

Useful technologies for doubling farmers income

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Agriculture has been playing an important role in the overall growth of the Mixed Economy of India despite its structural shift towards the services sector during the recent decades. Although the share of agriculture in GDP has declined from 55.1 % in 1950-51 to 6.5% in 2016-17, this sector remains a major source of employment for rural workers. India achieved self-sufficiency in food production at the macro-level, but still faces massive challenges of a large number of malnourished children and the high incidence of rural poverty. The dependence of the rural workforce on agriculture for employment has not declined in proportion to the falling contribution of agriculture to GDP. This has widened income disparity between the agricultural and non-agricultural sectors.

Key words: Farmers, Income, Technologies, Useful

INDIAN agriculture is passing through difficult times due to two consecutive drought situations in several parts of the country, thereby resulting into wide spread distress among farmers. The rural areas in these parts are facing food and livelihood crisis, more specifically the shortage of fodder and drinking water. Growth of the agricultural sector is important not only for ensuing food security and reduction of poverty in rural areas, but also sustaining growth of rest of the economy. Growth of non-farm sectors can be sustained only when the agricultural sector continues to provide adequate produce for food and clothing. Agricultural development creates sources of food for the people, fodder for livestock, manpower and raw materials for industry and produce for the export sector. It also unfolds possibilities of additional employment facilities and income generation in the rural sector.

Efforts are initiated to formulate action plan for enhancing farmers' income over the years. Several consultations were made by involving farmers, scientists, policy makers and

other stakeholders to formulate the action plan. Vetting of those modules are done in each district in a meeting of the farmers, line-department officials and scientists of the University. This novel approach will certainly pave a path towards doubling farmers' income by 2022 in Gujarat.

What is double farming income?

In day-to-day conversation, a number of terms sometimes lead to confusion, especially when the words involved are in disconnect from colloquial and professional context. Revenue and profit are often used inter-changeably by the average person, but these terms have separate meanings, albeit profit being an outcome of revenue. Contextual clarity on terminology is important to avoid confusion of intent or action. Revenue is a synonym for income, whereas profit mean the income or revenue that remains after all expenses.

Why double farmers' income?

Past strategy for development of the agricultural sector in India has

focused primarily on raising agricultural output and improving food security. The net result was a 45% increase in per person food production, which has made India not only food self-sufficient at aggregate level, but also a net food exporting country.

The strategy did not explicitly recognise the need to raise farmers' income and did not mention any direct measure to promote farmers' welfare. The results showed that farmers income remained low, which is evident from the incidence of poverty among farm households.

Low level of absolute income as well as large and deteriorating disparity between income of a farmer and non-agricultural worker constitute an important reason for the emergence of agrarian distress in the country during 1990s, which turned quite serious in some years. The country also witnessed a sharp increase in the number of farmers suicides from 1995 to 2004, losses from farming, shocks in farm income and low farm income. The low and highly fluctuating farm income is causing detrimental effect on the

interest in farming and farm investments, and is also forcing more and more cultivators, particularly younger age group, to leave farming. This can cause serious adverse effect on the future of agriculture in the country.

It is apparent that income earned by a farmer from agriculture is crucial to address agrarian distress and promote farmers' welfare. In this background, the goal set to double farmers' income by 2022-23 is central to promote farmers welfare, reduce agrarian distress and bring parity between income of farmers and those working in non-agricultural professions.

Income link directly to sales

Income is total revenue generated from sales of goods or services. Income is therefore the immediate outcome of sales fulfilled. Simply explained, the concept of Doubling Farmers' Income, has at first instance, to translate into multiplying their sales volume. The target to double farmers' income, will be best served by empowering access to more consumption points (markets). Such access is currently restrained mainly due to physical limitations of the logistics system. Policy direction to ramp up physical connectivity from farm to consumers and easing certain regulatory restrictions are required. Greater access to more markets hedges against selling risks, and adds opportunity to produce more. At a recent round-table, suggestions were put up to develop a roadmap for doubling farmers' income. These mostly focused on aspects that relate to optimizing farm input costs. The cost optimization is secondary to the primary need to multiply revenues. For instance, say a farming group is able to sell only 50% of their production capability. Increasing the quantum of produce or saving their input costs will result in an increase in their economy. It will surely not multiply their revenue and 50% losses will remain. Farm-gates need to be empowered to reach out to more consumers so that they can scale-up their sales and capture more revenue by delivering all production to markets.

Source of farmers' income

Doubling real income of farmers till 2022-23 over the base year of 2015-16, requires annual growth of 10.41% in farmers' income. This implies that the on-going and previously achieved rate of growth in farm-income has to be sharply accelerated. Therefore, strong measures will be needed to harness all possible sources of growth in farmers' income within as well as outside agriculture sector.

The major sources of growth operating within agriculture sector are: improvement in productivity, resource use efficiency or saving in cost of production, increase in cropping intensity, and diversification towards high value crops.

Sources outside agriculture: Here are shifting cultivators from farm to non-farm occupations, and improvement in trade for farmers or real prices received by farmers.

Strategies for improving farmer income

The sources of growth in output and income can be put in four categories: development initiatives including infrastructure; technology; policies and institutional mechanisms.

PRIME MINISTER'S VISION

Doubling farmers' income by 2022

Strategy: The planning to double farmers income by 2022 include irrigation: 'per drop, more crop'; quality seeds 'Improving seed replacement rate; soil-test based nutrient management- 'distribution of soil-health cards'; and post-harvest crop losses – large in warehousing and cold chains; value addition to farmers; creation of national agricultural market, removing distortions and e-platform across 585 markets; new crop insurance scheme 'Pradhan Mantri Fasal Bima Yojana'- Minimum Premium and Maximum Security; and Promotion of ancillary activities- poultry, sericulture etc.

Doubling the farmers' income under climate change

Challenge is to increase – doubling income of farmers in arena of climate change and face challenge of

increasing threat to food security and enhancement poverty in rural areas. For example due to recurrent droughts average yield of food grain in Gujarat is in decline. As per report *Nav Gujarat Samay*, it has come down from 2,097 kg/ha in 2013-14 to 1,552 kg/ha in 2016-17. The other data revealed that food grain production declined from 100 lakh tonnes in 2010-11 to 79.47 lakh challenge-even in Gujarat. This showed how serious is at national level also situation is same—country was required to import wheat after gap of many years. The average growth rate is below 2% in last two years.

Hence it must be realized that agriculture sector of country as a whole is still vulnerable – so are our farmers. To double their income in such a situation – when even after so many years of development we are dependent on good monsoon – more concerted and serious action plan is needed at local level-with strong monitoring is needed.

Technologies

Emerging Technologies may assist in bridging the above gap. Some technologies are discussed here.

Satellite communication and mapping technologies: The Cloud Sensors Irrigation Seeds Crop Protection Farm Equipment, Robotics and Machine Intelligence Vertical Farms: Aeroponics; Aquaponics Post-harvest Solutions Precision and Digital Farming Digital e -learning and farmer education Satellite Communications and Mapping India has relevant satellites in space that can map weather, floods, storms, and many other natural factors, such as soil erosion. In the future, information will be beamed to service providers, and thereon to farmers in real time, that will help the farmers take preventive and corrective measures quickly, thereby preventing damage, protecting crops, and working with alternative solutions. The Smart Phone, now cheap, full of applications, connected by 4G, will be the vehicle in the hands of the farmers – a powerful tool that will enable quick and ready flow of

information in real time, when required, and at small cost.

The Cloud: Information and Data will be stored in cloud and Analytics will keep standardized solutions saved and ready. Thus recommendations regarding nutrients, chemicals and other crop related information, will be available to farmers, regionally relevant and crop specific. The Cloud will become the Hub of Knowledge management.

Sensors : Leaf sensors, one in one acre (0.404 ha) of land, will give out information about plants wanting water and quantity required and when sensors in ears of animals will give data about animal sleeping, lying down, or eating. And many other applications, as the technology gets adopted and matures.

Irrigation: Irrigation projects will be connected. The systems will deliver water and fertilizers to the farm when required, consume about 10% of what the farmers uses today as water resources, give information on water quality, hardness and TDS. Solar energy will be the enabler for pumps, filters and drainage. Drip irrigation will take on a new avatar. Water-harvesting for agriculture will be the way forward.

Seeds : Genetically Modified and hybrid seeds within planted protection genomes, will protect the plants from pests and diseases. Seed treatment will be crop specific and protect the crop through its life span. Data from use of hybrid and GM seeds, will increasingly be available to be analysed from angles of human and plant safety, and corrections made at every step, by scientists, in collaboration with the universities and farm institutions. indeed, seeds, have the potential to usher in a Re-Green Revolution in India.

Crop protection : New Chemistries, Use of Biologicals, and Organic Products will make crop-protection targeted and pest, weed, disease specific and selective. Use of chemicals will decline. Integrated Pest and Crop Management will become a reality, through use of new mixtures,

formulations, and safer applications, that are cost effective. Spray equipment, will carry flexible technology and information for farmers. Soil-testing, water-testing and pest threshold levels, would be mapped in real time on farms, through service providers.

Farm equipment, robotics, and machine intelligence: Driverless tractors, harvesters, seed transplanting machines, guided by the satellite, will take over from landless labour, releasing them for other gainful employments. Equipment suitable for small-medium-and large-farmers will be available on rent, lease, or sale from high class equipment providers, who would help maintain the machines and systems. People are showing their interests in this field.

Vertical farms: aeroponics: Aquaponics Singapore, United States of America, Japan, Vietnam, Korea and various other countries are already pioneering vertical farms, as the future of agriculture, to save land, and provide fruits and vegetables to domestic populations on a sustainable basis. Small pilot units in Maharashtra, Tamil Nadu and Himachal Pradesh have also started such ventures. Entrepreneurship has to step in with Government support.

Post-harvest solutions: Computerized Silos will provide information on weight, volume and other parameters. They will automatically be connected to Cloud. Fumigation and stored grain pests and fungi will be controlled through modern systems. Each silo can cater to a specific number of village clusters in the area on lease basis, and be connected to cold chains, storage warehouses and transport linkages – from farm to retail. Vacuum Packaging will keep grains and cereals pest free, healthy, original and fresh, through use of inerts such as Nitrogen (N). Pilot units are set up in Dharwad University in Karnataka.

Precision and digital farming: Above technologies will contribute to precision farming. Track and Trace

Digital Farming tools will assist in tracking the history of the crop, such as grapes, fruits and vegetables, from seeding to harvest, and provide real time information on residues, disease etc. More applications are on the anvil.

Digital e-learning and farmer education: Already many NGO's and Self-Help Groups offer services to farmers regarding crops, commodities, products and prices. These initiatives will reach multiplier levels soon, thus making information, knowledge, solutions, and actions – available to the farmer at the clicks of smart phones. Multimedia, videos, and global connects, will be available at low cost.

SUMMARY

Doubling real income of farmers by 2022 is a formidable task but it can be possible only through the proper implementation of the appropriate strategies. Public R & D institutions should be supported to develop capacity in areas of technologies such as biotechnology which appear to have great potential. Farming is a skilled-profession and hence people could be skilled and motivated through various skill-development programmes of the government. Lucrative avenues can be created for those who want to leave agriculture and incentives and skills those who want to enter/continue this occupation. Higher price realization by farmers need to be achieved through various price realization market reforms like e-NAM and various provisions of APMC Act. Promotion of initiatives like Soil-health Card, ICT-based agricultural extension, formation of FPO's, Integrated Farming System. Concerted and well – coordinated efforts are required to be made between the centre and the states.

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This Yojana brings

Pradhan Mantri Krishi Sinchai Yojana

- Per Drop More Crop ● Inputs from MoWR and DOLR received
- Increase in agricultural production and productivity and enhance farm income.