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Initiative and option in transition

for doubling farmers' income

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In India, a large part of the farmland is still dependent on monsoons given there is mere 47% irrigation penetration. Therefore, two consecutive years of scanty rains have negatively affected farm income. In Union Budget 2016, the Finance Minister announced that the government would strive to double the farmer income by 2022. Though doubling rural income in nominal terms is possible by increasing agri-output and minimum support prices (while keeping inflation below 5%), doubling rural income in real terms would be a daunting task considering increasing agri-output by 12% every year with no additional land likely to be utilized for agricultural activity. In its initial years of reforms between 1978 and 1986, China witnessed growth of 14% per annum in farm income. This led to a reduction in poverty by half by generating demand for industrial products in rural areas. Back home, agricultural growth in Gujarat, Chhattisgarh, Rajasthan, Jharkhand, Himachal Pradesh and Bihar have seen upwards of 7% real agri-growth. However, Madhya Pradesh remains a shining star with 15.5% real agri-GDP growth in 2010-15.

Key words: Farmer, Income, Initiatives

THE past few years have been particularly difficult given two consecutive years of deficit monsoon that has severely affected crops, depleting groundwater levels and reduced income levels that have put the rural economy under stress. However, the onset of normal monsoon last year (2016-17) has brought much needed relief. A good monsoon can itself propel agriculture growth to as much as 8%. However, good rains can only help in the short run. A long-term solution is faster execution of policies that could develop infrastructure to support irrigation system and reduce the dependency on rains. Simultaneously, work towards improving productivity, changes in cropping pattern, generating additional income through ancillary activities and some out-of-the-box ideas would help in not only doubling rural income in the next few years but also providing stability in farmers earnings.

How to double the income of India's smallholder farmers?

The average monthly income per caput farming increased from ₹ 1,060 in 2003 to ₹ 3,844 in 2013 from abide by (Situational Assessment of Agricultural Households) by the NSSO, a compounded annual income growth rate of 13.7%. To double the income of farmers by 2022, in nominal (numerical) terms—which do not take inflation into account—would require a 15% compounded income growth rate, which is a marginal increase over the achieved increase from 2003 to 2013. However, to increase the income in real terms would imply restructuring agriculture processes and policy interventions.

In an effort to boost the agriculture sector, the Indian government has set an ambitious goal to double farmers' income by 2022. In doing so, it has unveiled strategies ranging from irrigation to crop insurance. But if the food value chain is to undergo true transformation, it needs to move from a production-driven system to one driven by demand, one that increasingly connects consumers with producers. This will require new approaches and innovations, as well as increasing collaboration between the private sector and other stakeholders in the food system. It will require integrated value chains that connect farm to fork, competitive markets that provide better prices to farmers, and an enabling environment that supports innovation and action.

Government initiatives to revolutionalize farm income

The Government of India has already planned to take many measures to increase farm income, stabilize production and, consequently, improve small farm productivity. India's farm yields are much lower as compared to other

advanced countries. Average per hectare rice production in India is 2.6 tonne compared to 7 tonne in China, 5.1 tonne in Indonesia and 5.6 tonne in Vietnam. Similarly, average wheat production in India is 3.2 tonne compared to 5.0 tonne/ha in China. The government's focus on improving farm productivity led to the initiation of promotion of high-yielding varieties/hybrids of crops alongwith improvement in soil-health care, micro-irrigation, water harvesting, credit and insurance facilities, creation of a vibrant e-market and encouraging integrated farming system including livestock, bee keeping etc with the support of the food processing industry.

Integrated farming system: Promotion of integrated farming system approach involving synergic blending of crops, horticulture, dairy, fisheries, poultry etc. seems viable option to provide regular income and at site specifc employment to small land holder, decreasing cultivation cost through multiple use of resources and providing much needed resilience for predicted climate change scenario. Similarly, dairy husbandry is a boon for small farmers, as a family with three cows or buffaloes can earn an annual income of ₹ 50,000 to 60,000, while conserving our precious native breeds. With stall-fed, high-yielding animals, the dung availability will increase by 3 to 4 times, giving a boost to biogas, vermi-composting and agricultural production. With introduction of good goat husbandry practices by appointing local youth to facilitate the activities as Field Guides, 35 million goat keepers in the country who are living below the poverty line, can enhance their income by four folds from ₹ 8,000 to 35,000 per annum (BAIF's experience in Jharkhand, Odisha and Rajasthan). Besides, promotion of intensive fruits and vegetables production using improved varieties, organic manure and drip irrigation, can provide five times higher annual income, to the tune of ₹ 2 lakh per acre (BAIF's experience in Andhra Pradesh, Karnataka and Maharashtra). Farmers in semi-arid areas with 2-3 cows or 8-10 goats and cultivating dual purpose food grain crops on 0.4 ha land, have been earning ₹ 60,000–75,000/ annum. With efficient watershed development, land use planning and selecting of suitable crops, the income of the farmers can go up by 80-100% to generate an annual income of ₹ 40,000 to ₹ 60,000.

Use of high-yielding variety and hybrid seed: The use of high-yielding variety and hybrid seeds are very essential for a successful crop production and increasing the yield by 15-20% depending upon the crop and it can be further be raised up to 45% with efficient management of other inputs. The response of all other inputs depends on quality of seeds to a large extent. Seed Replacement Rate (SRR) is directly proportional to productivity of all crops. Therefore, higher the Seed Replacement Ratio, higher will be the production as well as productivity and higher are chances of achieving food and nutritional security. Increase in SRR to 35% in case of open pollinated varieties, in self-pollinated crops 50% and above in cross pollinated crop varieties and 100% in case of hybrids will certainly help in doubling the food grains production. Due to huge demand supply gap, India suffers from a dismal seed replacement ratio. Currently, only around 15% of India's total cropped area is planted with freshly obtained quality seeds every year. Overall huge 85% area is sown with farm saved seeds. Without achieving the optimal seed replacement ratio, any efforts to get expected yields will be futile.

Creation of national farm market to empower farmers: The government launched the electronic National Agriculture Market (e-NAM), mainly to bring the existing Agriculture Produce Market Committees on a common nationwide platform to facilitate trading in agricultural commodities. The main purpose of the e-national agriculture market (which connects agri-markets in 29 states/585 stations) is to purge licensing and taxation obstacles and enhance farmer's suppressed return. The e-NAM would empower farmers of each corner of the country. It would give them free access to the whole agricultural market to sell their produce at the intended price. One of the other major benefits of e-NAM is the correct assessment of the demand-supply gap, which would help farmers take an informed decision about next season's sowing.

How this will help farmers and consumers?: This initiative has been envisaged to provide win-win situation for both farmers and consumers. It will bring transparency in selling and buying agri-products through digital portal. It will strengthen price risk management of the farmers by averting the need to bring produce in the market physically and stored in the warehouse. Buyers or agents will be responsible for the commodities storage and sale in the retail market, after farmers get their dues. It eliminates multiple tax levies and licenses. Farmers and agents need not register in all APMC's of all state. It is unified market at national level. Consumers will get the right cost of commodities for consumption. Digital transparency will insure from hoarding, black marketing and price rise. Wastage of crops can be mitigated by diverting the risk from farmers to buyers. More investment will be done by farmers to grow quality crops in order to earn higher returns.

Hurdles to implement this scheme successfully: There are hurdles in making it a successful programme. The center and state governments need to develop digital infrastructure to make it available for farmers to use e-portal to sell their crop products. Farmers are usually unaware of the government initiatives and schemes and how to avail them. It is also to be ensured that all farmers get to know about the selling of their commodities through e-NAM system and what are the benefits of using it. There is no doubt that e-NAM can transform or revolutionize the agriculture system, commodities supply and farmers' financial health in the country, if rightly implemented from the ground level.

Emphasis on improving penetration of micro-irrigation

Micro-irrigation along with the nutrients application can be highly efficient and priority should be given

to empower farmers with micro-irrigation. A National Project on 'Precision Agriculture on the pattern of Tamil Nadu Precision Farming Project' (TNPFP) should be launched with integrated approach from advance production technologies to formation of Farmer Producer Organization and linking them with the markets. Studies done by London School of Economics, Harvard, Indian Institute of Management, Ahmedabad and other premier global institutions show an increase of 80% to 600% extra yields in different crops under Tamil Nadu Precision Farming Project.

With the launch of the *Pradhan Mantri Krishi Sinchai Yojana,* which aims to provide water to every farm (*Har Khet Ko Pani*), the government has made a commitment to spend ₹ 50,000 crore on it. The efforts to create awareness about micro-irrigation has been greater than ever. In Budget 2016 ₹ 5,717 crore was allocated under *Pradhan Mantri Krishi Sinchai Yojana,* of which ₹ 2,340 crore has been allocated to micro-irrigation. Other than the central government, some state governments have embraced micro-irrigation. The Maharashtra Government has made it mandatory for all sugarcane producers to switch to drip irrigation by 2017. If not complied with, their produce would not be taken for crushing. Similarly, the Tamil Nadu government is also endorsing micro-irrigation through 100% subsidy to farmers opting for the micro-irrigation system. It is estimated that 59 billion cubic meter per annum of water can be saved though micro-irrigation.

Ancillary activity to be cherry on the cake for farm income

Currently, diversification towards high value crops (HVCs) offers a great scope to improve farmers income. The staple crops (cereals, pulses, oilseeds) occupy 77% of the total or gross cropped area (GSA) but contribute only 41% of total output of the crop sector. Interestingly, almost same value of output was contributed by HVCs (Fruits, Vegetables, Fibre, Condiments and Spices and Sugarcane), which just occupy 19% of gross cropped area during 2013-14. Also, small farmers are required to shift towards more remunerative horticultural crops, which simultaneously need to be supported by the food processing industry. Moreover, the government is also promoting ancillary activities like poultry, beekeeping, fisheries and dairy farming. Ancillary products can be consumed by food processing units and also significantly boost export income. In the entire value chain, farmers would be the biggest beneficiary.

Implementing ambitious Agri-business Hubs Model, operating on a national platform and establishing 2.40 lakh multi-functional Agribusiness hubs in all the *Gram Panchayats* of the country will revolutionize the farm economy and create jobs. The project outlines creating 10.0 million jobs, 50,000 crore of additional annual farm value, providing increased market opportunities of ₹ 50,000 crore and initiating various multifarious socio-economic activities, aimed at improving farm incomes.

Information and Communication Technology (ICT)-based agricultural extension brings incredible opportunities and has the potential of enabling the empowerment of farming communities. Information technology can support better crop, appropriate fertilizers and pesticides use planning as well as disease monitoring and their prevention, both in crops and animal husbandry, besides improving farmers' operational and financial management and to effectively connect them with the markets for better price realization.

Diversification of agriculture in the First Green Revolution areas such as Punjab, Haryana and Western Uttar Pradesh seems need of the hour. Promoting diversification on ecological principles, will require making monetary equivalence (profit margin) between the replaced crop/commodity and enterprise with the ones planned to be introduced. Farmer is mainly concerned with the profit he gets from a particular crop or commodity. Crops like maize, soybean, pulses, oilseeds, fruits and vegetables have the potential to replace rice and wheat in this area. Upward push in MSP in favour of proposed diversification crops will be a practical option to achieve this objective.

Integrating all central and state subsidies, instead of reducing costs of inputs, need to be targeted to empower farmers through infrastructure development in rural areas to promote agribusiness, food processing plants, water management, soil-health enhancement, seed production and processing, custom hiring centres, plant protection, dairy, poultry, fisheries and other enterprises etc. This will boost up agriculture sustainability and farms profitability.

Strengthening Organic Food Programme for India to make 10% of the global 60 billion US$ market for each. Major parts of India such as North-Eastern Region, Himachal

Pradesh, Jammu and Kashmir, Uttarakhand, Madhya Pradesh, Chhatisgarh, Jharkhand, which are organic by default, must be made organic by process for the producers to get advantage of market value.

New crop insurance scheme to bring stability in farm income

Considering that more than ~50% of farmlands are dependent on monsoons for farm water consumption, deficient rain, untimely showers, hailstorms and other vagaries of the weather have resulted in crop loss, unstable agricultural output and unpredictable rural income. Therefore, it is essential for the government and farming community to increase the penetration of crop insurance from the current dismal coverage of 25%.

With more than three decades of learning, the current government launched a new crop insurance policy *Pradhan Mantri Fasal Bima Yojana* (PMFBY) in January 2016. There were three clear outlines in the current scheme. Which insured areas that were deprived of sowing/planting due to adverse weather and deficit rainfall. The scheme includes comprehensive risk insurance from sowing to harvesting mainly to cover yield losses due to non-preventable risks like drought, dry spells, flood, inundation and pests. The government is aggressively promoting a new crop insurance (PMFBY) given increased challenges by farmers due to frequent climatic disturbances. It intends to increase crop insurance penetration from the current 25% to 50% in 2018 by increasing central governments allocation from ₹ 3,100 crore in Financial Year 2015 to ₹ 8,800 crore in Financial Year 2018. The government would be adopting an innovative technology, especially smart phones for capturing and uploading data directly from the farmer's field. This would help in completing the settlement process in time.

SUMMARY

The Government of India has already planned to take many measures to increase farm income, stabilize production and, consequently, improve small farm productivity. Integrate farming system approach involving synergic blending of crops, horticulture, dairy, fisheries, poultry, etc. seems viable option to provide regular income and at site employment to small land holder, decreasing cultivation cost through multiple use of resources and providing much needed resilience for predicted climate change scenario. HYV and hybrid seeds are very essential for a successful crop production and increasing the yield by 15-20% depending upon the crop and it can be further raised up to 45% with efficient management of other inputs. Micro-irrigation along with the nutrient application can be highly efficient and priority should be given to empower farmers with micro irrigation. The government is aggressively promoting a new crop insurance (PMFBY) given increased challenges by farmers due to frequent climate disturbances.

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Science, Technology and Innovation Policy: A New Paradigm

Science, technology and innovation can exist separately on their own in disconnected spaces. But, it is their integration that leads to new value creation. India's global competitiveness will be determined by the extent to which the STI enterprise contributes social good and/or economic wealth. There is, therefore, the need to create the necessary framework for enabling this integration in identified priority areas by exploiting endogenous resources, strengths and capacities. New structural mechanisms and models are needed to address the pressing challenges of energy and environment, food and nutrition, water and sanitation, habitat, affordable health care and skill building and unemployment.

"Science technology and innovation for the people" is the new paradigm of the Indian STI enterprise. The national STI system must, therefore, recognize the Indian society as its major stake holder. Global innovation systems tend to bypass large sections of the community. Innovation for inclusive growth implies ensuring access, availability and affordability of solutions to as large a population as possible. Innovation, therefore, must be inclusive. The instruments of the STI policy will enable this to be realized. The policy will drive both investment in science and investment of science-led technology and innovation in select areas of socio-economic importance. Emphasis will be to bridge the gaps between the STI system and the socio-economic sectors by developing a symbiotic relationship with economic and other policies.

Capturing Aspirations

The key elements of the STI policy are:

- Promoting the spread of scientific temper amongst all sections of society.
- Enhancing skill for applications of science among the young from all social strata.
- Making careers in science, research and innovation attractive anough for talented and bright minds.
- Establishing world class infrastructure for R&D for gaining global leadership in some select frontier areas of science.
- Positioning India among the top five global scientific powers by 2020.
- Linking contributions of science, research and innovation system with the inclusive economic growth agenda and combining priorities of excellence and relevance.
- Creating an environment for enhanced Private Sector Participation in R&D.
- Enabling conversion of R&D outputs into societal and commercial applications by replicating hitherto successful models as well as establishing of new PPP structures.
- Seeding S&T-based high-risk innovations through new mechanisms.
- Fostering resource-optimized, cost-effective innovations across size and technology domains.
- Triggering changes in the mindset and value systems to recognize, respect and reward performances which create wealth from S&T derived knowledge.
- Creating a robust national innovation system.

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