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## Market and Innovation-led Agricultural Transformation

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A number of policy reforms and consolidation of programmes for agriculture have been undertaken in the recent years. These reforms aim to improve farmers' income and welfare, and efficiency of the production systems and markets. As an effect, Indian agriculture has shown impressive growth (3-6%) in the last few years (2015-18). This growth is largely contributed by the delivery of technology and farm services including credit, better rural connectivity, and improved governance (IFAD, 2016; Verma et al., 2017). A positive side of the growth is that it was also contributed by comparatively low-productivity regions which has helped in setting up the process of regional convergence (Balaji and Pal, 2014). In terms of production diversification, high-value sectors like livestock and fisheries have registered a growth (7%) twice of the agricultural sector as a whole (2.9%) in 2018-19. This brief examines the sources of growth and policy options for transformation of Indian agriculture.

### Recent growth pattern

The regional pattern of agricultural growth echoes the national growth trend. The growth of livestock sector has been high in most of the states, notably in Andhra Pradesh, Bihar, Madhya Pradesh, Tamil Nadu, Rajasthan, Himachal Pradesh and Jammu & Kashmir, with a growth of more than 8 per cent per year during 2012-18. Crop sector growth was comparatively high (nearly 3 percent or more) in Andhra Pradesh, Assam, Chhattisgarh, Gujarat, Madhya Pradesh and West Bengal. However, it registered significant negative growth in Bihar, Kerala, Tamil Nadu, Telangana, and Uttarakhand, partly because of unfavourable weather in some of the years and changes in cropped area. Crop production efforts now should focus on sustainability and efficiency of the production systems by use of improved farm practices and technology on one side, and through risk and disaster management on the other side.

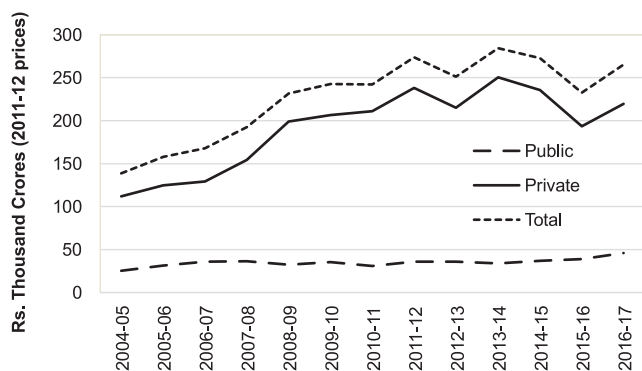
**Table 1. Growth (%) in agricultural gross state value added (GSVA), 2011-12 to 2017-18**

States/UT	Annual growth				Share (%) of agriculture in total GSVA
	Crops	Livestock	Fisheries	All	
Andhra Pradesh	5.0	9.5	23.0	9.2	29.5
Assam	2.9	1.5	4.6	3.0	18.1
Bihar	-2.5	8.4	8.3	0.9	19.7
Chhattisgarh	4.9	3.9	8.7	5.2	17.6
Gujarat	2.9	6.1	7.8	4.3	14.0
Haryana	-0.9	6.0	6.9	1.4	16.8
Himachal Pradesh	2.4	8.5	9.5	3.3	13.6
Jammu & Kashmir	0.6	8.5	0.3	3.2	15.1
Jharkhand	-0.4	2.8	9.6	2.0	14.5
Karnataka	-0.2	4.0	1.5	0.6	8.9
Kerala	-5.3	1.5	1.7	-2.5	9.6
Madhya Pradesh	6.6	18.0	11.8	8.1	33.0
Maharashtra	0.5	5.1	5.2	1.6	9.5
Odisha	0.2	3.4	11.0	2.0	14.4
Punjab	-0.3	4.4	6.4	1.1	24.2
Rajasthan	-0.4	9.7	10.9	3.3	24.4
Tamil Nadu	-2.7	14.9	2.5	4.6	11.3
Telangana	-4.1	6.7	2.6	0.3	12.0
Uttar Pradesh	2.0	4.3	6.9	2.5	22.5
Uttarakhand	-2.2	4.7	2.4	0.3	8.6
West Bengal	4.1	2.2	3.2	3.3	20.9
All-India	0.8	7.3	8.5	2.9	14.9

Source: CSO; Note: GSVA is at 2011-12 prices.

Can this growth be sustained? Many factors including product diversification would determine the pace, sustainability and inclusiveness of agriculture growth. The process of product diversification shall continue as it is demand-driven. The demand for horticultural

and livestock products shall continue to rise because of income growth, urbanization and changing consumption pattern (Gandhi and Zhou, 2014; Pingali, 2015; Kumar et al. 2016). The Government needs to empower the farmers to respond to this growing demand by providing adequate credit, quality inputs, technology, and market linkages. Also, on-farm investment has to be promoted, as just 25 per cent of credit is directed towards it and the rest 75 per cent is given for meeting short-term needs (RBI, 2019). Similarly, though 90 per cent growers of crops like paddy and wheat have access to improved seeds, there still exists demand for quality seeds in other crops.



**Fig 1. Public & private investment in agricultural & allied sector, All-India; Source: CSO**

The Government has renewed its priority for livestock and fisheries sector by creating a new Ministry, but this sector needs more private sector participation for delivery of services and products, and therefore 'ease of doing business' shall have far greater impact on the private investment.

## Price volatility and market reforms

Management of price risk, particularly for perishable commodities, needs greater attention. Volatility in the prices, measured by coefficient of variation, was as high as 31 per cent in onion and 11-19 per cent in potato, groundnut and cotton during 2002-17. At the lower end, farmers often dispose-off their produce at a price much lower than the cost of production. The Government has taken necessary steps to counter the negative effect on prices. Price Stabilization Fund (PSF) is working for onion, potato, and pulses, and Market Intervention Scheme is operating for horticultural crops, with a combined allocation for both the schemes of Rs 5000 crore in 2019-20. Moreover, with the shift of PSF to the Department of Consumer Affairs, now the focus is more on moderating the retail prices. Since price risk (shortfall) for farmers mainly arises from excess supply, policy needs to focus on the supply management.

A two-pronged strategy should be followed. First, use of warehouse for storage and warehouse receipt for pledge loan should be popularized in all states. This will provide a longer window to farmers to sell their products and protect them from distress-sale. Second, cluster-based processing shall help absorb excess supply and produce value-added products that can be consumed for a longer

period. However, long-term solution would be in linking production with consumption through compact value chains, which may include formation of farmer interest groups and digital platforms for product management. These platforms should be linked with agro-processing industry, consumer markets and other bulk buyers, including exporters. Investment in market infrastructure, market intelligence, and price discovery can also help moderate price risk to some extent.

Besides raising MSP for some crops like pulses and nutri-cereals, there are two significant steps that have made some impact. The procurement operations for pulses and oilseeds have been expanded by NAFED and import duty for edible oil has been increased, which have increased the farm harvest prices of oilseeds. There is some procurement of cotton, copra and jute, but the Pradhan Mantri Annadata Aay Sanrakshan Abhiyan (PM-AASHA) ensuring MSP for all crops is yet to be accepted by the states, perhaps due to want of funds. Two actions are needed. First is to review existing interventions and partnerships with the states to make the market interventions more effective. This should also involve roping-in large private players like oil extraction industries for a decentralized mechanism of procurement when market prices fall below MSP. The second is to consider trade policy as an integral part of the price and income policies. Agricultural exports should be liberalized, except for commodities with short supply like edible oils. Commodities like sugar, rice, and cotton should be exported to deal with surplus, and for rice and sugarcane, some area should be shifted to other suitable crops, as these two crops are capital and water-intensive. In particular, there is a problem with sugar industry and payment of arrears to sugarcane growers in the years of surplus production. The international price of sugar is much lower than the domestic prices and therefore management of sugar supply through area shift and product diversification (ethanol and alcohol) deserve priority.

Aggregation of produce is another important activity being pursued by the Government. Formation of farmer producer organizations (FPOs) is getting priority in successive budget announcements, and SFAC and NABARD are proactive in the formation of FPOs. But major action on this will be through the states and the state line departments can facilitate these groups. There is a need to form these groups around critical inputs, resources, or products. FPOs for production of bio-agents for organic farming, establishing custom hiring centres, and specialized products like minor millets can also be promoted. More importantly, FPOs have to be trained in product marketing, besides encouraging procurement activities. The success of FPOs will depend on potential economic benefits, size of the group and professional management support. SFAC can facilitate need-based training of member farmers and link FPOs with management consultants to organize their activities in a professional manner. There are many professional consultants and rural institutions like KVKs which can support FPOs.

Cluster formation and agro-processing is another vital component. Since there are region-specific production of commodities, promotion of clusters is a welcome

step by the Government. In fact, some are already operating, e.g. grapes, potato, mango, vegetables etc. and some of these are also linked with the international market. Potato is a good example of modernization of value chain transformation of the unorganized into an organized industry backed with technology, investment and contractual arrangement with farmers for potato production. Similar commodity-specific interventions and necessary technological and institutional support is a must for efficient value chains. For some commodities, there may be a need for development of varieties suitable for processing, while for others post-harvest technology may be required, and some may need a formal contractual arrangement to supply product of desirable quality. Almost all the commodities shall require adoption of good practices for food safety, production to post-harvest handling, processing, and distribution. This may be time taking and cost increasing, but ensuring food safety standards for both domestic and international markets will go a long way to promote commodity value chains.

## Research productivity and innovations

Some major sources of growth need greater attention for the transformation of Indian agriculture. First, which is often less discussed in public debate and media, is the role of agricultural research and development (R&D). Technological innovations supported by policy and institutions shall accelerate the rate of agricultural transformation. The role of technology begins right from the quality of inputs, efficiency of production systems, post-harvest management and value addition. Technology-led transformation has been witnessed recently in cereals, pulses, vegetables, fruits, commercial crops, poultry, fisheries and flowers. In all these commodities, technology was supported with institutional innovations, focusing on economic and operational efficiency at different stages of the value chains. Backward integration, contractual production, innovations in financing and contractual relations among different actors were some of the important institutional innovations. Studies indicate that these institutional innovations have been instrumental in sharing of production risk by the industry or aggregator, and led to a reduction in the transaction cost (BIRTHAL et al, 2005). We

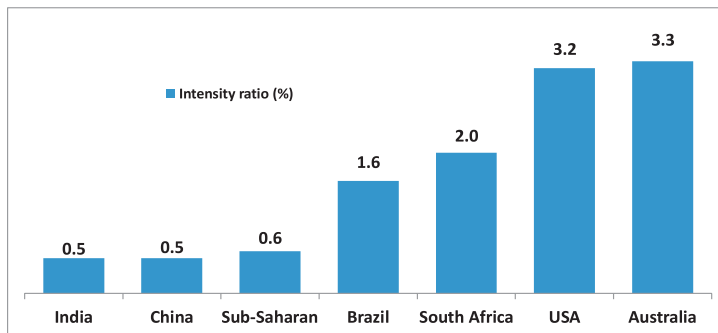


Fig 3. International agricultural research expenditure intensity ratios (%), 2010s ; Source: NIAP and ASTI

need to promote such innovations by protecting property rights (land, intellectual, inputs) and enforcing contract laws, particularly for conflict resolution, e.g. buyer and seller in contract farming. The Union Government has prepared a model Contract Farming Act (2018) and the states must adopt and enforce this Act.

Investing in agricultural R&D pays high dividends, in terms of increasing input and resource use efficiency, sustainability and farm income. It also has significant poverty reduction impacts, 2-3 times higher than that of the non-agricultural sector. Contribution of R&D to the growth of the total factor productivity is still high and widespread. The rates of returns to investment in agricultural research varied from 35 per cent to 81 per cent during 1980-2008 (Rada and Schimmelpfenning, 2018). The returns were equally impressive (39%) for a recent period (2000s and after) even in the irrigated rice-wheat system (Pal, 2018). In spite of these impressive payoffs, underinvestment in agricultural R&D persists. This trend should be corrected for larger social welfare. Presently, India invests much lower (0.4% of AgGDP) than China (0.5%), Brazil (1.5%) and South Africa (2.0%) on agricultural R&D (Fig 3). The only positive trend is that private investment is picking up in India (15-20% of the total) for applied research in plant breeding and seed, plant protection and farm machinery. This trend must be encouraged by providing a better regulatory environment, effective enforcement of intellectual property rights and public-private partnerships. However, major responsibility and leadership shall remain with the public sector, mainly ICAR-SAU system, and therefore public allocation of funds should be doubled in the next five years or so. Higher public allocations are also necessary in view of the shrinking international funding, slow down of international technology spillovers to India, and rising concentration of transnational companies in the global and national scenarios.

## Institutional reforms

Interventions in land markets can significantly improve the size of operational holdings. This would require enactment of the Model Tenancy Act (2019) by the states so that landowners have confidence in the landlease market. Enactment of the Model Act alone will not serve the purpose and this Act should be backed by a dispute resolution mechanism. The first

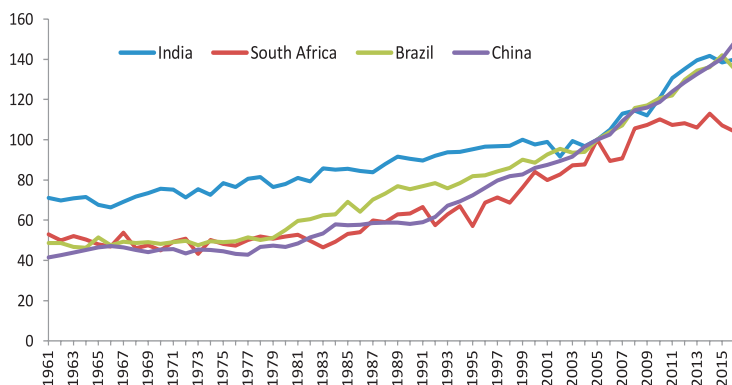


Fig 2. Trends in agricultural total factor productivity index (2005 = 100) ; Source: ERS, USDA

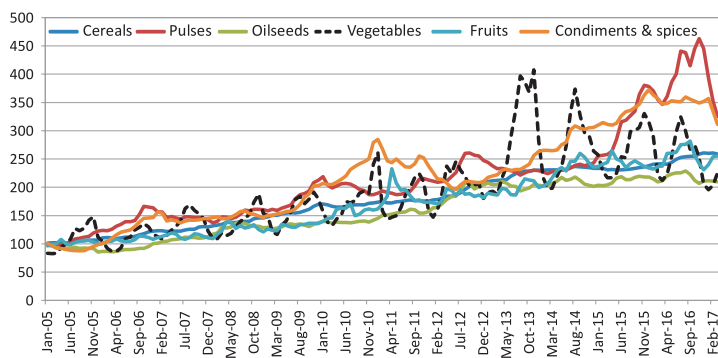


Fig 4. Trends in wholesale price index for major crop groups

and foremost cost-effective mechanism is the influence of *panchayats* to defend the tenancy contract, verbal or written. In most cases, the decisions of *panchayats* are correct as these have factual information. The second level of conflict resolution is the legal system, which should resolve the conflict in a time-bound manner, preferably within a season. In the absence of these enforcement mechanisms, a large proportion of land will continue to be used sub-optimally. The phenomenon of farmers' migration is increasing; 36 per cent farmers have shifted out of farming during 2005-12, becoming mostly wage earners. Their land can be effectively used through tenancy contract.

The second important aspect of land reform is the consolidation of landholdings. There exist more than 10 crore operational land holdings sizing less than one hectare, and more than 2.5 crore holdings of 1-2 hectare. This extent of fragmentation restricts adoption of much beneficial mechanization and related labor saving practices, and thereby making the government schemes less successful. Interestingly, even in the phase of agrarian distress, the phenomenon of marginal farmers leasing-in lands for raising crops is followed. During 2012-13, around 18 per cent of marginal farmers have leased-in some lands for cultivation. Institutional interventions that facilitate such activities have to be encouraged to avoid land being underutilized. Mutual consolidation of land parcels should be incentivized in the form of exemption of stamp duty. Further, public procurement shall be assured for products raised from consolidated holdings, and price incentives shall be further raised. These land reforms shall be possible only when land records are complete. Some initiative has been taken in this regard that needs to be taken to a logical conclusion.

## Summing up

The contours of agricultural growth are expanding both in terms of commodity coverage and regional spread. The growth has become more diversified and the process of regional convergence has set in mainly because of growth in the high-value commodities. Price incentives,

better rural connectivity, and infrastructure also had a positive impact on agricultural growth. Sustainability of this growth shall depend upon growth in the demand and empowerment of farmers by the provision of technology and access to markets. The food systems shall also undergo transformation for greater efficiency and stronger farm-fork linkages. Thus, institutional innovations to aggregate production, access to markets and modernization of value chains shall promote growth and efficiency in Indian agriculture. The associated changes in non-farm sector shall further contribute to employment and income growth in the rural areas. The role of the Government is to stress

upon improving rural connectivity, invest adequately in critical farm support services like R&D, facilitate private investment in inputs and food systems, enforce property rights and contractual arrangements like tenancy and contract farming.

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