

Research and Development Needs for Doubling Farmers' Income

*Research and technology with the support of pragmatic policies, targeted budget allocations and convergence of schemes based on agroecologically focused growth engines will be key to realizing the vision of doubling farmers' incomes (DFI) by 2022. This calls for a **change in the mindset** on how we do research – an approach that is holistic and enabled by cloud computing and mobile phones to support rapid cycle innovation, agri-entrepreneurs and farmer organizations to translate effectively the Science of Discovery to the Science of Delivery.*

WHY is a change in research mindset needed?

Although the Indian agricultural R&D system has been one of the pioneering systems among developing countries, there are many complexities restricting it from realizing its full potential. Though there has been considerable change in the research and extension system in India, many issues persist. **Farming is not generating sufficient income opportunities, with 55% of the population generating only 15% of the GVA.** This requires innovation to reduce production costs and market systems to increase unit prices of farm produce, with both integrating appropriate technology and services to reduce production and market risks. Only if we address these issues will farmers have agency to double their incomes and youth (future farmers) see agriculture as a viable commercial enterprise.

The Grand Challenge: Indian agricultural research needs to compress the time for demand-driven innovation to reach farmers' fields to increase rural incomes resilience and nutrition to the nation

HOW a mindset change can facilitate DFI

To bridge the gap from research to scaling, there is a need for a research-for-development mindset that is focused on **demand-driven innovation** (key pillar of the **Science of Discovery**) and engages a wide range of development actors in the public and private sectors and consults with farmers and consumers in the design, development and **delivery of farmer- and consumer-preferred solutions.**

Science of Delivery is a new and potentially disruptive concept that will motivate scientists and development practitioners to collaborate beyond their own disciplines and institutions. Popularizing innovative technologies and achieving larger impacts on the ground requires the involvement of all stakeholders. Science of Delivery will require focused funding, institutional incentives, behavior change, and rethinking on the role of public extension systems.

Farming is a complex and risky business in the wake of increasing water scarcity, land degradation and climate change. Its success heavily depends on the size and quality of the land, weather, markets, knowledge, access to inputs, support services and capital and infrastructure. Hence, **solutions need to be flexible as we tailor them to local needs and production and market situations** and scale them through "trust networks" and market signals that leverage ICT. Science of Delivery for agriculture development requires strengthened farmer organizations, better functioning service providers and an enabling institutional framework. Demand for agricultural advisory services will likely emerge from market players who want to compress supply chains to increase quality, integrate traceability, ensure supply and be competitive in the marketplace.

Some of the key areas under Science of Delivery:

- **Accelerating the innovation cycle** will require agricultural research to compress the long research-into-use pathway into a shorter and more impactful pathway that leverages participatory research approaches coupled with ICT to provide real-time feedback on farmer and consumer acceptance of new products and services, so that they can be adapted and then adopted quickly by farmers.
- **Modernizing agriculture** will draw on the rapid evolution of molecular biology and information technology to integrate across disciplines to develop new varieties with multiple production and market traits integrated. In a similar manner, modern tools (cloud computing, artificial intelligence, mobile, remote sensing, and systems research) are driving transformation of agriculture in advanced economies that incentivizing youth to return to agriculture as a commercially attractive and sustainable enterprise.
- **Convergence** of data (agriculture, nutrition, environment, hydrology, soil health, weather, farm diversification, markets, socio-economics and government schemes/policies) is critical to the implementation of a **modern agrifood system** to optimize resources, ultimately accelerating equitable and sustainable rural economic growth. **Spatial Data Integration (SDI)** offered through commercial cloud services will be a key component as Artificial Intelligence is used to distil complex data into **actionable recommendations for farmers/FPOs**. It will also provide **real-time M&E to policy makers** to identify bottlenecks and accelerate DFI schemes. Additionally, it will give visibility to the opportunities for **multi-disciplinary research efforts** to work in concert to increase farmers' incomes, safeguard the environment, and deliver better nutrition to farmers and consumers.
- **Partnership with the private sector and supporting agri-entrepreneurs** will provide modern value addition, delivery of inputs and provision of extension services by bringing together agriculture sciences, Information and Communication Technology (ICT), and allied sectors to deliver sustainable and scalable solutions.
- **Backward integration of value chains** ensures that farmers' surpluses will enjoy market opportunities. Agri-entrepreneurs are recognizing their rapidly emerging role to compress value chains and provide primary processing services closer to rural communities to reduce losses, increase convenience to diversify diets, and shift value capture closer to farmers.
- **A consortium** of research organizations, government ministries, public and private sector organizations and non-governmental organizations needs to work in a coordinated and accountable manner with the appropriate cloud-enabled databases and dashboards to **scale-up science-backed solutions for farmers**.

Achieving tangible economic benefits for farmers will require research systems to adopt and operationalize a holistic approach through convergence and collective action. To achieve the goal of sustainable intensification, backward and forward linkages in terms of providing necessary inputs (seeds, fertilizers, pesticides, machineries, credit and insurance), local value addition and preservation (primary processing and storage) and market integration. This will require modern grades and standards, policies and private sector partners in the agrifood sector. **With the support of Aadhaar IndiaStack coupled to SDI (AgriStack or KisanStack)**, the vision for doubling farmers' incomes can be translated into reality with the commitment from leadership at all levels to work as a consortium of public and private sector partners to implement state rural development plans – with speed and at scale.

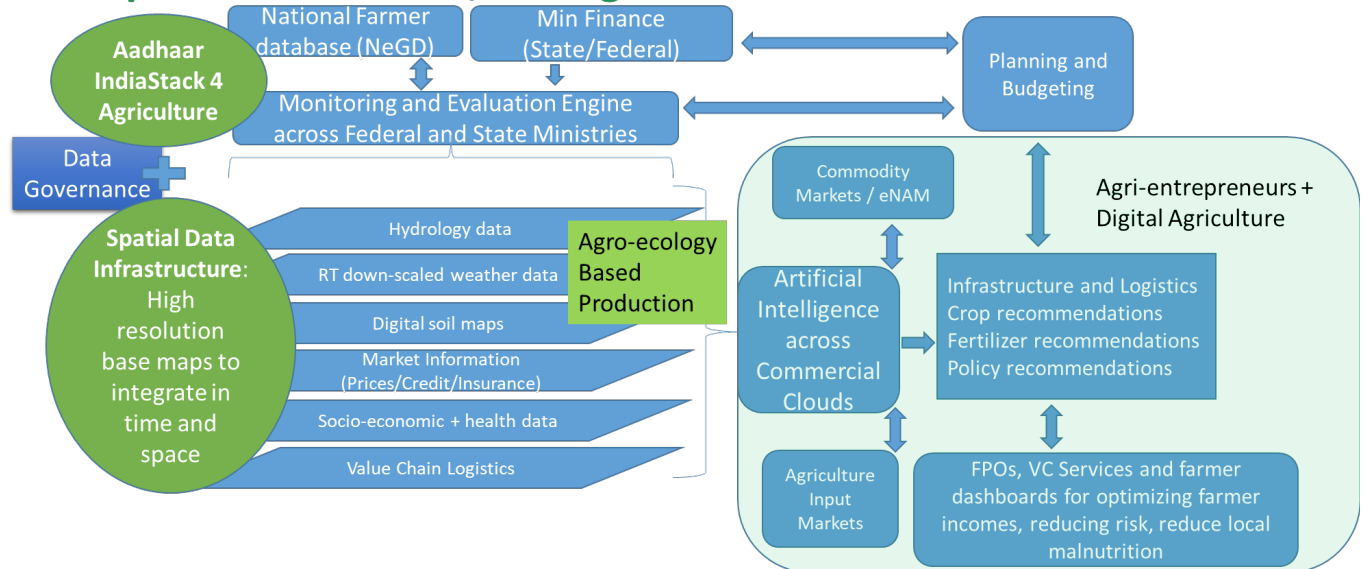
WHAT needs to be done

NeGD needs to pivot its focus to DFI by working with State e-Mission Teams along with SAUs, ICAR, CGIAR, private sector and FPOs to define state (district-level) growth engines for each agroecological zone. Focus on 5-10 states that have the full support of the respective CMs who designate a direct report embedded in the State e-Mission Team that has license to work across Ministries within the state. SAUs and KVKs respond to the gaps identified by district-level value chain analysis led by the State Ministry of Agriculture. Key steps that need to be actioned before the next production season:

- **Spatial Data Integration** to be supported by government and commercial cloud services to integrate data assets (starting with digital soil maps, hydrology and weather) to drive agroecological-based convergence and stimulate private sector investment, especially agri-entrepreneurs. This data would also serve financial institutions to better serve farmers through a range of financial services (e.g. credit, microfinance, insurance) to stabilize markets, manage risk and support farmers as viable businesses.
- **Modern grades and standards** to be set for all major commodities (including horticulture, livestock and fisheries) that can be graded based on mobile devices. This will support traceability to realize higher prices for farmers and support the vision to triple agri-exports by 2022.
- **National Nutrition Mission should integrate with DFI** for creating consumer awareness to diversify diets and farms. Farmers should be incentivized to produce better nutrition to fuel the development of children and expecting mothers.
- **Primary processing should shift closer to farmers** for value addition, reducing postharvest losses and providing convenience to rural consumers.

Leverage Aadhaar IndiaStack and Spatial Data Integration (KisanStack) to converge schemes with progressive states to deliver targeted and timely subsidies for farmers based on the ecology, soil requirements and market requirements to dampen price volatility and prioritize local investments in processing and storage. Within a year, lead farmers in participating states would have a mobile dashboard to optimize farm resources, access service providers and connect to e-NAM clusters, processors or consumers to compress value chains and consolidate logistics.

Smart Development Infrastructure to support Convergence, Optimize Resources, Manage Risk and Increase Rural Incomes



All data feed into advanced analytics to guide farmer (profitability, minimize risk, improve availability of nutritious, diverse and safe food) and support government planning, investment and accountability

Given the complexity of convergence and the data-intense nature of agriculture, our strong recommendation is to put in place incentives to drive Spatial Data Integration across research organizations, government ministries and progressive private sector partners that will enable the **delivery of timely, targeted and tailored solutions for farmers to double their incomes by 2022.**