




CoSAI
Commission on
Sustainable
Agriculture
Intensification

Case Study: India's investment in innovation for sustainable agricultural intensification





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About this Case Study

India faces crucial challenges of food security and sustainability. The country needs to grow a significantly higher quantity and quality of food to provide adequate nourishment to a population that is expected to increase to 1.6 billion by 2050. Furthermore, its environmental factors are already severely stressed. For instance, India has only 4% of the world's freshwater resources but has 17% of the global population. Given the nature of agriculture in India which relies heavily on groundwater, the country is facing severe depletion in a large majority of its aquifers. A switch to more sustainable agriculture practices is critical for India, and greater investments in sustainable agriculture are critical.

This case study provides an overview of investment patterns for agriculture as well as SAI innovation in India with analysis of both the key sources of funding and segments of the agriculture ecosystem receiving investment.

This case study accompanies the report: *Funding Agricultural Innovation for the Global South: Does it Promote Sustainable Agricultural Intensification?* The full report can be found on the CoSAI website: <https://wle.cgiar.org/cosai/innovation-investment-study>

1. Summary

The study estimates that India spends over USD 3 billion annually (~USD 25 billion for the period 2010-2018) on agricultural innovation, including investments by the government, development partners, and PE/VC firms. The SAI investment as part of innovation is estimated to be ~USD 120 million annually (less than 5% of overall innovation funding). The Indian government eclipses other funders in the country with ~USD 2.5 billion of innovation¹ investments annually. In the absence of data from the private sector², the fast-growing PE/VC sector comes a close second with ~USD 600 million of annual innovation funding³. Almost all the SAI innovation investments come from public spending and amount to approximately USD 120 million annually.

Spending on agricultural innovation. More than 50% of the USD 2.5 billion public innovation funding is driven by the central Ministry of Agriculture; the state governments make up ~25% of innovation funding. Almost all the public investment is directed to research institutes (50%) or government agencies (50%). Unsurprisingly, more than 70% of the innovation investment is directed to crops. Much of the ag-tech investments by institutional investors (~USD 600 million annually) have been used to enhance market linkages through agri-marketplaces. Lastly, OECD bilateral/multilateral funders contribute about USD 60 million annually in innovation funding⁴ - mainly towards adoption rather than core R&D.

Spending on SAI innovation. The Indian government is estimated to be the biggest funder of SAI innovation (~USD 120 million annually), though the project-level descriptions of intentions are limited in detail. Most of this SAI investment goes into the production systems layer, specifically on inputs with research into fertilizers (e.g., judicious use and organic manure), standing out. Investments in water and soil management follow next, led by the Integrated Watershed Management Program in India. Other sources contribute little: PE/VC investors often lack environmental and human dimension in their intentions, and even though a larger proportion of multilateral funding is tagged as SAI, it is significantly smaller in absolute numbers.

¹ Sources for all investments include OECDstat database, Tracxn, Government published programmatic budgets and expenditure. These estimations exclude investments by private agribusinesses (apart from start-ups) into innovation, as well as individual investments by farmers, and other stakeholders into the purchase of innovative equipment, seeds, etc.

² Innovation in the sector is driven by large corporations, with R&D laboratories in the Global North. A disaggregation by region will involve false precision of data.

³ Calculated using an analysis of data recorded in the Tracxn database.

⁴ Though this study in aggregate considers bilateral investment from China, deeper analysis is done on the OECD funders given the lack of granularity in China data.

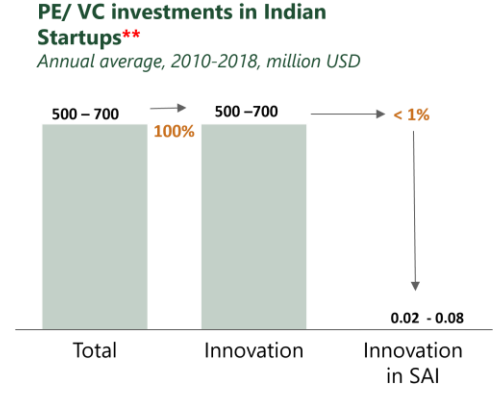
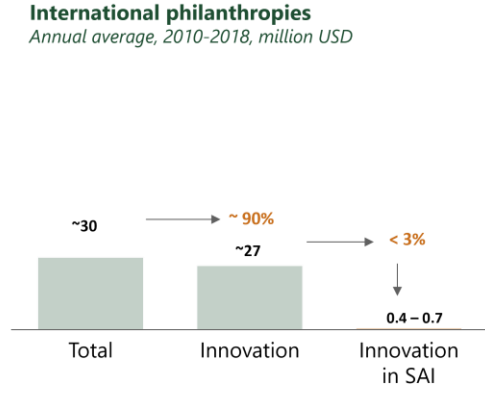
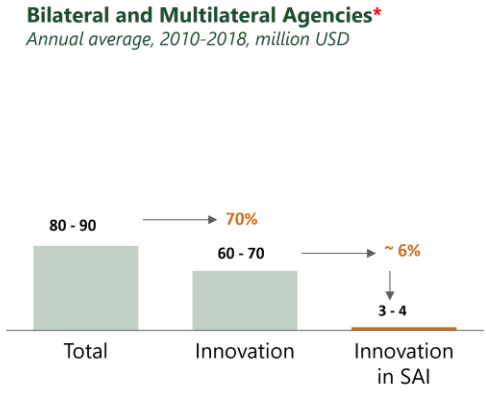
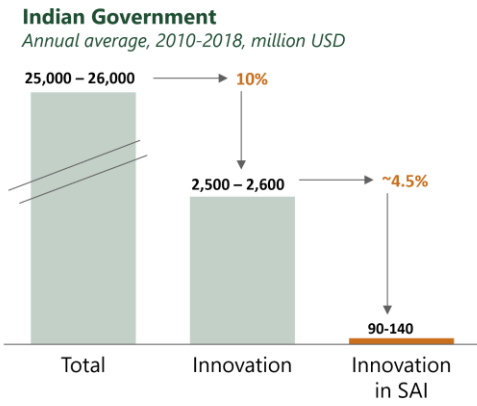
2. Sources of Funding for Agricultural Innovation and SAI Innovation

The Indian government is the largest funder of agricultural innovation⁵ in India by a wide margin and spends ~USD 25 billion annually on agriculture (USD 240 billion cumulative for the decade), of which about 10% (~USD 2.5 billion annually) is estimated to be towards innovation. More than 50% of the public funding on innovation is driven by the Ministry of Agriculture & Farmers' Welfare, focusing on farmer financing, irrigation schemes, agricultural inputs, and research. While agriculture is a state subject in India, **the state governments make up only ~25% of total agricultural innovation spending (2019).** However, state expenditure has more than doubled from 2016 to 2019 leading to a rise in a stagnating trajectory of investments from 2010 to 2016.

Institutional investors (mainly PE/VC) are likely the next biggest funder⁶ group contributing ~USD 600 million annually (~USD 5000 million cumulative for the decade) to innovation. More than 60% of innovation investments are focused on enhancing market linkages through agri-marketplaces, focusing on inputs such as seeds and fertilizers, as well as access to end consumers. It is worth noting that the number of startups in the space is growing significantly; there existed over 500 VC-funded ag-tech start-ups in 2019. This growth is mostly led by global investors like Tiger Global Management, Accel, Blackstone, and Syngenta Ventures, to name a few.

⁵ 'Innovation', as defined in Chapter 1 of the main report, includes all funding related to the creation or adoption of new agricultural technologies, practices and systems within the Global South. In addition to purely technological innovation, the study includes investments in non-technological areas such as business models, policy reforms, agricultural extension and training, process innovations, and marketing expenditure on innovative technologies. Please refer to the methodology document for details of calculation.

⁶ Given the exclusion of private businesses, this is an estimation. Based on inputs from other countries and a small sample set in India, private companies as a category are likely to be a small fraction of total innovation investments.



* Including bilateral/ multilateral investments flowing into the government
 ** Based on the conservative to aggressive estimates of the overall PE/ VC investments

Figure 1. Cumulative funding towards agriculture, innovation in agriculture, and innovation in SAI in India (2010-2018).

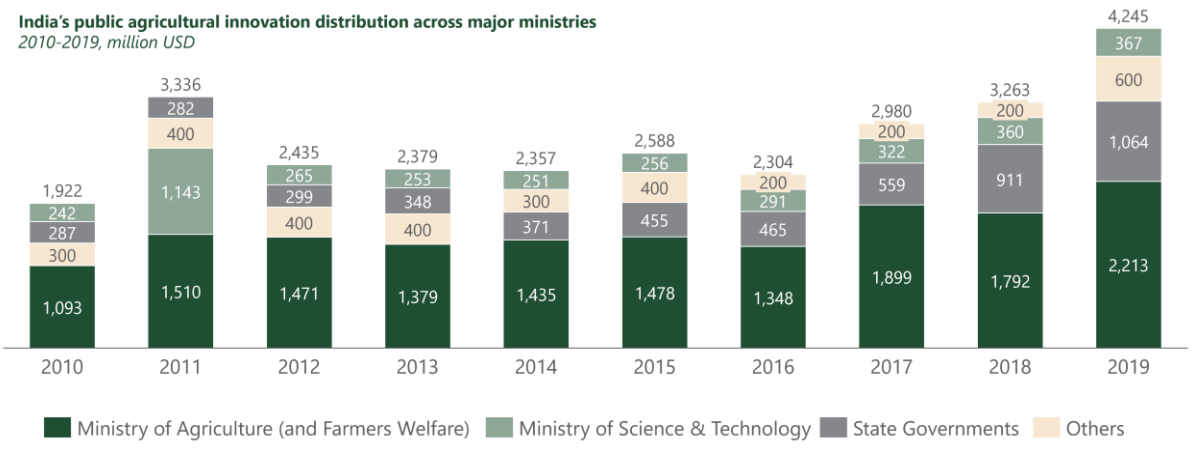
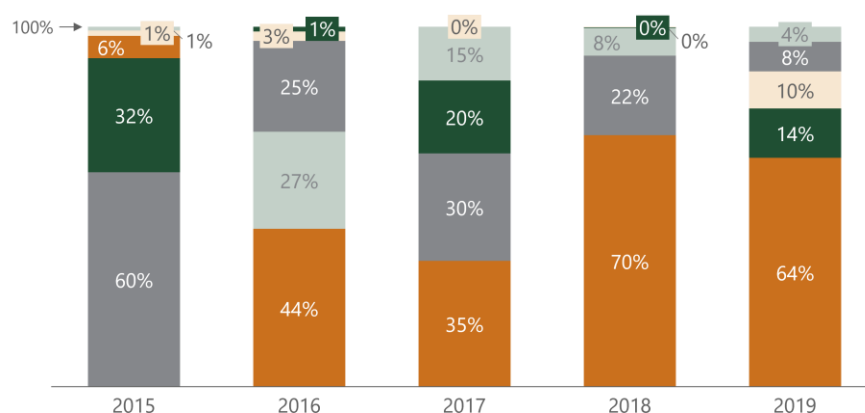


Figure 2. Funding towards innovation in agriculture across major ministries.

India's investments in agri startups across market segments*

2015-2019, million USD, % split across areas

■ Agri marketplaces
 ■ Farmer engagement platforms (including marketplaces and information platforms)
 ■ Others
■ Seed development and biotech
 ■ AI/analytics based advisory algorithms (incl. weather)



* Based on the analysis of a sample of 300+ Indian startups using the tracxn database

Figure 3. Funding towards innovation in agriculture and allied industries in India.

3. Recipients of Innovation Funding

In India, most of the public innovation funding, and consequently overall innovation funding, goes towards research institutes and government agencies. The Indian Council of Agricultural Research (ICAR), an autonomous body responsible for coordinating agricultural research in India, is the largest recipient of research funding. Similarly, among government agencies, the Pradhan Mantri Krishi Sinchayee Yojana (WDC-PMKSY) stands out, aiming to ensure improvement in productivity and livelihood. Agricultural startups are the next biggest category of innovation-funding recipients, representing ~25% of the total funding. In 2019, most of the start-up funding was directed towards tech-enabled supply chains to create market linkages to procure farming inputs (e.g., Agrostar, DeHaat) and to sell final produce (e.g., Bijak, Crofarm)⁷ Lastly, NGOs/NPOs receive a very small share of the funding.

⁷ Inc42, Accel. [Indian Agri-tech Landscape Ripe for VC Investment](#) (2020).

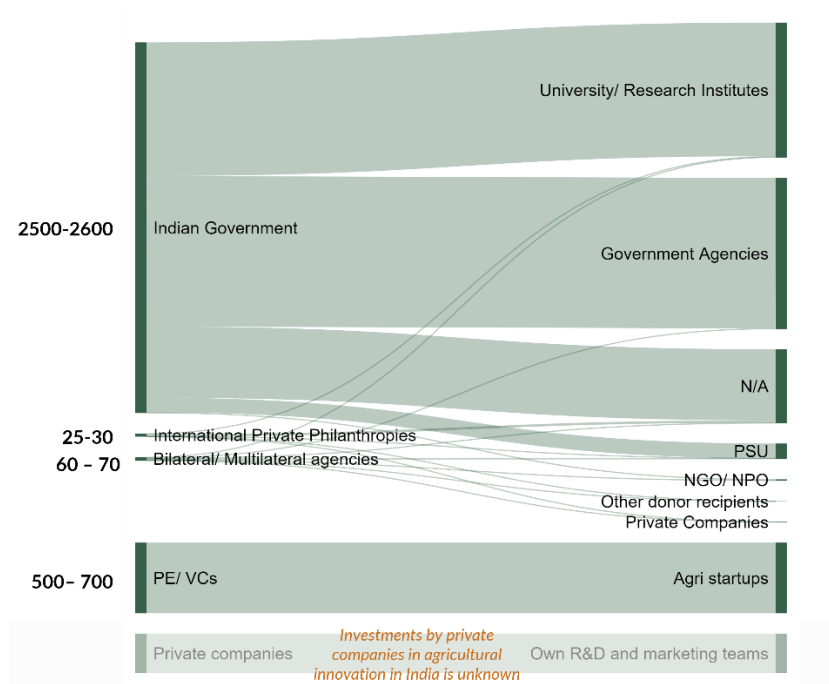


Figure 4. Funding towards innovation in agriculture and allied industries in India (USD millions, annual average 2010-2018).

From a value chain lens, more than 70% of the innovation spending goes towards crops. The majority of the innovation spends on crops is directed towards the improvement of the input fertilizers through interventions like the Council of Scientific and Industrial Research (CSIR) and the National Project on Soil Health and Fertility. In contrast, livestock, dairy and poultry, and fisheries and aquaculture together combined attract less than 10% of funding. ~15% of innovation funding is deemed as cross-cutting across various value chains.

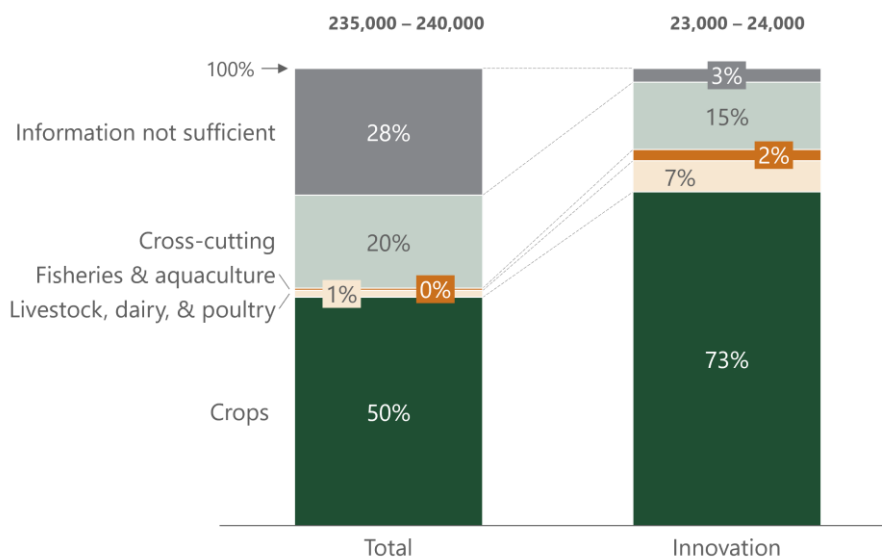


Figure 5. Value chain split of agricultural expenditure and agricultural innovation expenditure by the Indian government (2010-2018, million USD).

4. SAI Innovation Investments in India

India spends an estimated 120 million USD annually on SAI innovation⁸ – less than 5% of the total innovation funding⁹ in agriculture. Public investment into inputs and production (as part of the production systems layer) form most of India’s SAI investments. Within the inputs stage, the Council of Scientific and Industrial Research (CSIR) stands out with large research investments in production processes of eco-friendly fertilizers for instance, biofertilizers and liquid seaweed fertilizers. It is likely that the Indian Council of Agricultural Research (ICAR) funds significant SAI investments (more than CSIR), but lack of information makes exact estimation difficult. Within production, even though the Ministry of Agriculture and Farmer’s Welfare (MoAFW) is the major funder, the Department of Animal Husbandry, Dairy and Fisheries (DAHDF) stands out with granular data on investments through the National Livestock Mission, with the goals of sustainable development of the sector. Investments in water and soil management follow next, led by the Integrated Watershed Management Program.

Area of Focus	Sub-Area of Innovation	Average annual Innovation Spending in million USD	Average annual SAI in million USD (broad definition)	% of total innovation spending*	Level of focus
Level 1: Macro Systems	Agriculture governance systems & policy support	282			
	Research, knowledge & education systems	943	4		
	Agriculture financing systems	222	1		
	Collaboration & trade systems	4	1	24%	Low
Level 2: Production systems layer	Inputs	637	91	14%	High
	Production	165	32	19%	Medium
	Post-production	63			
	Core-processing	10			
Level 3: Production factors & NRM	Farm-level cross cutting systems	109			
	Water & Soil Management	134	37	28%	Medium
	Forestry & biodiversity Management	M			
	Land use, and rights management	24			
	Information not sufficient	31			

Note: The table above shows cumulative average values for the Indian government, bilaterals and multilaterals (excluding the funding flowing towards the government) and international private philanthropic investments. Also, it has overlaps in terms of innovation spending and SAI investments across areas and sub-areas of focus.

Figure 6. Focus of India’s SAI investments across areas.

⁸ Based on intentions around the dimensions of sustainability. According to a strict definition, investments with intentions of productivity and environment, along with one of social or human condition are tagged as SAI. In the narrow definition, investments with intentions or either productivity or environmental are tagged as SAI. Please refer to the methodology document for details of calculation.

⁹ Estimated through manual tagging of individual projects based on stated intentions in project titles and descriptions. It is important to note that often government descriptions are not detailed and lack granularity.

An analysis of the investment intentions reveals that across both the public and institutional investments, economic and productivity stand out, but descriptions of intentions of environmental sustainability and the human condition are weaker. As a result, fewer investments get tagged as SAI¹⁰, compared to other sources such as bilaterals where the intention descriptions across domains are stronger.

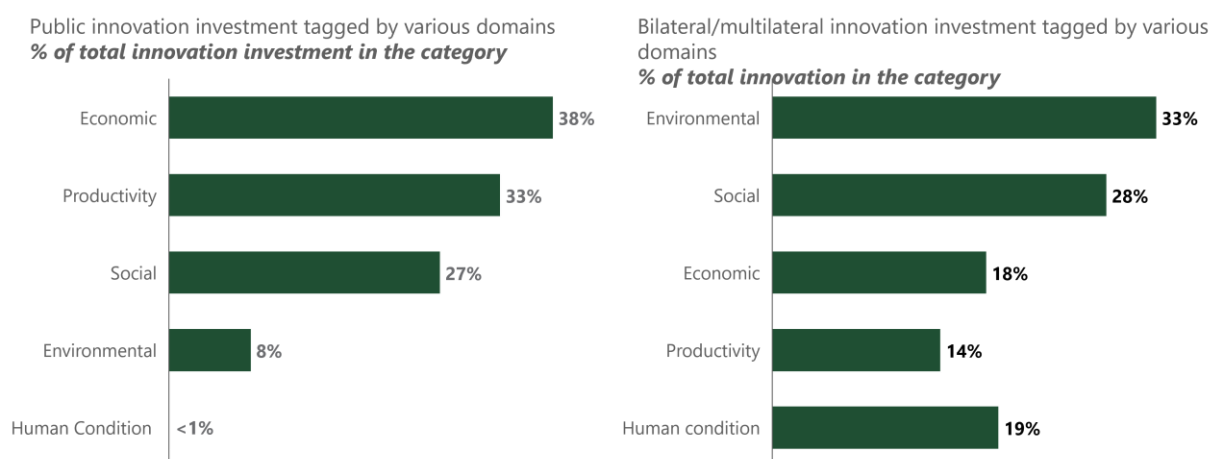


Figure 7. Percentage of innovation spends tagged by sustainability domains.

5. Conclusion

While there is substantial spending on agriculture in India, the per capita spending on agricultural innovation is less than USD 2 per person per year, even though in absolute terms, it is very significant (USD 3 billion annually). A recent report by OECD¹¹, estimates this number to be less than USD 1 per person per year. And the funding for sustainable agricultural innovation seems to be no more than 10 cents per capita per year. Only 8% of the public innovation spending in agriculture seems to be, overtly, focused on environmentally sustainable agriculture. Keeping in mind the environmental challenges of growing more food in India, a business-as-usual approach will not suffice, and substantially more innovation investments are needed in SAI. A coordinated approach to investing for sustainable agriculture that defines clear metrics, encourages collaboration between different categories of funders is likely to prove very useful going forward.

¹⁰ Data not tagged as say “economic” is not necessarily a non-economic investment. The tagging is based on intentions.

¹¹ [OECD Agricultural Policy Monitoring and Evaluation 2021](#) pegs “system innovation” at less than USD 1.4 billion per year



The Commission on Sustainable Agriculture Intensification (CoSAI) brings together 21 Commissioners to influence public and private support to innovation in order to rapidly scale up sustainable agricultural intensification (SAI) in the Global South.

For CoSAI, innovation means the development and uptake of new ways of doing things – in policy, social institutions and finance, as well as in science and technology.

Contact us: wle-cosaisecretariat@cgiar.org

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