way, fiscal and non-fiscal [tools to aid the sector](#) may contribute towards reducing the overall cost of the final product.

As the industry scales up markedly in the next five years, companies can be incentivised to promote and maintain sales through production linked incentive (PLI) schemes. PLI schemes have helped boost manufacturing in other sectors, such as electric vehicle battery manufacturing, where upwards of \$8.3 billion in [investments were made to meet rising global demands](#). Similar supportive policies can encourage allied industries to recognise the long-term business prospects of smart protein and bring in early investments. For instance, allied biotech industries can be nudged to invest in smart protein, allowing the sector to leverage their production of ingredients such as cell-culture media and recombinant proteins for smart protein food manufacturing.

Indian equipment manufacturers and fabricators are also a promising allied industry that the government can support to produce processing machinery for the industry. In line with the government's efforts towards positioning India as a global leader in capital goods, existing manufacturers can prospectively be at the forefront of this market. Through efforts such as the [National Capital Goods Policy 2025](#) led by the Ministry

of Heavy Industries, manufacturers can be persuaded to invest in the sector through upfront capital expenditure support and production-linked incentives on pari-passu basis. To ensure global quality standards, international partnerships may be fostered through bilateral platforms such as the [India-Europe Trade and Economic Partnership Agreement](#).

## Promoting the ease of doing business through clarity and transparency



With [India ranking 63rd in ease of doing business](#), the country can make significant changes to foster a more supportive environment for entrepreneurs.

Building regulatory standards for smart proteins can be simplified by harmonising them with international efforts. For India specific safety and risk assessments and to build a roadmap for regulatory clarity, the Food Safety Standards Authority of India (FSSAI) can assess establishing working groups for the category. The working group, with researchers, experts, and industry members (working in precision fermentation and cultivated proteins), can help develop relevant data to build regulatory guidance.

Additionally, the FSSAI and the Advertising and Standards Council of India can work with the industry to institute labelling requirements that are intuitive and developed by analysing consumer studies.

A clear and scientific regulatory framework for informed and safe consumption of smart protein can address ambiguity for Indian entrepreneurs and those looking to enter the Indian market.

Beyond food regulations, a bottleneck that drives up the cost for producers is high-taxation of products due to inaccurate trade codes being assigned to smart protein products. The lack of a Harmonized System of Nomenclature (HSN) codes specific to smart protein products presents a prominent trade hurdle for producers, who are taxed considerably higher than producers of other food products. Similar to the codes available for animal sourced foods and continued efforts towards developing new codes [for various rice varieties](#), the Ministry of Commerce and its Directorate General of Foreign Trade may evaluate the possibility of instituting a new category of codes that are specific to smart proteins.

## Bridging the talent gap in India



With one of the largest working-age populations in the world, India stands to benefit from investing in skill development, capacity building, and vocational training to emerge as a preferred destination for the expansion of the smart protein industry.

To provide specialised educational training for white-collar workforce, agencies like the Department of Higher Education, the Ministry of Human Resource Development, and the All India Council for Technical Education can develop course work that can be integrated into educational programmes as electives or short courses. For example, in 2023,

[University of California Davis \(UC Davis\) in the United States](#) launched a cultivated meat short course. Student channels such as the [Alt Protein Project](#) are mobilising student groups in close to sixty regions around the world. In India, students from Delhi University, Ashoka University in New Delhi, and Indian Institute of Technology Madras in Chennai are supporting their institutions to develop into talent hubs.

**Building on this foundational work scoped by these institutes, government agencies can fund activities, awareness programmes, and course development initiatives and help the leading universities [develop into Atal Innovation Mission recognised Atal Innovation Labs](#).**

For grey and blue-collar workforces, Sector-Skill Councils, in coordination with National Skill Development Corporation and the National Council for Vocational Education Training (NCVET), can build focused vocational training courses. The courses can focus on redirecting translational skills required for allied industries and standardising training with global standards through the creation of National Qualification Standards and Qualification Packs.

[Similar efforts have been employed](#) in the transport sector with positive results. In 2022, the Food Processing Sector Skill Council (FICSI), worked to develop the [Plant-Based Food Technologist job role](#) and its associated eligibility criteria. Officially recognised by the NCVET, the qualification pack for this role can be found on the government's National Qualifications Register.



To advance this initiative, the University of Transdisciplinary Health Sciences in Bangalore and FICSI are working together to build a certification course. In this manner, continued support from government education bodies can help promote and replicate such efforts across the smart protein value chain, similar to [global efforts](#).

## Policy tools to help smart proteins reach the consumer



To increase consumer awareness and adoption of smart proteins in India, the government can play a pivotal role in educating the public about new food sources.

By communicating the optimal nutritional requirements, particularly the importance of protein in Indian diets, through the national dietary guidelines, smart proteins can be positioned as a viable food choice. Through such strategic interventions and initiatives, the sector can work with the government to promote these new food sources and work towards the widespread acceptance of smart proteins. In the 1970s, the National Dairy Development Board's Operation Flood helped India emerge as one of the largest dairy producers in the world. A huge part of this success is credited to the extensive public awareness campaigns that promoted the benefits of dairy consumption.

The Ministry of Health and Family Welfare and the Ministry of Food Processing Industries can develop similar awareness programmes, campaigns, and initiatives to highlight the health and sustainability benefits of smart protein. Similarly, Niti Aayog's efforts to drive climate-friendly behaviours through the Lifestyle for Environment initiative can become a constructive platform to promote awareness of sustainable consumption and the environmental benefits of smart proteins over animal-sourced foods.

To incentivise the uptake and repeat purchasing behaviour for smart protein products, the government can implement [behavioural nudges](#). This is particularly true in the case of [green nudges that can influence eco-conscious behaviours](#) and choices.

Bodies like the Behavioural Insights Unit at Niti Aayog, with support from the FSSAI, can develop awareness-building initiatives, discussion papers, and consumer studies to reduce and prevent misinformation about smart protein technology. Food labels that display the source, technology, ingredients, and nutritional composition are an important way of gaining consumer trust (that a product is safe to consume). To further strengthen industrial claims about smart proteins, the FSSAI can look into sharing knowledge about the technological process of smart protein production in their resources and on their website. Similar initiatives by the Singapore Food Agency to [display information](#) on public government websites have helped foster consumer confidence. The FSSAI, with support from researchers and the industry, can demonstrate the role that smart

proteins can play in our diets and the ways they can be integrated for seamless protein supplementation.

## Coordination is key



To streamline coordination efforts across the various government bodies, establishing an inter-ministerial task force or committee can be a monumental step towards cohesive policy-making. The government has previously implemented effective intergovernmental coordination between three or more ministries and agencies. For instance, coordination efforts were established to jointly work on ecosystem development for areas such as the [Artificial Intelligence and Emerging Technologies Working Group](#) and for longer-term objectives such as the [Inter-Ministerial Committee on Just Transition From Coal](#).

A committee or action group of this nature can be tasked with harmonising efforts and aligning on approaches to provide policy and regulatory support. A coordinated allocation of resources that includes funding for R&D, subsidies, incentives, and grants can maximise impact while avoiding duplication and siloes.

Beyond international coordination and sharing best practices on regulatory frameworks through forums such as the CODEX Alimentarius Commission through the [Committee on Nutrition and Foods for Special Dietary Uses](#), international coordination can be explored for trade opportunities, research, and talent-development. Financial cooperation and catalysing technology transfers can build bilateral and multilateral strengths and knowledge transfers similar to the [Indo-German Solar Energy Partnership](#). To promote cross-border trade and research through initiatives like the Department of Biotechnology and the [U.S. National Research Foundation's joint call for proposals](#), partners can actively create awareness and facilitate matchmaking between forthcoming partners.

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Through a more unified approach of increased public funding and focused support to drive regulatory clarity, promote consumer awareness, and bolster infrastructure and research development, the government can galvanise this emerging industry that aligns with several national priorities. By instituting policy mechanisms in place to drive coordinated support for the industry, India can emerge as a leader in building a smart protein future.

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