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Agricultural Reforms



Vice President releases Second Volume of Selected Speeches of the President of India



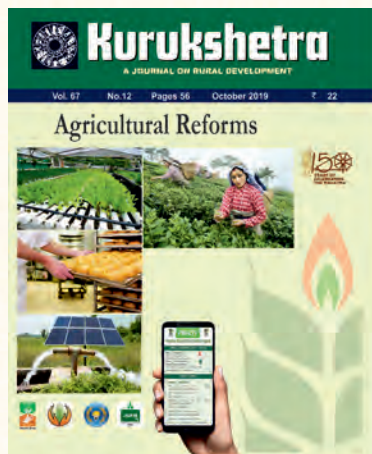
The Vice President, Shri M. Venkaiah Naidu releasing the two books of selected speeches of the President of India, Shri Ram Nath Kovind, titled 'The Republican Ethic (Vol. 2)' and 'Loktantra ke Swar (Khand 2)', in New Delhi on September 6, 2019. The Union Minister for Environment, Forest & Climate Change and Information & Broadcasting, Shri Prakash Javadekar; the Union Minister for Social Justice and Empowerment, Shri Thaawarchand Gehlot; the Secretary, Ministry of Information & Broadcasting, Shri Amit Khare and the Pr. DG, Publications Division, Dr. Sadhana Rout are also seen.

The Vice President of India, Shri. M Venkaiah Naidu released two books on Selected Speeches of President of India, Shri Ram Nath Kovind, titled 'The Republican Ethic (vol. 2)' and 'Loktantra ke Swar (khand 2)' at the Pravasi Bhartiya Kendra in New Delhi on September 6, 2019. Shri Prakash Javadekar, Minister of Environment, Forest & Climate Change and Information & Broadcasting, Shri Thaawarchand Gehlot, Minister of Social Justice & Empowerment, Shri Amit Khare, Secretary, Ministry of Information & Broadcasting, Dr. Sadhana Rout, Pr. DG, Publications Division and others were present at the occasion.

The Vice President complimented the Ministry of Information & Broadcasting and the Publications Division for publishing the collection of speeches of Hon'ble President in an aesthetic manner. The Vice President said that upholding values and ethics was of paramount importance for people in public life and added that both he and the Hon'ble President Shri Ram Nath Kovind felt strongly about it and their priorities for the nation converged at a number of points such as "clean India, an educated skilled India, an innovative India, a fit India and a harmonious, strong and empowered India."

Union Minister Shri Thaawarchand Gehlot said that the President has dedicated his life for social justice, which is reflected in the speeches presented in the books. He said that Shri Ram Nath Kovind is 'people's President'. He highlighted several aspects and areas which the President has stressed upon in his speeches, including education, female empowerment, good governance, inclusive growth, upliftment of the poor and downtrodden, among others. He also talked about the life of the President along with the challenges he faced and overcame. Union Minister Shri Prakash Javadekar highlighted Hon'ble President's concern for ensuring social, economic and political justice to all citizens. Shri Javadekar pointed out that Shri Kovind has a definite vision and awareness about India's future and a keen sense of transformation of society through a future-oriented education. He lauded the efforts of Publications Division for bringing out these important publications.

Several dignitaries including Members of Parliament, Members of Diplomatic Corps, Secretaries and other senior officers of different Ministries and departments, attended the event.



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Editorial

The present Government has taken several steps to accelerate agricultural growth in the country. The government has also initiated key reforms to boost the agri sector. India is predominantly a rural economy, where the mainstay of people is agriculture. More than 50 per cent of the population is directly dependant on agriculture and allied sector. As an agrarian economy, the country derives 18 per cent of its GDP from the agri sector. Over 50 per cent of the national workforce is directly or indirectly employed in this area. A clear shift in government's policies and priorities towards agriculture can be witnessed in the last five years. Due to the various initiatives of the Union Government, the country has witnessed record food production in the recent times. A large number of schemes to achieve the best results while promoting agricultural growth are in place to bring prosperity in the lives of farming community.

Women's role in agriculture has been extremely vital in the production, processing and distribution sector. Women play a pivotal role in the management and rearing of livestock and other activities like fodder collection, post-harvest activities and farm cleaning activities. The country has made impressive strides on the agricultural front in the recent times. The credit for this success should go to the several million small and marginal farmers that form the backbone of Indian agriculture and economy. Policy support, production strategies, public investment in infrastructure, research and extension for crop, livestock and fisheries have significantly helped to increase food production and its availability. The Government has also set a goal of doubling farmers' income by 2022 and is making all out efforts to achieve this. The present government has been constantly emphasising to create a facilitating environment for investments in order to ensure infrastructure development to boost the agri sector. With all the agriculture related schemes, the main focus of the government is to benefit the farmers and ensure the overall growth of this key sector which is crucial for country's development.

More importance has been accorded by the government to the constructive use of water, proper crop selection and use of modern irrigation technologies to ensure a high agricultural productivity. Ministry of Agriculture through its various steps and awareness programmes has been constantly encouraging the farmers to adopt new technologies and advancements to get better farm produce. Because of the key initiatives and the hard work of the farming community, overall increase can be seen in foodgrain. It is high time that the farming community must take advantage of the one of strongest national agricultural research system which the country has. Schemes like, Pradhan Mantri Kisan Samman Nidhi, Pradhan Mantri Krishi Sinchayee Yojana and Pradhan Mantri Fasal Bima Yojana are helping the farmers and agriculture sector in a big way. Undoubtedly, these steps will enhance productivity and ensure overall development of the Agriculture sector.



AGRICULTURE REFORMS: TOWARDS DOUBLING FARMERS' INCOME

Alpana Pant Sharma

Government of India has launched the Pradhan Mantri Kisan Samman Nidhi (PM- KISAN) scheme with an aim to provide assistance to small and marginal farmer families with an amount of Rs. 6000/- per year. The scheme initially covered only small and marginal farmer families with land holding up to 2 hectares as beneficiaries, subject to certain exclusion criteria for higher income status but now the Union Government has extended the scheme to all farmer families irrespective of land holding size, subject to applicable exclusions.

The Government has been reorienting the agriculture sector by focusing on an income-centeredness which goes beyond achieving merely the targeted production. The income approach focuses on achieving high productivity, reducing cost of cultivation and remunerative price on the produce, with a view to earn higher profits from farming. Various initiatives by way of schemes and policy reforms have been rolled out in consonance with this approach. Further, these initiatives are supported by a big jump in the much needed budgetary allocations for the agriculture sectors. Besides, non-budgetary resources have been mobilized to supplement budgetary resources.

The Doubling Farmers' Income Committee has had the farmers' income into its core deliberations and incorporated it as the fulcrum of its strategy. Recently, a High Powered Committee of Chief Ministers for 'Transformation of Indian Agriculture'

has been constituted and two meetings of the Committee have been held on 18th July 2019 and 16th August 2019 to deliberate and firm up their report.

At present the Government is implementing various schemes and adopting policy measures to synchronize with higher gains for the farmers:

I. For Higher Production Through Productivity Gains:

- National Food Security Mission (NFSM)- for cereals, pulses, oilseeds, nutri-rich cereals, commercial crops
- Mission for Integrated Development of Horticulture (MIDH) for high growth rate of horticulture crops.
- National Mission on Oilseeds and Oil Palm (NMOOP) launched in 2014-15 for increasing production of oilseeds and Oil Palm.

II. For Reduction In Cost of Cultivation:

- Soil Health Card (SHC) to ensure judicious and optimal use of fertilizer application thus saving the input cost for farmers.
- Neem Coated Urea (NCU) is being promoted to regulate use of urea, enhance availability of nitrogen to the crop and reduce cost of superfluous fertilizer application.
- Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) micro irrigation component (1.2 million ha/yr target) with the motto of 'Har Khet Ko Paani' for providing end-to-end solutions in irrigation supply chain, comprising water sources, distribution network and farm level applications.

III. For Providing Assistance To Small and Marginal Farmers

- Government of India has launched the Pradhan Mantri Kisan Samman Nidhi (PM KISAN) scheme with an aim to provide assistance to small and marginal farmer families with an amount of Rs. 6000/- per year. The scheme initially covered only small and marginal farmer families with land holding up to 2 hectares as beneficiaries, subject to certain exclusion criteria for higher income status but now the Union Government has extended the scheme to all farmer families irrespective of land holding size, subject to applicable exclusions. State Government and UT Administration identify the farmer families who are eligible for support as per scheme guidelines. The fund will be directly transferred to the bank accounts of the beneficiaries. Till date, PM KISAN has over 6.37 crore beneficiaries and Rs. 20,520 crores have been transferred as direct benefit to farmer families.
- Pradhan Mantri Kisan Maan Dhan Yojna (PM-KMY) has been launched which provides for a payment of a minimum pension of Rs. 3000/- per month to eligible small and marginal farmers on attaining the age of 60 years. It is a voluntary and contributory pension scheme, with entry age of 18 to 40 years. The monthly contribution by farmers ranges between Rs. 55 to 200 depending on their age. Central Government will contribute an equal

amount in this contributory pension scheme.

IV. To Ensure Remunerative Returns:

- National Agriculture Market Scheme (e-NAM) is an innovative market process to revolutionize agri-markets by ensuring real-time better price discovery, bringing in transparency and competition to enable farmers to get improved remuneration for their produce, moving towards 'One Nation One Market'.
- Farmer Producer Organizations (FPOs) have been on-boarded on e-NAM portal and they have started uploading their produce for trading from their premise.
- The Model Agricultural Produce and Livestock Marketing Promotion & Facilitation) Act, 2017 has been released on 24th April, 2017 for its adoption by States/UTs, to promote alternative competitive marketing channels for better pricing for farmers and to encourage private investment in developing efficient marketing infrastructure and value chain. The provisions under the Act include setting up of private markets, direct marketing, farmer-consumer markets, special commodity markets and declaring warehouses/silos/cold storages or such structures as market sub yards.
- Existing 22,000 rural haats to be developed and upgraded into Gramin Agricultural Markets (GrAMs). These GrAMs, electronically linked to e-NAM portal and exempted from regulations of Agriculture Produce Marketing Committees (APMCs) will provide farmers, the facility to make direct sale to consumers and bulk purchasers.



- Warehousing and post-harvest loans at concessional rate of interest so as to discourage distress sale by farmers and to encourage them to store their produce in warehouses against negotiable receipts.
- Minimum Support Price (MSP) is notified by the Government for certain crops periodically. Giving a major boost for the farmers' income, the Government has recently approved the increase in the MSP for all Kharif crops for 2019-20 season.
- Procurement of oilseeds, pulses and cotton are undertaken by central agencies at MSP under Price Support Scheme (PSS) at the request of the State Government concerned.
- Market Intervention Scheme (MIS) for procurement of agriculture & horticulture products, which are perishable in nature and are not covered under PSS

V. For Risk Management and Sustainable Practices

- Pradhan Mantri Fasal Bima Yojana (PMFBY) & Restructured Weather Based Crop Insurance Scheme (RWCIS) provides insurance cover at all stages of the crop cycle including post-harvest risks in specified instances and available to the farmers at very low rates of premium.
- Government provides total interest subvention up to 5 per cent (inclusive of 3 per cent prompt repayment incentive) on short-term crop loans up to Rs. 3.00 lakh. Thus, loan is available to farmers at a reduced rate of 4 per cent per annum on prompt repayment.
- Paramparagat Krishi Vikas Yojana (PKVY) is being implemented with a view to promote organic farming in the country. This will improve soil health and organic matter content and increase net income of the farmer so as to realize premium prices.
- Mission Organic Farming in North- East- MoVCD (NE) for realizing the potential of organic farming in the North Eastern Region of the country

VI. Allied Activities:

- 'Har Medh Par Ped' launched during 2016-17 to encourage tree plantation on farm land along with crops/ cropping system. Implementation of the Scheme has been started in the states where liberalized transit regulations for transport of timber have been notified. Agro forestry will not

only help in increasing soil organic carbon but also in creating additional source of income to farmers.

- National Bamboo Mission has been announced in the Union Budget 2018-19 for value chain based holistic development of this sector as a supplement to farm income.
- Bee-Keeping has been promoted under Mission for Integrated Development of Horticulture (MIDH) to increase the productivity of crops through pollination, and increase the honey production as an additional income to the farmers.
- For dairy development, there are three important schemes: National Dairy Plan-1 (NDP-1), National Dairy Development Program (NPDD) and Dairy Entrepreneurship Development Scheme.
- Foreseeing high potential in fisheries sector, a Blue Revolution with multi dimensional activities mainly focusing on fisheries production, both inland and marine is being implemented.
- Rashtriya Gokul Mission launched in December 2014 for gene pool of indigenous cattle and buffaloes.
- National Livestock Mission launched in 2014-15 to ensure intensive development of livestock especially small livestock (sheep/goat, poultry, etc.) along with adequate availability of quality feed and fodder.

A farmers' income is a basket of earning from agriculture (including horticulture), allied activities like dairy, livestock, poultry, fishery etc. and ancillary activities like beekeeping etc. Apart from these farm incomes, he also earns from other activities like wage labour, off-farm activities etc. Earnings from agriculture constitute the principal source of income of a farmer. It is hoped, that the answer to agrarian challenges and realization of the aim of farmers' welfare lies in higher and steady incomes. Notwithstanding the many faces of challenges, India's agriculture has demonstrated remarkable progress. Henceforth both production & marketing shall move forward together hand in hand, unlike in the past when their role was thought to be sequential.

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ROADMAP FOR AGRICULTURAL REFORMS

Dr. J P Mishra

The agriculture and allied sectors enjoy the centrality in any development planning process in India for its significance in engaging and employing the people, providing food and ensuring food security, raw material for sugar, textile, herbal and food processing industries. A multi-sector and connectivity-based growth is required to ensure food and nutrition and income security, alleviate poverty, increase trade and also enhance the income of those who work in the farm and farm-related activities.

With the Prime Minister constituting a High Powered Committee of the Chief Ministers of 7 States – Maharashtra, Karnataka, Haryana, Arunachal Pradesh, Gujarat, Uttar Pradesh, Madhya Pradesh and Union Minister of Agriculture, Rural Development & Panchayati Raj with Member, NITI Aayog as the Member-Secretary, the agenda for Transformation of Indian Agriculture and reforms initiated in 2014 gets sharpened. The agriculture and allied sectors enjoy the centrality in any development planning process in India for its significance in engaging and employing the people, providing food and ensuring food security, raw material for sugar, textile, herbal and food processing industries.

The budgetary allocations for agriculture have been increasing steadily. However, the growth in agricultural GDP has been low with seasonal fluctuations. To ease out farmers' distress, the Government introduced Pradhan Mantri Kisan Samman Yojana providing Rs.6000/year to each farm household. Low price realisation, excessive intermediation in trade and low private investment in infrastructure development are some of the priority areas of reforms that need concerted efforts of all stakeholders. The vast gap in infrastructure is also a serious constraint which will require immediate attention. National Centre for Cold Chain Development estimated a gap of 99 per cent in pack houses, 85 per cent in reefer vans, 10 per cent in cold storages, and 91 per cent in ripening chambers.

A Paradigm Shift

A paradigm shift in policies and priorities during last 5 years has been seen. India will be home of 1.6 billion people by 2035. The per capita availability of land, water and other finite natural resources will decline and water stress would augment due to climate change. The foodgrain demand is estimated over 340-356 million tonnes by 2033 and similar increase for other commodities. The agricultural

planning has to change to make it sustainably profitable with mainstreaming of agricultural reforms in production, agri-business, value chains, investments and governance. The policies and investment priorities 'in' and 'for' agriculture can be aligned for income security and inclusiveness. The investments in water positive interventions in fund-starved rainfed regions must be enhanced. The participatory ground water management and drought-proofing with investments in a framework of extensive supportive irrigation with conjunctive use of groundwater and surface water bodies is needed. The estimates show that the potential of rainfed areas can be unlocked with the investment of Rs. 50000/ha or more against the present investment of Rs.12-15000/ha. There is a need for a multi-sector and connectivity-based growth to ensure food and nutrition and income security, alleviate poverty, increase trade and also enhance the income of those who work in the farm and farm-related activities.

Research and Technology

The productivity of agricultural commodities in India is lower than any global benchmark. While reasons are many, the predominant issues are less use of quality seeds and feeds, and improved technologies. The water stress in over half agricultural areas restricts multiple cropping leading to inefficient utilisation of land resource. The farmer's income increases substantially with double cropping, much of the technology developed in public sector labs does not flow to farmers due to weak extension or inadequate delivery mechanism. Some of the crops like oilseeds and pulses where the desired genetic enhancement has not been possible with the conventional breeding, the development of varieties/hybrids involving GM technologies is essential. Simultaneously, the renewed focus on reducing application of chemical fertilisers need some new plant types and plant root and microorganism symbiosis to mobilise the already

available phosphorus and other nutrients from the soil reserve. The GM technology may also be useful for addressing various climate change induced stresses. The activities in seed and seed research and the new formulations related to microorganisms consortia, bacterial consortia, bio-inoculants, bio-stimulants etc., which are typically not a chemical product and neither an insecticide but need license for commercialization. The standards and specification may be inbuilt in the respective Acts for facilitating such formulations/materials for commercialisation.

The future of agriculture in India lies in how much we are investing in agri Research and Development (R&D) today. Agriculture R&D has to innovate for precision agriculture, varieties with higher nutritive and processable traits, climate smart technologies, cyber-agro-physical system for generating artificial intelligence based farm and market advisories. The developmental research on water governance and water footprints and others are urgently needed. The frontier areas like gene editing, genomics, artificial intelligence, nano technology are ushering in 4th industrial revolution need special attention.

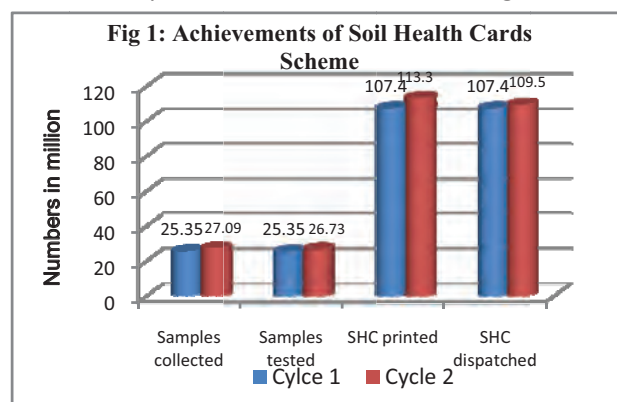
Water-Governance

As close to 84 per cent of fresh water is used in agriculture, both demand and supply side management through reforms are crucial in India which is a water stressed country with annual water availability at 1544 m³ per capita and approaching towards scarcity (<1000 m³ per capita). Central Groundwater Board, through their study of 6607 units (blocks/mandals/taluks), proved that 16.2 per cent of these assessed units are 'overexploited' and 14 per cent either 'critical' or 'semi-critical'. Majority of them fall in north-west. It proves that groundwater as an exit mechanism for the farmer is no longer available to escape the delivery failures of large scale public irrigation systems. The large gap between potential created and utilised has been a matter of concern as out of 112.53 million ha created irrigation potential only 89.26 million ha is utilised. A strong convergence amongst programmes and agencies based on comprehensive information of all water bodies and reservoirs is the remedy. Fortunately, the Government, through PMKSY provided overarching governance for convergence amongst the programmes of agriculture, water resources, land resources and other departments dealing with water. It must be sharpened after the

Prime Minister's call for water conservation and its efficient use. The Jal Shakti Abhiyan may focus on these issues. A major reforms in the micro-irrigation scheme is necessitated to transform it from individual farmer subsidy driven programme to area based public-private business model covering installation, repair and maintenance of the micro-irrigation systems. States should encourage to push such models through the corpus of Rs. 5000 crore established in NABARD for micro-irrigation. The water governance should focus on micro-irrigation and water budgeting based on a strong tariffs regime. The related policy on free power to agriculture should also be reversed with a metering system as done in Gujarat.

Reforms In Fertiliser Sector

The strong advocacy for Zero-Budget Natural Farming (ZBNF) has been noticed in recent past. The alternate sources of nutrition like microbial consortia, bio stimulant, bio compost, plant growth promoters, etc and their specifications can appropriately be included in Fertiliser (Control) Order, 1985 and Insecticides Act, 1968 to promote their trade and commercialisation and compensate part of the chemical fertilisers through these alternate sources. While consensus on phasing out the fertiliser subsidy is yet to be evolved, the rationalisation of the regime is necessary. The strategy to introduce NBS for all major nutrients should be evolved at the earliest. DBT in fertilisers has been a great success. The Soil Health Card scheme is one of its kinds with 100 per cent penetration to every farm household. Over 216 million soil health cards have been distributed in cycle I and II (Figure 1). The next level reform in SHC should include making soil health card the integrated soil health care system by including the data of crops, cropping systems with calibrated fertiliser requirement for farmer's holding size. The



fertiliser distribution (in kind) or fertiliser subsidy (in cash) may be linked with this integrated soil health care data system.

Risk Management

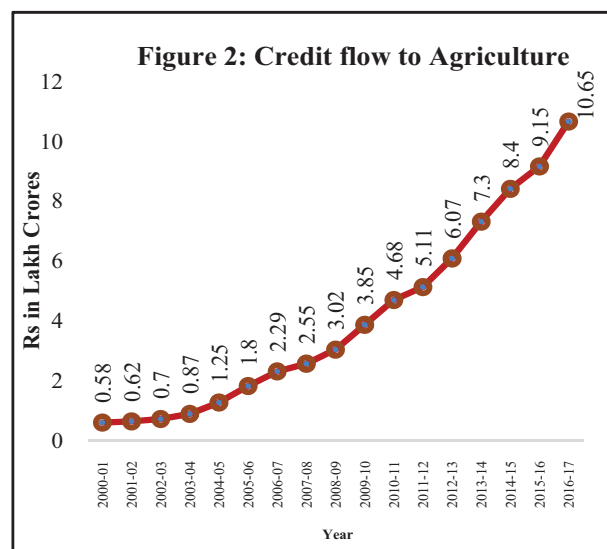
No of farmers insured	92.09 million
Area insured	90.33 million ha
Sum Insured	Rs. 3333550 million
Claim paid	Rs. 333877 million
No of farmers benefited	28.1 million
Average pay-out per farmer	Rs. 11881.70

Pradhan Mantri Fasal Bima Yojana (PMFBY) has been launched in January 2016 subsuming the multiple insurance schemes. Till Kharif season 2017, it benefited 28.1 million farmers with an average pay out of Rs. 11881.7 per farmer (Table 1). However, the timely and precise estimates and pay outs are the real challenge being faced by the scheme. The precision of record of area insured and the extent and intensity of damage for speedy pay outs is the challenge. So far the States identify and accept the Crop Cutting Experiments (CCE) data. Hence, conducting adequate number of CCEs though significant is yet the most challenging for the success of PMFBY. States have to reform to accept and include technologies like remote sensing, drones, smart phones etc. as an effective and accepted tool for conducting the field level assessments of area insured and the losses.

Credit in Need to Needy

The Sarangi Committee (2016) recommendations on interest subvention are implemented by the Government. The interest subvention on the short-term crop loan up to 3 lakh and Kisan Credit Card scheme have been made broad-based to include term credit and consumption needs, besides some risk cover against accidental death. The credit targets and availability has been rising (Fig. 2) but the equitable distribution of credit amongst farmers and regions is the concern as the private money lenders flourish in many states on the cost of small and marginal farmers. The institutional credit is also not available to tenants or lessee cultivators. The lessee in general is not provided the institutional credit, relief, although the number and proportionate area under leasing is increasing over time. The States should reform their land leasing laws based

on the Model Act on Agricultural Land Leasing, 2016 prepared by NITI Aayog which will help mainstreaming the tenants under the fold of institutional agricultural credit as provisioned by the Government in 2018-19 Budget. The alternate system of banking in the form of banking correspondence should be strengthened in regions with low density of rural banks. The reforms in banking procedures with least paper work for availing short-term crop loans perhaps would help greatly.



The small and marginal farmers constitute 86 per cent of farm households and 45 per cent of area but sell only 12 to 33 per cent of their output. Cropping alone can never increase income of these farmers substantially. The value of output data for year 2013-14 shows that fruits and vegetable crops on average generate Rs. 3.30 lakh worth of output per ha compared to Rs 0.38 lakh by cereals, Rs. 0.29 lakh by pulses and 0.49 lakh per ha by oilseeds. The value of farm output can be increased substantially by diversifying from field crops to fruits and vegetables. Diversified farming in A.P. Gujarat could be attributed for rapid decline in rural poverty during last 15 years. In the past, the significant positive shift has been noticed in livestock sector (Table 2). The directed diversification can only happen if farmers are given the full right to sell their produce to whomsoever they want. A well-functioning system of contract farming will go some distance towards providing a guaranteed price as well as necessary technical support to the farmer. The input dealers, FPOs, agro-processors, exporters, financial service providers, insurance agencies etc. should integrate

Directed Diversification

Subsector	1999-2000	2010-11	2013-14 (2011-12 series)
Crop	32523851	39668677	90310924
Horticulture	11554905	17945771	34053970
Livestock	15122628	23901369	53087251
Fisheries	2776670	4202372	9020252
Agroforestry	6787984	8337170	14682563
Total	68761890	94055359	201154960

to work with the farmers as entrepreneurs. Reforms in contract farming, tariff and tax regimes, credit is pivotal for achieving commercialisation in agriculture. The policies that facilitate the development of food processing industry will go a long way towards creating demand for high value commodities.

Manage Post-Harvest

The annual post-harvest losses are estimated at Rs. 92651 crore. Reforms in Essential Commodity Act relating to stock holdings and storage could reduce the losses to great extent. Better synergy amongst agriculture, food processing, and commerce is also required. The Agriculture Export Policy is a new beginning which must be strengthened with technological backstopping and critical reforms for attracting more investment in developing processable crop varieties and products. The initiatives of e-NAM and Gramin Agricultural Markets will have far reaching consequences. The Government can also evolve two competing agri-market systems—one through APMCs, and second through integrated value chain models. The FPOs/Joint Liability groups can be promoted to channelise the small growers into the value chain.

Minimise The Price Shocks

The MSP implementation has never been inclusive for produce, producer and geographies. It also induced changes in production pattern favouring for water guzzling crops in less precipitation areas causing stress on groundwater, led to regional bias in cropping pattern and incomes of farmers. Of late, the farmers of all states are demanding price guarantee for all major agricultural commodities like MSP on rice and wheat. The Government, in the Budget 2018-19, announced for introducing

MSP 1.5 times of production cost. NITI Aayog and Ministry of Agriculture in consultation with the states suggested Price Deficiency Payment System, and Private Stockists Procurement System as the alternate mechanism. These could be rolled out as early as possible. In view of NFSA priorities, the commodities like oilseeds, cotton may be taken up first. The states should also enact their APMC laws based on the Model Agricultural and Livestock Marketing (APLM) Act, 2017 to facilitate out-of-mandi transactions, exemption of market fee on perishables, electronic marketing etc. Contract farming under which the buyer can provide the farmer access to modern technology, quality inputs, other support and a guaranteed price is a prospective solution. The Government in May 2018 launched the Model Act on Contract Farming to empower the farmers to decide their price and negotiate with the sponsor. States should enact appropriate Contract Farming Act based on the Model Act.

Make Indian Farmers Competitive

To make Indian farmers globally competitive for quality produce and price, the vibrancy of the private sector, on a larger scale, should be mainstreamed for investment 'in' and 'for' agriculture. Since liberalisation, the private sector helped in significant investments in some sectors that have created quality jobs and provided additional income to farmers. The poultry sector is one such example which grew into a well-organised industry. The commercial vegetable production is gradually picking up, the recent spur in poly houses and hi-tech horticulture and expansion of fisheries in some states is the product of small and medium investments in sustainable supply chains that link primary producers with viable markets.

The revolution in ICT has enabled farmers and producers to learn and adopt better practices and access market information. The private sector should be given a signal that some work may not happen without their investment while Government should continue with policies and governance and channelising the public funds to reach out to disadvantaged regions and people. The private sector may be encouraged to supplement investments in high-risk high-potential projects. Suitable modifications in GST may be effected to bring more investment in agriculture. The 'state of the art' food testing labs, accredited by NABL as a policy, could be established at all major seaports for testing of quality standards and to establish Indian brands in overseas market. The frequent changes in trade policy as export ban, import liberalisation, etc., inflicts lot of damage on farm sector through depressed domestic prices. These policies are not promptly changed in response to change in ground situation. A consistent policy regime at least for some specified period will establish India as a good buyer and seller of agri-commodities helping the domestic producers a long way.

Turning Small Into Big

The push and pull mechanism with enabling reforms for the grouping of small and marginal farmers into Farmers Producer Organizations (FPOs) is the game changer for those who own less land. The Budget 2019-20 provided push to set up more FPOs. Earlier, in 2014-15, a corpus of Rs. 200 crore was established in NABARD to create 2000 FPOs. NABARD established 2174 FPOs under the corpus. These FPOs are all in the nascent stage. Further scaling up of membership, equity mobilisations, capacity building and initial business of input supplies etc. should be supported with appropriate reforms. The modernisation of income tax laws allowing exemption to FPOs income, approving direct marketing by FPOs to buyers and single state-wide license for trading of the inputs are some reforms needed immediately. The current legal structure of FPOs does not provide for external equity infusion or commercial borrowing. This may be solved through a provision for collateral free loans to FPOs up to Rs. 25 lakh from the financial institutions. The rate of interest to FPOs may be rationalised to the rate of individual farmers for crop loans. The FPOs registered under Companies Act may also be made eligible for loans from the cooperative banks, etc.

The agriculture commodity-specific exemptions are provided to the cooperatives for sales tax. Treating FPOs registered as FPCs at par with the cooperatives for all sales tax exemptions and other state specific tax exemptions could help them immensely. FPOs may also be allotted breeder seed for multiplication into quality seeds as being made to NSC, State Seed Corporations and Farmers Cooperatives (IFFCO and KRIBHCO).

Conclusion

The prime function of the Government agencies is to create an ecosystem for the larger acceptance for the reforms. This requires three things—information, intelligence and interaction. Right information gathered through the intelligent systems should be placed before stakeholders to make an informed decision rather than based on anecdotes. A paradigm shift is required to look agriculture differently to that what we have been looking so far.

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Shri Prakash Javadekar Presents Report Card on 100 Days of Government

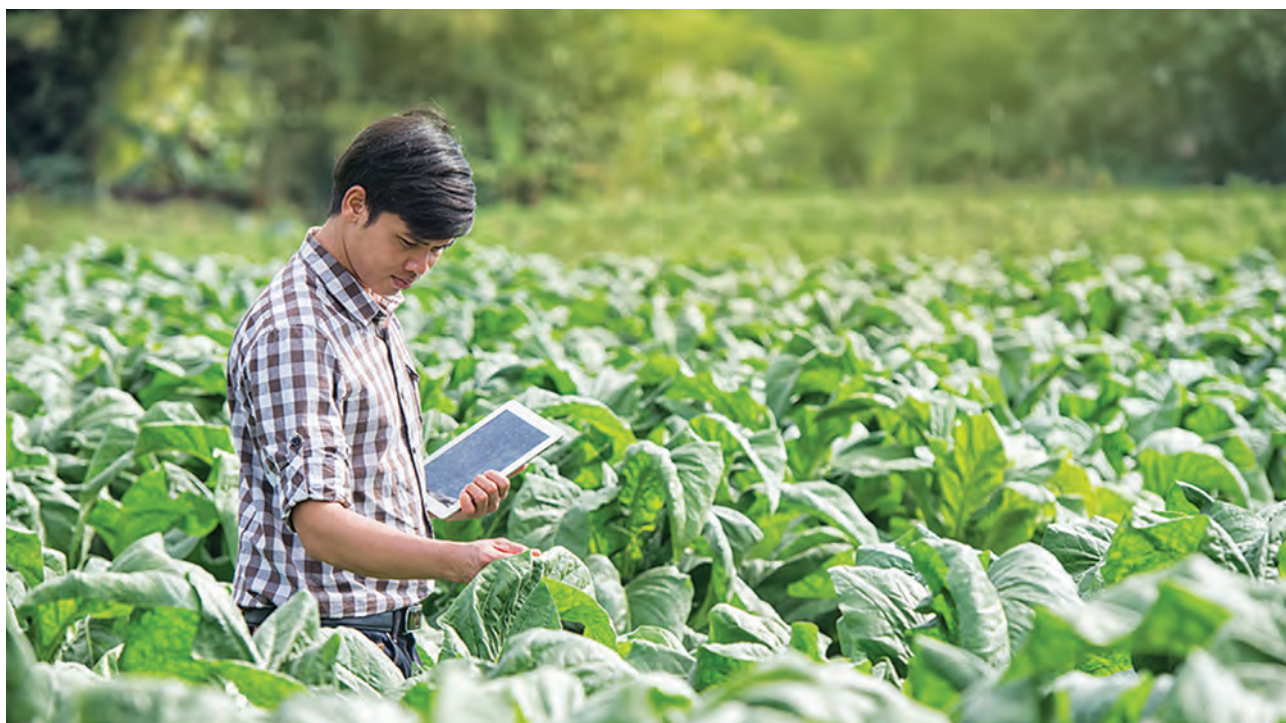
On September 8, 2019 the Union Minister for Environment, Forest & Climate Change and Information & Broadcasting, Shri Prakash Javadekar, addressed a Press Conference on key decisions taken by the Government in the first hundred days of its second term. The Minister released the booklet 'Jan Connect' and inaugurated an Exhibition on 'Furthering India's Development-100 Days of Bold Initiatives & Decisive Actions'.

Key highlights of the achievements mentioned in the booklet 'Jan Connect' are

- **Abrogation of Articles 370 and 35A** with a view to the betterment of life of common people of Jammu, Kashmir and Ladakh;
- **Steps towards achieving the vision of making India \$5 trillion economy;**
- **Historic merger of Public Sector Banks** and additional credit expansion through PSBs; Support to Non-banking Finance Companies and Housing Finance companies; linking repo rate - reducing EMI for housing loans, vehicles etc.; Infrastructure credit;
- **Ease of doing business** measures such as CSR violations; Transparency and Accountability in Tax administration; Relief from enhanced surcharge on long-term/shortterm capital gains; Customer ease; Special measures for MSMEs;
- **Boost to Start-ups-** Measures to simplify Taxation; Labour Laws; Environmental clearances; Corporate Affairs; Deepening of bond markets in India; Access of Indian companies to the Global Markets; Reduction in corporate tax; Review of FDI policy on various sectors approved; Companies Amendment Act 2019; Special Economic Zone (Amendment) Act, 2019;
- **Boost to Automobile Sector;**
- **Code on Wages, 2019;**
- **Ensuring Social Justice to all Sections of the Society** including legislation against Triple Talaq; Amendment of POCSO Act; The Transgender Persons (Protection of Rights) Bill 2019 etc.;
- Several measures for delivering **Tribal and Minorities Welfare;**
- Ensuring Wage Security **The Code on Wages 2019** ensuring women's equality; etc.;
- Measurements **Towards Doubling Farmers' income;**
- **Formation of Jal Shakti Ministry towards commanding Water Security;** Har Ghar Bijli Yojana; Ujjwala scheme for gas connections; Ayushman Bharat; Jan Bhagidari movements; Fit India and campaign against ending menace of single use plastic etc.;
- Steps taken towards ensuring **Good Governance;**
- **Focus on development of Higher Education Infrastructure;**
- Emphasis on Discovery and Scientific Endeavours;
- Focus on Security and Defence Sectors;
- India's expanding sphere of influence in the world; Neighbourhood First Policy;
- Empowering North East etc.



The Union Minister for Environment, Forest & Climate Change and Information & Broadcasting, Shri Prakash Javadekar releasing the booklet 'Jan Connect', at a Press Conference on completion of 100 Days of Government, in New Delhi on September 08, 2019. The Secretary, Ministry of Information & Broadcasting, Shri Amit Khare, the Principal Director General (M&C), Press Information Bureau, Shri Sitanshu R. Kar and other dignitaries are also seen.



INITIATIVES IN AGRICULTURE SECTOR

Abhishek Mukherjee

Agriculture is an important contributor to employment with nearly 50 per cent of the population employed in it. Agriculture sector supports the industry by providing raw materials and necessary inputs for its production. Government initiatives in agricultural sector provide the hand holding support for the agriculture sector to grow and progress. Agriculture sector has to achieve its objective of maximizing efficiency and also ensuring equity in a sustainable manner.

“If agriculture goes wrong, nothing else will have a chance to go right in our country”

-Dr. M. S. Swaminathan, Father of Indian Green Revolution

Since ancient times, agriculture has been the pioneering force in shaping up any economy. India has not been an exception. In fact, slowly and silently, agriculture has laid down the foundation stone of India’s growth trajectory.

For a developing economy like India, agriculture is immensely important. Even a small tweak in the agriculture sector, whether it is positive or negative, impacts the economy to a great extent. The primary challenge for agriculture sector is to provide food to 1.3 billion population in India. With National Food Security Mission already in place, the onus is on agriculture to provide food for all in a sustained manner.

Agriculture is also an important contributor to employment with nearly 50 per cent of the

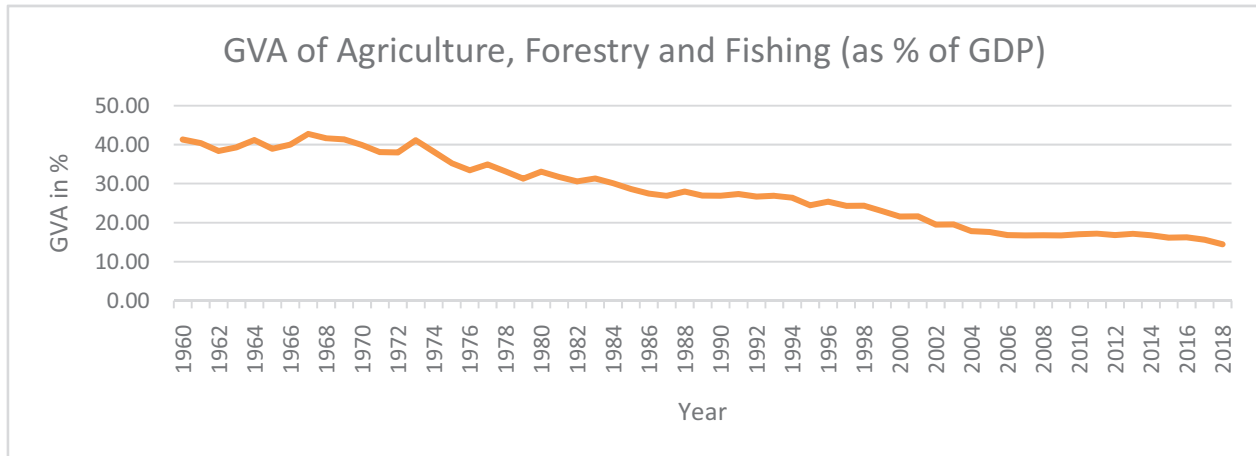
population employed in it. Agriculture sector supports the industry by providing raw materials and necessary inputs for its production. On the other hand, it consumes fertilizers, pesticides produced by the industries for its own production. So, there exists an interdependence between agriculture and industry which is essential for the socio-economic development of the country.

Keeping in view, the importance of agriculture in socio-economic fabric of India, the Government has given special emphasis and attention to this sector.

Agriculture Sector in India: Current Scenario

India’s economic growth in FY 2019 is estimated at 6.8 per cent percent. Agriculture

Figure-I: GVA of Agriculture, Forestry and Fishing as a percentage of GDP



(Source: World Bank)

accounts for nearly 18 per cent of GDP, and employs almost half of country's total workforce.

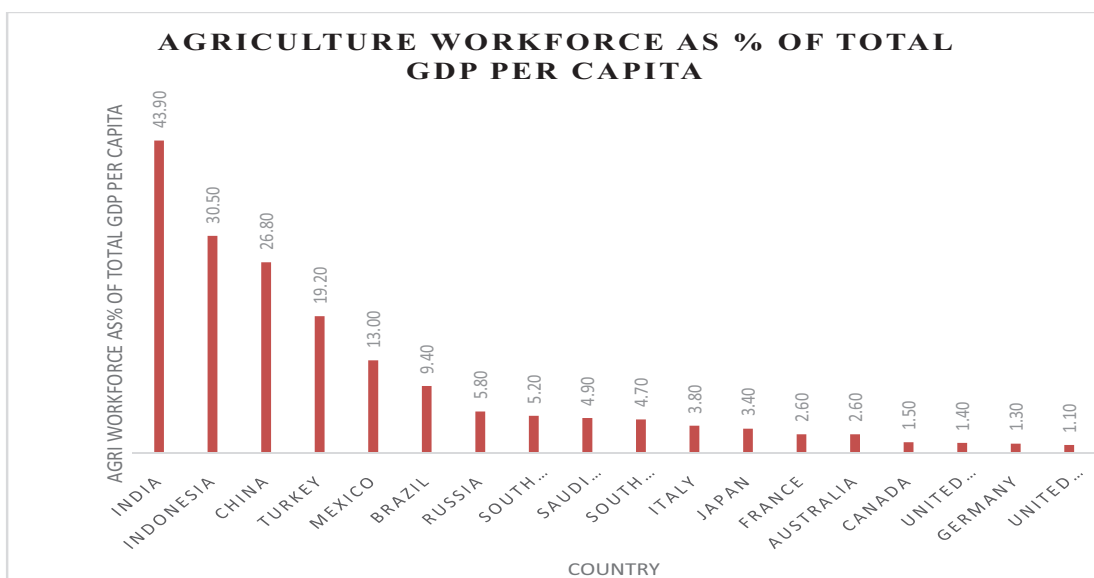
As is evident from the figure above, there has been a decline in contribution of agriculture sector in GDP along the years. Despite the fall in contribution in GDP, agriculture sector continues to be the major source for employment in the country.

The figure above clearly establishes the fact that highest proportion of workforce is employed in agriculture in India when compared with major economies of the world.

The growth of agriculture sector in India has always been volatile, especially in last decade.

Inconsistency in growth rate of agriculture has impacted farmer's income and credit worthiness adversely. Despite the volatility, in 2017-18, total food grain production in India was estimated at 275 million tonnes (MT). India is also the largest producer of pulses in the world accounting for 25 per cent of global production. India's annual milk production in 2017-18 was 165 MT, making India the largest producer of milk, jute and pulses. India is also the second-largest producer of rice, wheat, groundnuts, cotton and sugarcane. It is also the second-largest fruit and vegetable producer, accounting for 10.9 per cent and 8.6 per cent of the world fruit and vegetable production, respectively. Share of agriculture sector in total

Figure II: Agricultural Workforce as a percentage of GDP per capita



Source: World Bank

exports of the country is 11.76 per cent for the year 2018-19 as per DGCIS data. The exports of agricultural products provide enhanced marketing opportunities for the agricultural producers and also in turn increase their income.

Key Challenges Facing the Indian Agriculture Sector

Impediments such as decreasing size of agricultural land holdings, poor transport infrastructure, poor storage facilities, lack of use of modern technology, lack of proper irrigation facilities and inadequate access to irrigation which result in over dependence on monsoons, loss of soil fertility, inadequate access to agricultural credit and lack of marketing support hamper the agricultural productivity in India. Decreasing size of agricultural land holdings not only increases input cost but also irrigation becomes difficult in a small fragmentation of land. It becomes extremely difficult to store and subsequently transport agricultural produce from remote areas, owing to lack of cold storage and transportation facilities. This results in gross wastage of the produce. Since, the storage facility is inadequate farmers are compelled to sell off their produce immediately after harvest, at the prevailing market prices which are low, resulting in loss of remunerative income for the farmer.

Access to agricultural credit is directly dependent on land holding titles. Due to this reason, small and marginal farmers, who account for more than half of the total land holdings, and who do not hold formal land titles, are unable to access institutionalized credit and are left in the sphere of uncertainty. Farmers require credit to purchase seeds, fertilizers, tools and machineries for production so that they have a smooth agricultural season starting from sowing of seeds to its harvest. Lack of credit or inability to access credit makes it difficult for them to sustain.

To address the issues of farmers and improve agricultural productivity and socio economic status of agriculture, the Government has floated several initiatives and schemes.

Government Schemes for Enhancing The Socio-Economic Status of Agriculture

The Government in its efforts to bail out the agricultural sector from its existing challenges has

not only implemented several pro-farmer schemes but also has raised the budgetary allocation substantially to run these schemes successfully. Government of India has increased the allocation to agriculture sector by 78 per cent in the Budget for FY 20. The budgetary allocation stands at Rs. 1.39 lakh crores for agriculture, of which Rs.75,000 crore will be spent on Government of India's flagship scheme Pradhan Mantri Kisan Samman Nidhi (PM-KISAN). For Pradhan Mantri Fasal Bima Yojana (PMFBY), the Government has increased its allocation to Rs.14,000crore in the current fiscal compared to Rs. 12975.70 crore allocated during FY 19. For the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), the government has raised the budgetary allocation to Rs 3,500 crore for FY 20 from Rs 2,954.69 crore in FY 19.

NITI Aayog's seven year National Development Agenda and Three Year Action Agenda along with Union Budget has set the goals and objectives for the agriculture sector.

Some of the major schemes introduced by the Government to protect the farmers and at the same time encourage them for better crop productivity are discussed below.

Pradhan Mantri Kisan Samman Nidhi (PM-KISAN)

PM-KISAN is a Central Sector scheme launched on 01.12.2018 with full funding from Government of India. Under this scheme, an amount of Rs. 6000/- under three equal installments are provided to farmer families. The amount is being transferred to the beneficiaries directly in their bank accounts. However, farmers who do not own land are not eligible for applying through this scheme. The scheme was initially launched to augment the income of small and marginal farmers having cultivable land holding upto 2hectares. However, in its second phase, the scheme has been expanded, by bringing all land holding farmer families under its purview. This scheme has been extremely beneficial for small farmers. The amount given to the farmers serves as a source of investment for the farmers and also as a buffer from any unforeseen incident.

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)

Earlier programmes such as Accelerated Irrigation Benefits Scheme, Har Khet ko Paani,



Per Drop More Crop and Watershed Development have been brought under one umbrella scheme, which is Pradhan Mantri Krishi Sinchayee Yojana. This scheme has an outlay of Rs.50,000crore and is to be implemented across the country in a five year span from 2015-16 to 2019-20. The scheme has been formulated to remove bottlenecks and increase access to irrigation facilities. The major objectives of PMKSY are to increase cultivable area under irrigation, improve on-farm water use efficiency by reducing wastage of water, enhance and encourage the use of precision irrigation and promote various water conservation practices to conserve water.

So far, as per the data available with Ministry of Agriculture and Farmer's Welfare, under PMKSY–Per Drop More Crop component, an amount of Rs.2240.35 crore has been released to States. An area of 6.48 Lakh hectares has already been covered under micro irrigation under this scheme. Till December 2018, 12,473 numbers of water harvesting structures have been constructed.

Pradhan Mantri Fasal Bima Yojana (PMFBY)

PMFBY is another scheme which has helped the farmers immensely. This particular scheme offers crop insurance at a very negligible cost to the farmers. The farmers are fully secured against any crop loss on account of natural calamities. The scheme was launched in 2016 with the aim to protect farmers from any financial loss due to natural calamities. In this scheme, farmers have to pay an annual premium of 2 per cent for Kharif crop, 1.5 per cent for Rabi and oilseed crops and 5 per cent

for commercial/horticulture crops. The rest of the premium amount is being borne equally by Central and respective State/UT Governments. The scheme also has a very robust claim settlement procedure. Owing to the nature of Indian agriculture, which is predominantly monsoon dependent, this scheme has been very well received by the agricultural community.

Interest Subvention Scheme of Ministry of Agriculture

Access to agriculture credit has always been a challenge for farmers, especially, small and marginal ones. To address this challenge, the Government has introduced an interest subvention scheme for short term crop loans up to Rs.3 Lakhs at a reduced interest rate of 7 per cent p.a. This scheme provides interest subvention of 2 per cent per annum to Banks on use of their own resources. Additional 3 per cent incentive is also given to the farmers for prompt repayment of the loan, resulting in reduction of the effective rate of interest to 4 per cent. Under this scheme, the interest subvention (2 per cent) on crop loan continues to be available to banks for the first year on the restructured amount, to provide temporary relief to the farmers.

Kisan Credit Card

To encourage digital payments and also to provide adequate credit facility for purchasing necessary inputs for agricultural and other requirements, Kisan Credit Card scheme was launched. This Scheme has been further simplified and converted into ATM enabled RuPay debit card.

Soil Health Card

Fertility of soil is essential for high yield and productivity. To ensure crop fertility, soil health card has been introduced which would evaluate the fertility of soil across the country with respect to several parameters. The farmers are fully aware of the conditions of the soil they are working on from the soil health card and hence to get the best yields out of it, they can use fertilizers at the recommended dose. This scheme has dual benefit. One, yields are higher due to efficient use of ingredients and secondly, the use of fertilizer can also be restricted through this process.

e-National Agriculture Market (e-NAM)

Marketing of agricultural produce has always been one of the biggest challenges owing to its perishable nature. To facilitate better marketing opportunities and expose the farmers to greater number of markets, e-NAM has been launched in 2016. As per information available in Ministry of Agriculture, 585 regulated wholesale markets (APMCs) have been integrated to the e-NAM platform by 31st March, 2018 and another 415 markets are expected to be integrated by 31st March, 2020. This platform provides wider market access to the farmers and also ensures better price for the produce.

National Mission for Sustainable Agriculture

National Mission for Sustainable Agriculture (NMSA) was launched in 2014-15 with the primary objective of holistic improvement of agriculture by making it more productive, sustainable, remunerative and climate resilient through the process of implementation of location specific integrated / composite farming systems; soil and moisture conservation measures; comprehensive soil health management; efficient water management practices and mainstreaming rainfed technologies.

Rainfed Area Development Programme is an important component under National Mission for Sustainable Agriculture and focuses on Integrated Farming System for enhancing productivity and minimizing risks associated with climatic variability by integrating crops with activities like horticulture, livestock, fishery, vermi-organic composting etc. This is particularly beneficial from socio-economic point of view, as it allows farmers to maximize their returns for sustained livelihood and also reduce the

impacts associated with natural calamities such as drought, flood etc.

Apart from the above mentioned initiatives for the holistic development of farmers and agriculture, the Government has significantly set a target of doubling farmer's income in real terms by 2022. To achieve this target, Government has already increased the Minimum Support Prices of Kharif crops for 2018-19 agricultural season. The focus is income-centred. As incomes of farmers will increase, it will ensure not only better standard of living and upliftment of their socio-economic conditions but also contribute in a positive way at the macro-level.

Government initiatives in agricultural sector provide the hand holding support for the agriculture sector to grow and progress. Agriculture sector has to achieve its objective of maximizing efficiency and also ensuring equity in a sustainable manner. It also has to grow in tandem with other sectors, and then only, the dream of becoming a 5 trillion dollar economy by 2024-25 will be fulfilled.

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BEST FARMING TECHNIQUES IN INDIAN SCENARIO

Dr. Y S Shivay and Dr. Teekam Singh

India has made impressive strides on the agricultural front during the last four decades. Much of the credit for this success should go to the several million small and marginal farming families that form the backbone of Indian agriculture and economy. Policy support, production strategies, public investment in infrastructure, research and extension for crop, livestock and fisheries have significantly helped to increase food production and its availability.

India has made impressive strides on the agricultural front during the last four decades. Much of the credit for this success should go to the several million small and marginal farming families that form the backbone of Indian agriculture and economy. Policy support, production strategies, public investment in infrastructure, research and extension for crop, livestock and fisheries have significantly helped to increase food production and its availability. During the last 40 years, India's foodgrain production has increased more than twice from 123.2 million tonnes in the ending of Fifth Five Year plan of 1979 to 284.8 million tonnes in 2017–18. Virtually all of the increase in the production resulted from yield gains rather than expansion of cultivated area. Availability of foodgrains per person increased from 455 g per capita per day to over 518 g per capita per day, even as the country's population swelled from 683 million to nearly 1300 million.

Nevertheless, future increases in the production of cereals and non-cereal agricultural commodities will have to be essentially achieved through increase in productivity, as the possibilities of expansion of area and livestock population are minimal. Indian agriculture needs immediate attention to bring economic advantages to millions of farm families through enhancing agricultural productivity as it remains low for many crops when compared to other countries. Best management practices are essential to increase agricultural productivity and livelihood of farmers, especially marginal and small farmers who make the major chunk of our country. There are many such practices which are able to sustain production and productivity without deteriorating soil health and environment.

Conservation Agriculture (CA)

Conservation Agriculture (CA) has been viewed



as an important strategy against food security challenges posed by climate change, deterioration and depletion of soil health, reducing or stagnating crop yields, land degradation and environmental pollution. Currently, CA has spread to about 8 per cent of world's crop lands and has also gained some ground in India over last one and half decades. The rice-wheat dominated region is also surrounded by rice/sugarcane-wheat growing regions, western Uttar Pradesh and Haryana, where a huge amount of rice and wheat crop residues are generated but due to a low population of dairy/ draught animals their disposal is a problem; thus farmers burn the crop residues in-situ to clear the fields and make them ready for the next crop, which cause a very serious atmospheric pollution problem, particularly during November-December months when rice crop residue is burnt in large quantities. Heat and moisture stress are other serious issues of crop production. Thus, conservation agriculture has a good scope in this geographically important region. Any sound research efforts made here can be easily shown/ demonstrated or disseminated to a large number of targeted groups or clientele.

Conservation Agriculture is defined as a sustainable agriculture production system comprising a set of farming practices adapted to the requirements of crops and local conditions of each region, whose farming and soil management techniques protect the soil from erosion and degradation, improve its quality and biodiversity, and contribute to the preservation of the natural resources, water and air, while optimizing yields. This novel resource conservation practice encompasses no or minimum soil disturbance, providing a vegetative soil cover through crop residues or other cover crops, and crop rotations for achieving higher productivity and reducing adverse environmental impacts. The CA shouldered by three major pillaring principles, viz., i) minimum soil disturbance; ii) maintenance of permanent soil covers and iii) cropping system diversity, crop rotations, which must be fulfilled to CA objectives. Regarding minimum soil disturbance, there can be no-tillage (NT) or reduced tillage (RT) restrictive to primary tillage only. These three related core principles must be concurrently applied to create synergies. All three principles show lot of promises in alleviating problems like sustaining soil health,

conserving natural resources, fulfilling basic needs for cereals, pulses, oilseeds and vegetables, regulating farm income, securing food and nutritional security, reducing the use of external inputs, ensuring environmental safety and creating employment opportunity. Government of India has made provision of Rs. 1140 crore in the Budget 2019-20 for eco-friendly management of crop residues especially rice and wheat residue in Northern plains. Similarly, many states are also committed to demote residue burning and promoting CA based practices through providing subsidies on suitable machineries like 'Happy Seeder'. It has now been seen that residue burning has reduced drastically in Indo-Gangetic Plains. CA based crop management practices not only enhance crop productivity but also reduce cost of production and maintain soil health.

Integrated farming systems (IFS)

One of the best approaches for implementing best management practices in agriculture is by building farm resilience through spreading risks and creating buffers, i.e. not putting 'all fruits in one basket'. The Integrated Farming Systems approach is considered as important and relevant, especially for the small and marginal farmers as location-specific IFS will be more resilient and adaptive to climate variability. Integration of livestock rearing with crop production gives higher economic returns as compared to crop production alone for both marginal and small farmers. On-station and on-farm research in different regions of the country has resulted in identification of many sustainable and profitable IFS models for rainfed areas. In general, in regions with rainfall of 500 to 700 mm, the farming systems should be based on livestock with promotion of low-water requiring grasses, trees and bushes to meet fodder, fuel and timber requirements of the farmers. In 700 to 1,100 mm rainfall regions, crops, horticulture and livestock-based farming systems can be adopted depending on the soil type and the marketability factors. Runoff harvesting is a major component in this region in the watershed-based farming system. In areas where the rainfall is more than 1,100 mm, IFS module integrating paddy with fisheries is ideal. Under irrigated areas the following IFS models are most suitable to maintain soil fertility and productivity.

- Intensification and diversification of crop component of farming system
- Diversification of other components of farming system for higher income

IFS proves its tremendous potential for developing farms to their optimum levels by integrating different enterprises in a farming system mode to make agriculture a profitable venture for farmers under different agro-climatic and ecological situations.

Precise Nutrient Management and Soil Health Cards

Soil Health Card (SHC) scheme was launched on 19th February 2015 and till 2018 nationwide a large number of SHCs were issued and accordingly nutrient management was done which resulted in record foodgrain production in even drought like conditions. Site-Specific Nutrient Management relies on principles of '5Rs', the right time, the right amount, the right place, the right source, and the right manner. The Site-Specific Nutrient Management (SSNM) approach emphasizes 'feeding' crop with nutrients as and when needed. SSNM strives to enable farmers to dynamically adjust fertilizer use to optimally fill the deficit between the nutrient needs of a high-yielding crop and the nutrient supply from naturally occurring indigenous sources such as soil, organic amendments, crop residues, manures, and irrigation water. The following nutrient management strategies are the most efficient methods to enhance nutrient use efficiency in the field crops.

- 1) Use of neem coated prilled urea and zinc sulphate-coated urea is beneficial in increasing grain yield, yield attributes, agronomic efficiency and apparent nitrogen recovery of field crops.
- 2) Production of hundred per cent neem coated urea for improvement in soil health and reduction in the attack of pests and diseases. This leads to decrease in the use of plant protection chemicals, overall increase in crop yield and the reduction in use of urea for non-agricultural purposes.
- 3) Use of biofertilisers like the application Phosphate Solubilising Bacteria (PSB) and Vesicular Arbuscular Mycorrhizae (VAM) along with rock phosphate provide higher productivity of field crops. These bio-fertilisers enhance root length, root volume and root dry weight

which results in robust plant growth and higher yield.

- 4) Application of NPK fertilisers is adjusted to the location and time as per the needs of the crop based on Soil Health Card.
- 5) Leaf Colour Chart (LCC), Chlorophyll meters and Green Seeker based nitrogen management which ensures that nitrogen is applied at the right time and in right amount as needed by the crop, which reduces wastage of N-fertilizer.
- 6) Integration with other Integrated Crop Management (ICM) practices such as the use of quality seeds, optimum plant population and efficient water management.
- 7) Fertigation is the most efficient method of fertiliser application, as it ensures uniform application of the water and fertilisers directly to the plant roots as per the crop demand. Since both water and nutrients reach directly to the rooting zone, it has tremendous effect on resource saving.
- 8) Use of software-based skills like – Nutrient Experts, Crop Manager, Geographical Information System (GIS) and Global Positioning System (GPS) in monitoring and application of nutrients.

Efficient Water Management

With the mission of 'per drop more crop', the Government of India has allocated more funds under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) so that more area can be covered under irrigation by encouraging drip and sprinkler irrigation and development of small water sources like farm ponds. In arid and semi-arid regions, where precipitation is low or infrequent during the dry season, it is necessary to store the maximum amount of rainwater during the wet season for use at a later time, especially for agricultural water supply. Uses of collected water include provision of drinking water, water for livestock and irrigation, diversion of run-off water for infiltration in water-scarce cropping areas, and refill of aquifers (groundwater recharge). For this, both in-situ and ex-situ rain water management play crucial roles for increasing and sustaining the crop productivity. In the union budget of 2018, under the 'Har Khet ko Pani' a component of PMKSY scheme, the ground water irrigation scheme was implemented in 96 districts, where less than 30 per cent land is

currently getting an assured irrigation facility. The pressurised micro irrigation systems not only save water in food grain production but also contribute to higher productivity, cost effectiveness, higher water productivity and energy use efficiency compared to conventional irrigation methods.

Organic Farming

Organic farming in India has been reinvented and getting more popular with each passing day. Farmers, entrepreneurs, researchers, administrators, policy makers and of course consumers are showing increasingly greater interest in promotion and development of organic farming in the country. Organic food products are considered to be much safer and nutritious than the products produced by the conventional farming. Organic farming also helps to restore soil health, protect environment, enhance biodiversity, sustain crop productivity and enhance farmers' income. Seeing the long-term benefits of organic farming, the Government of India has taken many important steps for its promotion in the country. With the support of all kinds of stakeholders and the Government, the scope of organic farming movement has widened tremendously in India. The main objectives of organic farming or *paramparagat kheti* are the following:

- 1) To promote the use of natural resources based on integrated, sustainable and climate-friendly farming practices.
- 2) Reducing the dependence of farmers on external inputs, promotion of soil fertility, natural resource protection and nutrient recycling.
- 3) Reducing the cost of agricultural production of farmers so that per unit income can be increased.
- 4) Protecting the environment from hazardous inorganic chemicals by adopting conventional techniques and farm-friendly technologies, which are cost effective.

Crop Diversification

Crop diversification proved to be of paramount importance in mitigating the environmental problems arising on account of monoculture. Inclusion of certain crops in sequential and intercropping systems has been found to reduce

some obnoxious weeds to considerable extent, thereby reducing the need of herbicides to a great extent in areas where such weeds have assumed alarming problem. Inclusion of legumes in cropping systems has been found to be effective in reducing the nitrate leaching in lower profiles. Legume intercropping in cereals grown with wider row spacing has been found beneficial. There is need to diversify crop cultivation with pulses, oilseeds, fibre crops along with high value crops like fruits, vegetables, flowers, medicinal and aromatic plants, spices, etc as per agro-climatic conditions and resourcefulness of the farmers for efficient management of natural resources and higher productivity and profitability. The adoption of suitable agro-forestry options would certainly enhance the productivity of the farm along with soil health and farm income.

Resource Conservation Technologies (RCTs)

RCTs refer to those practices that conserve resources and ensure their optimal utilisation and enhance input use efficiency. These techniques include zero or minimum tillage (save fuel), permanent or semi-permanent residue cover, new varieties that use nitrogen more efficiently, laser land levelling that save irrigation water, system of Rice Intensification (SRI), Direct Seeded Rice (DSR), use of Leaf Colour Chart (LCC) for precision application of nitrogen and brown manuring helpful in suppressing weeds and increasing the yield. RCTs are more effective in combinations rather than their individual application.

Integrated Crop Management (ICM)

ICM suggests the use of Good Agricultural Practices (GAP) such as Integrated Nutrient Management (INM), Integrated Weed Management (IWM), Integrated Disease Management (IDM) and Integrated Pest Management (IPM), etc., for raising a good crop. Thus, ICM is an alternative system of crop production, which conserves and enhances natural resources while producing quality food on an economically viable and sustainable foundation. It also covers integrated tillage and water management approaches in a holistic manner. It combines the best of traditional methods with appropriate modern technology for balancing the economic production of crops with positive environmental management. ICM is particularly beneficial for small and marginal farmers because it

aims to minimise dependence on purchased inputs while utilizing on-farm resources.

Small-Farm Mechanisation

Timeliness of operations has a significant role for increased germination and required plant population, good crop stand and sustained productivity of crops. Large areas remain fallow or planted late due to poor access to farm machinery which results in low crop productivity. Therefore, improved access to the farm machinery for sowing, harvesting and other operations is an important adaptation strategy to deal with climatic variability such as late onset of monsoon, mid-season and terminal droughts and contributes to timely sowing of post-rainy crops. Many efficient low-cost farm implements were designed for various operations. These reduced 20–59 per cent operation cost, saved 45–64 per cent in operation time, saved 31–38 per cent seeds and fertilizers and increased productivity of dryland crops by 18–53 per cent. In the recent past, custom-hiring of agricultural machinery became an appropriate institutional arrangement which promotes mechanization of agricultural operations on small farms. For the first time, a systematic attempt has been made under the National Innovations on Climate Resilient Agriculture (NICRA) to setup one custom-hiring centre each at the 130 climatically vulnerable villages across the country.

Climate Smart Cropping

In the changing climate scenario, developing cultivars resistant to climate change may become important adaptive mechanism for maximising resource-use efficiency. For example, crop varieties those are resistant to lodging (e.g., short rice cultivars), may withstand strong winds during the sensitive stage of crop growth, are viable alternative. Similarly, change of planting dates to minimise the effect of temperature increase and reducing spikelet sterility can be used to enhance yield stability by avoiding the flowering period to coincide with the hottest period. Such adaptive measures like change in crop calendar to reduce the negative effects of increased climatic variability in arid and semi-arid tropics prove advantageous in avoiding extreme weather events (e.g. typhoons and storms) during the growing season.

Protected Cultivation

Protected cultivation or greenhouse cultivation is the most contemporary approach to produce, mainly, horticultural crops qualitatively and quantitatively and has spread extensively over the world in the last few decades. It is also known as Controlled Environment Agriculture (CEA) and is highly productive, encourages water and land conservation as well as protects the environment. The technology involves cultivation of horticultural crops in a controlled environment wherein factors like the temperature, humidity, light, soil, water, fertilisers etc. are manipulated to attain the maximum produce as well as allow a regular supply of them even during off-season. By adopting protected cultivation technology, the growers can look forward to a better and additional remuneration for quality produce.

The main purpose of protected cultivation is to create a favourable environment for the sustained growth of crop, so as to realise its maximum potential even in adverse climatic conditions. Protected cultivation technology offers several advantages to produce vegetables, flowers, hybrid seeds of high quality with minimum risks that arise due to uncertainty of weather while at the same time ensuring efficient use of resources. This becomes relevant to farmers having small land holdings who would be benefitted by a technology, which helps them to produce more crops each year from their land, particularly during off-season when the prices are higher. This kind of crop production system could be adopted as a profitable agro-enterprise, especially in peri-urban areas. At present, there is a large gap between the demand and production of these crops to meet both quantitative and qualitative needs of domestic and export markets which are difficult to be bridged with the traditional cultivation practices. Thus, protected high-value horticultural crops have great potential to enhance income especially of small farmers in India if appropriate technological interventions are made.

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EMPOWERING WOMEN FARMERS

Vishnu Sharma

Women's role in agriculture has been verily vital in the production, processing and distribution sector. Domestically, women play an important role in the management and rearing of livestock and other activities like fodder collection, post-harvest activities and farm cleaning activities.



As an agrarian economy, India derives 18 per cent of its GDP from the agriculture sector. Almost 50 per cent of the national workforce is directly or indirectly employed in this sector. It is a sector which is indispensable to not only the economy of the nation as it plays a major role in the employment generation and revenue from foreign exchange but it also ensures food security to India's large population. The production of food grain during the crop year 2017-18 alone was estimated to be at a whopping 284.83 million tonnes. Ushering in of the Green Revolution in 1960s and its subsequent spread brought with itself an array of developmental transformations in the agriculture sector. From providing the High Yielding Variety of crops to improved and more streamlined irrigation facilities along with mechanised farming, Green Revolution enhanced agricultural productivity and made way for India to become self-reliant in terms of food production. The infrastructural developments in the rural regions as well as financial services provided in form of price support gave a fillip to agricultural productivity as a result of which India in the present

time is not only self-sufficient in food production but also occupies the seventh position as the net exporter of agri-products worldwide.

Women's role in agriculture has been verily vital in the production, processing and distribution sector. Domestically, women play an important role in the management and rearing of livestock and other activities like fodder collection, post-harvest activities and farm cleaning activities. According to the 2011 Census, the total number of female workers engaged in agricultural activities in India stood at 65 per cent, with 30.3 per cent of the total cultivators and 42.6 per cent of total agricultural labourers being women. Furthermore, the Agriculture Census conducted every five years by the Department of Agriculture, Cooperation and Farmers Welfare (DAC&FW), Ministry of Agriculture and Farmers Welfare, established that the 12.78 per cent of the female operational holdings in agriculture during the year 2010-11 have increased to 13.78 per cent during 2015-16. This shows that women participation in the organised agricultural sector is increasing and

therefore, support and thrust on the part of the government becomes quite necessary to empower them and provide them with further opportunities to encourage their larger involvement. The DAC&FW dedicatedly implements farmer welfare programmes and schemes. The Women Component Plan requires the state governments to allocate 30 per cent of the funds for welfare initiatives catering to the women farmers. In the rural areas, education and awareness is the fundamental concern that has to be primarily addressed in order to ensure successful implementation of any government policy or scheme. In this respect, it becomes extremely important to enlighten women about the various opportunities that lie ahead of them and to educate them about the technical as well as the financial aspect of farming and other agricultural activities so that they are empowered in a holistic manner.

The glaring dependency of women on the primary sector impels for a need for creating and implementing schemes, programmes etc. for their welfare and development. There have been myriad efforts to bolster women's role in agricultural activities. For instance, the foregrounding, recognizing and mainstreaming of women's role in agriculture as encapsulated within 'The National Policy on Farmers', 2007. It underlined the importance of incorporating 'gender issues' within the agricultural development agenda. The DAC&FW lays emphasis on the 'mainstreaming of gender concerns in agriculture' vis-à-vis the adjoining of 'pro-women initiatives' in various schemes or programmes/missions by allotting at least 30 per cent of benefits and resources for women under all such developmental initiatives.

With a view of creating a women sensitisation module encompassing 'pro woman initiatives' consisting of a compendium of special provisions and a set of assistance that women agriculturists can claim under various on-going missions and schemes, the National Gender Resource Centre in Agriculture (NGRCA) was setup in the DAC&FW in 2005–06. The "Women Farmer Friendly Handbook" enumerates the special provisions that empower women in multifarious ways, some of them include –

1. **Support for Women Food Security Groups (FSGs)** Women farmer groups are recognised under ATMA Cafeteria as a compulsory activity at Rs. 0.10 lakh per group/year for attaining food security at the domestic or the household level, by setting up of kitchen garden, promoting off-farm activities with cattle (activities that otherwise evade the GDP computation).

2. **Procurement of Agricultural Machinery & Equipments (Subsidy Pattern)** Women farmers can avail benefits in tandem with, or over and above the benefits offered to men. For purchasing an essential agricultural equipment, say, tractor (up to 20 PTO HP), women get additional benefits, subsidies and cost reduction, for instance, 35 per cent of the subsidy to the total cost, as compared with 25 per cent of cost for men.
3. **Representation of Women Farmers** It is imperative for women farmers to be included in the decision making bodies – the State, District, Block Farmer Advisory Committees, ATMA governing committees etc.
4. **Promoting Women Groups** Women's groups, Cooperatives, Self Help Groups (SHGs) to be incorporated by the States for the distribution of Certified Seeds (under the aegis of the National Mission on Oilseeds & Oil Palm (NMOOP)).
5. **Integrated Scheme for Agricultural Marketing (ISAM)** Women are endowed with subsidies for storage infrastructure that includes a 33.33 per cent subsidy (on capital cost) for women as compared to 25 per cent for men.
6. **Agricultural Insurance** Safeguarding coverage of women farmers along with a budget allocation and utilization in accordance with the population proportion.

Being mindful of the crucial role that women play in agriculture industry, the Agriculture and Farmers Welfare Ministry established Indian Council of Agricultural Research, ICAR, a Central Institute for Women in Agriculture in Bhubaneswar, Odisha in the year 1996. The Institute has been undertaking numerous studies on gender implications in the agricultural sector and developing women-centred technology. The condition of women in the unorganised farming sector is also being improved through various research projects of this Institute that mainly cater to the provision of improved



agricultural tools to women so as to reduce the toil they have to put into farm operational activities. It is also working to mobilise the Self-Help Groups with a view to increase the income generation of female participants in agriculture and animal husbandry. Technology has become a crucial part of policy making when it comes to information dissemination and creation of a far-reaching knowledge base. The Institute develops softwares and interfaces to facilitate mass media communication and carries out outreach programmes for educating and empowering rural women. A gender knowledge portal, displaying all the relevant data and information related to women farmers has also been created. With the aim to fortify agricultural research and enhance agricultural productivity to bolster farm income, ICAR has initiated the All India Co-ordinated Research Project (AICRP). Its Krishi Vigyan Kendras (KVKs) have successfully trained about 3.1 lakh women agriculturists and besides this, one female scientist in every Kendra has been made mandatory in 668 KVKs across the country. As per the current status, 8.62 lakh women have been benefitted in total in 2017-18. To give an impetus to the research endeavours in the agricultural sector and attend to the gender-based participation in the research and development activities, women agriculturists are provided with ample opportunities to take active part in various programmes conducted by the KVKs like agricultural demo and frontline demonstration. There is also a provision under the National Food Security Mission (NFSM) that provides training based on cropping system to farmers including the SC, ST and women farmers to generate awareness on augmented technology for increasing crop production and yield.

To ensure that women in the agricultural sphere are kept abreast with the latest technological and farm developments, the central government is making special provisions for women under various schemes and policies such as Pradhan Mantri Kaushal Vikas Yojana self-employment schemes, organic farming, etc. Acknowledging the prevailing gender disparity in terms of work hours and wages, the Agricultural Ministry has come up with several measures to the improve the status of women in the mainstream agricultural sector like focusing on women Self-Help Groups (SHGs) in order to connect women to micro-credit via capacity-building activities, ensuring adequate representation of women in decision and policy making bodies, etc. In addition to this, 15th October of every year was marked as the Women Farmer's Day by the Ministry of Agriculture and Farmers Welfare in the year 2016.

Women play an influential role in the framing and sustenance of the familial as well as societal structure. More often than not, their contributions go unnoticed and potential remains unharnessed in the mainstream sectors of the economy. Empowerment for women in an all-round manner can only come about when women are educated about their health, social well-being, financial standing and political partaking. As far as the agricultural sector is concerned, women's role has been well acknowledged. According to the Economic Survey of 2017-18, "with growing rural to urban migration by men, there is 'feminisation' of agriculture sector, with increasing number of women in multiple roles as cultivators, entrepreneurs, and labourers." Even globally women are playing an important role in matters of food security and preserving agro-diversity. The survey rightly suggests for adopting "gender specific interventions" in agriculture to "increase productivity" and enhancing "agricultural value chain". Accordingly, all the necessary measures to provide technical, social as well as financial assistance have been effectively introduced by the government. Great emphasis is being laid on making women self-sufficient and their skill-development by means of various training and demonstration programmes organised consistently from time to time. Women in the agricultural sector have come a long way and an increased participation with whole-hearted practical implementation of the training skills received is the way forward for them. Numerous initiatives and welfare schemes are in the pipeline at the government's end which would further prop up the participation and growth of women workforce in the agricultural sector.

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In Kurukshetra August 2019 issue, an article titled Union Budget 2019-20: Towards a Healthy India published on page no. 42 was jointly written by Shri. Alok Kumar and Ms. Urvashi Prasad. The co-writer name was not published by mistake. We regret the same.

SWACHH BHARAT MISSION

PRESIDENT OF INDIA GRACES SWACHH MAHOTSAV 2019

The President Shri Ram Nath Kovind, graced and addressed the Swachh Mahotsav 2019, a function held at Vigyan Bhavan in New Delhi on 6th September, organised by the Union Ministry of Jal Shakti. On the occasion, the President presented the Swachh Bharat Awards in various categories. He also received the Swachh Bharat Mission's Book on Behavior Change Communication from Shri Gajendra Singh Shekhawat, Union Minister of Jal Shakti, who formally released it.

Addressing the gathering, the President said that the biggest feature of 'Swachh Bharat Mission' is that it has become a campaign of every Indian, not just a government campaign. Everyone has taken up the task of cleanliness as his/her own responsibility. He noted that Sustainable Development Goals set by the United Nations are to be achieved by 2030. But, India is set to achieve cleanliness targets 11 years ahead, that is in 2019 itself. He said that it is a matter of pride for us and every citizen of the country deserves appreciation for this achievement.

The President said that a new awareness has emerged in our society through Swachhta Abhiyan. He emphasized that goals of the next phase should be achieved while strengthening the success of the first phase. We have to pay attention towards the maintenance of the facilities set up during the first phase. He said that for this, we have to imbibe the culture of cleanliness more deeply.

The President said that we have to move forward, adopting the broader meaning of cleanliness. For example, providing clean drinking water also comes under the purview of sanitation. Cleanliness is also an essential condition for the success of 'Jal Jeevan Mission' launched by the Government of India this year.



The President, Shri Ram Nath Kovind, the Union Minister for Jal Shakti, Shri Gajendra Singh Shekhawat at the release of the Swachh Bharat Mission's Book on Behaviour Change Communication, during the "Swachhata Mahotsava 2019", organised by the Ministry of Jal Shakti, in New Delhi on September 06, 2019. The Minister of State for Jal Shakti and Social Justice & Empowerment, Shri Rattan Lal Kataria and the Secretary, Department of Drinking Water and Sanitation, Ministry of Jal Shakti, Shri Parameswaran Iyer are also seen.

(Source:PIB)

CHANGE IN PUBLIC SERVICES FOR POORER SECTION

Narendra Singh Tomar

Due to schemes like MGNREGA, transfer of money into the accounts of poor people, creation of sustainable assets and livelihood have been encouraged. It is necessary to make employment available for wage-labourers on demand.

The responsibility of making public service system easier to access, smooth and reliable is often left on the plea that private sector will itself do all that because the deliverance of quality services by the public system is not only difficult, but almost impossible too. In a vast country like India, the deliverance of necessary public services to the most deprived families, based on equality and justice depends on (i) evidence-based selection of beneficiaries, (ii) policy measures based on deep research (which would have the provision for timely necessary reforms), (iii) reducing human intervention by the availability and maximum utilization of information technology resources, and (iv) apart from others, evolving an effective coordination among various agencies working under the federal structure. Keeping in view the infrastructural deficiencies, vast geographical areas and very few habitation in the interiors and far flung areas nearly inaccessible, this becomes a matter of great urgency. In fact, it is impossible for the non-governmental agencies to even conceptualise, plan and deliver such a vast level of desired services. However, there have been some remarkable achievements in the private sector at state/local levels. Yet, in the broader framework of “Sabka Saath Sabka Vikas”, fulfilment of ambitious national aims like ‘housing for all’, ‘health for all’, ‘education for all’, ‘employment for all’ and to fulfil the dream of ‘New India’, it is essential to have adequate arrangement for public services, so that intended and required changes may be made, from time to time, on all India basis with respect to planning, financing, implementation and monitoring of the programmes. For this, the following measures are necessary and significant:

1. To determine the condition of scarcity among such families, a pan-Indian flawless survey should be conducted and implemented. Subsequently, a review of the survey should be done by the local government;
2. The blueprints of programmes should be prepared on the basis of past experiences and



- the best national and international practices so as to ensure programmes as per requirement;
3. To ensure adequate financial resources for the well prepared programmes; and
4. Coordinating among different levels of administration taking lessons from the past experiences and effecting reformative measures with promptness during the implementation.

In order to achieve the ultimate aim of poverty eradication, the above mentioned measures are inevitable so as to ensure services for a large Indian population living in scarcity. It is proved from the recent successful experiences that we cannot neglect them at any cost.

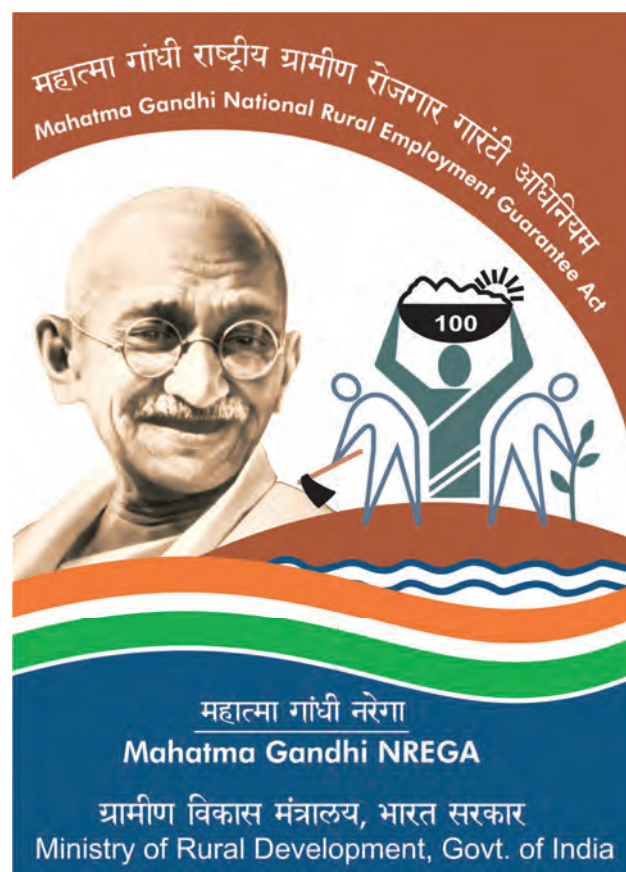
During the last few years, programmes like Gram Swaraj Abhiyan conducted in the Rural Development Sector have been completely transparent. In fact, these programmes are excellent examples for preparing a reliable public service system in order to achieve the intended results while being fully responsible and accountable to the target community.

It should be noted that our journey started with the finalization of Socio-Economic & Caste based Census (SECC) 2011 data analysis in July, 2015. It was necessary to authentically identify the families living in scarcity for connecting them with public welfare schemes being run for the

poorer sections. The BPL list prepared in 2002 containing those living below the poverty line had then become a privilege of the Gram Pradhan and it often excluded those who were genuinely poor. It is easier to identify the parameters of scarcity through the SECC. During the collection of data people were ignorant of what the SECC meant and how the same would be used. It is now evident that the reports prepared on the basis of these data are much realistic and authentic.

After the poverty parameters for families had been determined, the process of verification through the Gram Sabha enabled the database to create space for community-based reforms. Selection of beneficiaries for LPG connection scheme Ujjwala, free electricity connection-Saubhagya, housing through Pradhan Mantri Awas Yojana-Gramin (PMAY-G) and medical assistance in hospitals through the Ayushman Bharat was done on the basis of scarcity-related parameters of the SECC. This database does not have any link with religion, caste and class. It is based on the scarcity parameters showing different aspects of poverty, which could be verified easily. SECC data was used for determining the state labour budgets under Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGA) and also for inclusion of all households with scarcity in creation of Self-Help Groups (SHGs) under Deendayal Antyodaya Yojana-National Rural Livelihood Mission (DAY-NRLM).

The administrative and financial reforms like proper identification of poverty, revision of data and its updation, Adhaar, IT/DBT, geo-tagging of assets, introducing one nodal account in states for various schemes, entrusting Panchayats the right to spend money with no provision of cash, Public Financial Management System (PFMS) could be adopted through the participation of Gram Sabhas. As a consequence, great improvement is seen in the condition of leakage. Jan Dhan and other accounts of the poor have turned to be medium of Direct Benefit Transfer (DBT) without any interference of the middlemen. This led to significant improvement in the system. Instead of transferring cash into the accounts of Panchayats, payment against material costs and wages can be made through this system under the authority of the elected Panchayat leader.



Owing to schemes like MGNREGA, major reforms including transfer of money into the accounts of the poor, creation of sustainable assets and livelihood security got a big boost. It is essential to make employment opportunity available for waged-labourers, on demand. Along with this, creation of sustainable assets for improvement in income and conditions of poor people as a result of wage-based employment is necessary too. The wage-material ratio of 60:40 at Gram Panchayat level has been changed and implemented at district levels also. Personal Benefit Schemes have been introduced as an assistance to the poor to enable them to work for 90-95 days for constructing their own houses. Along with the poor, marginal and small peasants have been included in these schemes. Sheds have been built for cattle, wells & ponds have been dug in agricultural fields and plantation works have been done on a large scale under the scheme. Emphasising on Natural Resource Management (NRM) as well as on agriculture and allied activities, creation of community assets has been continued. We depended on evidences for creating good quality assets and for eradicating leakages under MGNREGA. In a study by Economic

Development Institute conducted in 2018, it was observed that 76 per cent of newly created assets were of good or very good quality. Only 0.5 per cent assets were found to be unsatisfactory. Evolving a reliable public system for MGNREGA and its efficient implementation is an important step. This is the same programme for which studies were got conducted by Sandip Sukhantkar, Clemet Embert *etc.*, during the years 2007-13 and the studies exposed leakages on a large scale. MGNREGA was provided with funds even before it could achieve the capability to spend amounts in suitable, transparent and accountable manner with proper technical aid. We created a technical team for natural resources management and used this technique for implementation of evidence-based programmes. Now the good results are pouring in. Within a period of 15 days only, number of payment orders increased from 26 per cent in 2013 to 90 per cent in 2018-19. This year we are making efforts to ensure that payment orders are not only issued in time, but respective amounts also get deposited in accounts within 15 days.

Under the rural housing scheme, 15 million houses have been built during the last 5 years and phase-wise geo-tagged pictures have also been uploaded in the public domain on www.pmayg.nic.in. Best experts have studied designs of traditional houses in different regions in order to promote diversity throughout the country. Along with emphasizing on promotion of use of locally available materials, masons have been imparted proper training. Today all kinds of amounts are transferred into electronically verified accounts. The whole process is monitored through a dashboard of the website. With the effective use of technology, annual rate of completion of construction of houses has increased almost 5 times. With this our confidence as to providing homes to everyone by 2022 has got reinforced. These houses have been provided with, through convergence, Swachh Bharat latrines, Saubhagya electricity connections, Ujjwala LPG connections and 90 days' of work under MGNREGA. Many persons are now beneficiaries of Ayushman Bharat and women are members of Self-Help Groups with bank linkage under DAY-NRLM. Through multidimensional efforts, living conditions of the poor have changed for sure. In the economically backward or BIMARU states, most of the population

lives in vulnerable huts. These states have created an example of outstanding work done under the Pradhan Mantri Awaas Yojana–Gramin. This is the only scheme in India where BIMARU states have taken the initiative to lead the change.

Despite remarkable community based unity of women through SHGs under the National Rural Livelihood Mission, much more is yet to be done for bringing diversity in livelihood and providing bank linkage. Due to much emphasis laid on bank linkages, loans amounting to more than rupees two lakh crore has been sanctioned to 3 crore women under the NRLM during the last five years. This has resulted in larger level of diversification in livelihood. Women have got opportunities to engage in public transport, become banking correspondent or own a custom hiring centre. More than 6 crore women are now changing the fate of the poor without any capital subsidy. The percentage of non-performing Assets to these loans has come down from 7 per cent in 2013 to slightly above 2 per cent today. No doubt, these women are our best borrowers. For a creative change in rural sector, it is necessary to support their nano initiatives which would later on convert into micro and small enterprises. For promotion of enterprises, the Ministry of Rural Development has ensured more than 67 per cent employment opportunities under DDU-GKY and more than two third jobs under RSETI programme. Under this scheme, various reforms have been made in skill development programmes in order to emphasize up on providing employment as well as self-employment through Rural Self-Employment Training Institutes (RSETI).

Gram Panchayats can now carry on other infrastructural developments as per requirement along with works relating to rural roads and drains as a result of huge funds having been transferred to them under the 14th Central Finance Commission. During the last one year efforts have been made to make the entire process fully accountable and transparent through geo-tagging, IT/DBT and PFMS under the MGNREGA and PMAY-G. We have firm faith that accountability will increase more with electronic monitoring of accounts under PRIASOFT, geo-tagging of assets, transfer of funds through transaction based MIS and unitary nodal account. The scope for corruption often increases in cases of fund transfers to local level accounts.

If the authority spends Gram Panchayat funds but payments are made to labourers and retailers direct in their accounts electronically, corrupt practices will certainly come to halt. National social support schemes were implemented through similar process to provide pensions to old-age persons, widows and differently-abled persons – under NSAP. Their records have been digitalised. Today in most of the states, direct transfer of pension funds each month to the bank accounts of the poor through IT/DBT platform has become possible with the help of technology. No doubt, with the help of women Self-Help Groups and extension of services of banking correspondents in far-flung areas, it would be possible to deliver pension to old-age persons and sick widows at their door steps itself. Technology is very helpful in evolving an effective and reliable public delivery system. Experience pertaining to the last four years makes us believe that it is quite possible.

The Gram Swaraj Abhiyan was a unique effort of the government for overall coverage of each and every person in 63974 villages of the country through the seven major public welfare schemes. Under this programme, benefits relating to Ujjwala for LPG connection, Saubhagya for electricity, Ujala for free LED bulbs, Mission Indradhanush for vaccination, Jan Dhan for bank accounts and insurance for contingencies as well as life insurance were provided to each and every household at their door steps, within a stipulated time through an effective monitoring process. In fulfilling this greater task, help from a large number of central government employees was also obtained. This was a great and unique federal effort for mutual cooperation where six crore women Self-Help Groups, 31 lakh elected members of Panchayati Raj Institutions and Central, State as well as local governments came under one umbrella to work together. Thus, it was proven that it is never difficult to achieve any aim howsoever greater it may be, if there is strong will power.

Same kind of efforts were made in respect of rural roads under the Pradhan Mantri Gram Sadak Yojana (PMGSY). 130 to 135 km length of roadswere constructed every day during the last 1000 days and it became possible due to effective monitoring and continuous dialogues with the State Governments. Connecting the residential hamlets with a population of more than 500 people in plain

areas of BIMARU states and more than 250 people in hilly areas, with roads was a big challenge. They were encouraged to connect 97 per cent of these residential areas with roads by March, 2019. Although the original deadline was up to the year 2022. It has been established through the rural road scheme, how public scheme like PMGSY can provide public service within the stipulated time and at an optimal cost. In order to decrease the carbon footprint and to provide a lasting base for development, more than 30,000 km of roads were constructed through green technology, using waste plastic material.

Government has already sanctioned integrating 1,25,000 km of thorough and main rural roads to connect them with higher secondary schools, hospitals and slums with an estimated cost of Rs. 80,250 crore. Directives in this regard have been issued to all the states and the process for sanctioning projects has been started.

It is true, we do not take interest in mentioning the success of public delivery system as most of us have formed our viewpoint to consider the Government as inactive or ineffective and contrary to it, the private sector as an effective and prompt one. Undoubtedly, the private sector has in its account several remarkable achievements. However, we need to understand that in social sector, programmes pertaining to education, health and nutrition for poorer people, among many other public services, still need community-led and community-owned public service delivery system which is result oriented. The ultimate goal of such system should be centred on welfare and improvement in the living conditions of the poor. We cannot now retreat from the process of creating a reliable public service system as it is essential to bring in change and improvement in the living conditions of the deprived. It is a matter of pleasure that under the able leadership of our popular Prime Minister Shri Narendra Modi, the NDA Government has been constantly making efforts in this regard since beginning of its innings. Many pleasant outcomes of these efforts have come to fore and this is not going to stop here.

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WAYS TO ENHANCE AGRICULTURE PRODUCTION

Dr. Jagdeep Saxena

The Government set a goal to double farmers' income by 2022, and took up the challenge in mission mode. In this context, the Government constituted an Inter-Ministerial committee to examine the issue and suggest strategies to reach the target in the prescribed time-frame.

Current foodgrain production at 284.95 million tonnes (4th advance estimate, 2018-19), horticultural production at 313.85 million tonnes (3rd advance estimate, 2018-19) and milk production at 176.30 million tonnes (2017-18) place country in a stable state of food and nutritional security. But, agricultural production needs to be accelerated primarily due to steady growth in population and changing pattern of socio-economic status of people. The population of India is projected to be 1.65 billion by 2050 with nearly 50 per cent people residing in the urban areas. There are various projections of increase in demand for food commodities in India. According to one scenario, at seven percent growth rate in national GDP, the demand for foodgrains will grow by nearly 50 per cent while rise in demand for fruits, vegetables and animal products will be in the range of 100 to 300 per cent. But can we achieve this target under the cloud of serious challenges, such as climate change, degradation of natural resources and shrinking land for agriculture?

On the other hand, the country is facing agrarian crisis due to low and highly fluctuating farm income with so many risk factors. The Government set a goal to double farmers' income by 2022, and took up the challenge in mission mode. In this context, Government constituted an Inter-Ministerial committee to examine the issue and suggest strategies to reach the target in the prescribed time-frame. The Committee has identified seven sources of income growth, namely, improvement in crop productivity; improvement in livestock productivity; resource use efficiency or savings in the cost of production; increase in the crop intensity; diversification towards high value crops; improvement in prices



received by farmers; and shift from farm to non-farm occupations.

Efficient Management of Resources

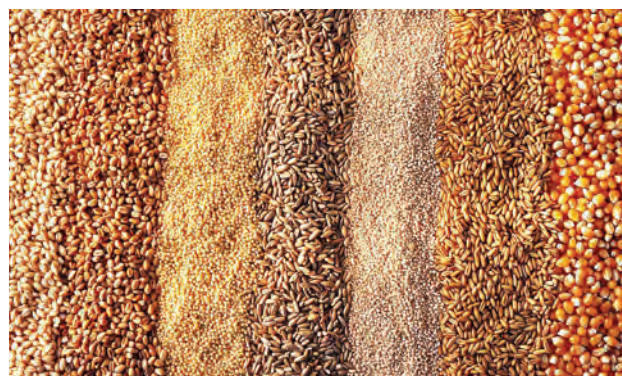
Sustainable management of soil health is a key area of concern for raising productivity of farms. In 2014-15, the Government launched an ambitious Soil Health Card scheme under which the soil of every operational land holding is being tested for major nutrients and micronutrients. Soil Health Card recommends suitable fertilizer mix as well as micronutrients for use in the specific farm. Since 2015, nearly 15.50 crore soil health cards have been distributed to farmers across the country. A study undertaken to study the impact of soil health cards revealed that use of fertilizers and micro-nutrients as per recommendation of soil health card resulted in reduction of consumption by 8 to 10 per cent whereas the yield of crops increased by 5 to 6 per cent. Thus it had a positive impact on income of farmers as well. Similarly, promotion and use of neem-coated urea also optimized its consumption and decreased cost of fertilizers. As per Government decision, the entire quantity of the domestic and imported urea is now available in neem-coated form only.

During 2014-15, the Government launched Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) to ensure assured irrigation to every field, that is '*har khet ko pani*', and also to realize the vision of 'more crop per drop'. To extend irrigated area, special effort is being made to operationalize 99 major/medium irrigation projects by December this year. When in action, these projects will put over 76 lakhs hectare land under irrigation giving way to increase crop intensity and productivity. On the front of water use efficiency, micro-irrigation is being promoted in a big way through a dedicated corpus fund of Rs.5,000 crore.

Corpus among various technologies, drip irrigation and sprinkler irrigation are the most popular ones due to their suitability for a range of cereal and horticultural crops. Besides water use efficiency, micro-irrigation increases productivity in the range of 40 per cent-50 per cent and also adds value to crop quality thereby raising its market value. In general, it increases farmers' income to the tune of 40 per cent. Additionally, micro-irrigation cuts farming cost by saving energy, fertilizers and labour.

New Crops-New Ways

The popular dictum 'as you sow, so you reap' is fundamental to raise agricultural productivity. Hence, the agricultural research system focused its efforts on developing high-yielding varieties with additional benefits, such as climate resilience, resistance/tolerance to pests and diseases, higher nutritional contents etc. The Indian Council of Agricultural



Research alone developed over 1,000 new varieties during 2014-19 that include varieties of cereals, oilseeds, pulses and horticultural crops.

Generally, high yielding varieties are developed with a target to increase crop yield by 15 per cent-20 per cent under normal conditions. But, efficient input management and scientific package of practices increase the potential upto 45 per cent. In view of the impending danger of climate change, new varieties are being developed with special features, such as drought/flood tolerance, heat tolerance, etc. These varieties secure livelihood of farmers with higher income and sustainability.

One such challenge is regular and timely supply of quality seeds to farmers at affordable price. It is estimated that quality seeds contributes to around a quarter of the overall increase in productivity. Efficacy and impact of all other agricultural inputs is largely determined by the quality of seeds used. Hence, a mission mode approach is underway to

Box – 1: Integrated Farming System for Multiplying Gains

Integrated Farming System (IFS) is an innovative approach wherein solo agriculture systems are integrated with livestock, aquaculture, or other inter-related set of enterprises to multiply gains and reduce input cost. Waste from one enterprise becomes an input for other, thus cost is reduced, production is increased and the ultimate income gets multiplied. IFS models are especially developed to suit small-sized farms that have resource crunch due to economic resources. Scientists, are the basis of research works conducted across the country, have concluded that multicomponent farming is the only way of efficient resource cycling, increased profitability, and sustainability. Due to these advantages, the Ministry of Agriculture and Farmers' Welfare, Government of India has laid major emphasis on IFS while planning for doubling farmers' income by 2020.

IFS models with various combinations and permutations have been developed for different agro-climate zones and terrains for specific size of land holdings. Although these models are highly location specific, but choice of a model varies from place to place and even farmer to farmer in the same area. Net return from an IFS also varies depending on the selected model, characteristics of soil, input of resources etc. However, an extensive study in a district of Karnataka revealed that IFS can increase net farm income in the range of 25 per cent to 150 per cent depending on the local conditions. It can be further enhanced to 40 per cent to 170 per cent by adopting new technologies. In this context, the Indian Council of Agricultural Research (ICAR) has partnered with 25 Central Agricultural Universities and one Central University and has so far developed over 45 IFS models suitable to 23 states and one Union Territory. These models are being disseminated to small and marginal farmers through the nation-wide chain of ICAR-Krishi Vigyan Kendras (KVKs).

supply quality seeds to farmers. Breeder, foundation and certified seeds are being produced jointly by private sector. Farmers are important stakeholders in this effort playing double role as producers of seeds, and user of seeds. Recently, the initiative of creating seed hubs in villages has shown remarkable success in providing high quality seeds at farmers' doorstep.

Mechanization and energy management in agriculture is another core sector with excellent potential to increase productivity and farmers' income. Over the years, Research and Development efforts have resulted in development of many agricultural machines and implements that ensure timely operations at a lower cost with enhanced efficiency and accuracy. But, procurement and use of these machines was financially difficult for farmers. Hence, under different sponsored schemes, Government distributed over 29 lakhs machines to farmers across India during 2014-19. Nearly 14,000 Custom Hiring Centers have also been established during this period to provide machines to farmers at a reasonable hire charges. These centers also test machinery in fields and train farmers for their best usage. Modern machinery, such as laser land levelers, precision seeders and planters, and practices like precision farming, zero tillage, ridge plantation etc. also have potential to raise production and income of farmers substantially. But, these technologies require strong extension system and support for the adoption by farmers.

Crop Diversity-Crop Intensity

Diversification towards high value crops is important way out for doubling farmers' income. The aim of crop diversification is to increase crop portfolio so that farmers are not dependent on a single crop to generate their income. Diversification also manages price risk appropriately because all products will not suffer low market prices at the same time. Studies have revealed that shifting one hectare area from staple crops to commercial high value crops has the potential to increase gross return upto Rs. one lakh. Scope also exists to raise farmers' income by diversifying towards other allied enterprises like forestry, beekeeping, mushroom cultivation, sericulture etc. Similarly, increasing crop intensity is another area with potential to increase farmers' income.

Recently, the Government has reviewed its commitment for transforming farmers into energy providers. A specific scheme 'KUSUM' has been

launched this year to support establishment of solar power plants on barren lands or agricultural lands. Promotion of value chains across crops and livestock products will raise farmers' income by developing direct market linkages with wholesalers, supermarkets or exporters. We need to find ways to integrate small producers into modern value chains, both domestic and export oriented. In this regard, Farmers Producers Organizations (FPOs) can play a seminal role by taking up marketing responsibilities as a group and safeguarding interests of farmers. Current Union Budget (2019-20) has proposed to form 10,000 new FPOs over the next five years. FPOs enable farmers to enhance productivity through efficient, cost-effective and sustainable resources use and realize higher returns for their produce. Additionally, Electronic National Agricultural Market is ensuring best market prices to farmers by providing on-line and transparent trading of commodities across the country. Progressive market reforms, such as revised APMC Act, Model Contract Farming Act, Upgradation of Gramin Haats as Centres of Aggregation are also contributing significantly in raising the income of farmers. Recently, the Government has aligned its business-oriented schemes, such as SFURTI and ASPIRE, with agricultural activities to boost business prospects in agriculture sector.

Livestock for Livelihood

Despite being top milk producer of the world, productivity of milk producing animals and other livestock is low compared to world averages. Breed improvement, better feed and nutrition, animal health, and better herd composition are some of the important measures that can raise livestock productivity and farmers' income. The Government has understood its importance and has launched several schemes for betterment of animal health and improvement in productivity. Moving towards fresh waters and seas, Government has launched mission 'Blue Revolution' to make fisheries sector more remunerative and attractive for fish farmers. Plans are ready to launch a dynamic Pradhan Mantri Matsya Sampada Yojana to establish a robust fisheries management framework.

Vigorous efforts with vision and policy support are chasing the goal of doubling farmers' income by 2022. We are confident that country can achieve this goal with excellence.

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MAHATMA GANDHI AND THE IMPORTANCE OF FARMERS

Dipanker Shri Gyan

Mahatma Gandhi's own experience with farmers in Champaran and Kheda followed by the expansion of his Constructive Programme which included the thrust on rural industries, helped in his articulation of the importance of peasants. He wanted farmers to become peasants by their choice and not be forced to take up the profession due to circumstances.

He stopped at the threshold of the huts of the thousands of dispossessed, dressed like one of their own. He spoke to them like one of their own. He spoke to them in their own language. Here was living truth at the last and, not only quotations from books. For this reason the Mahatma, the name given to him by the people of India, is his real name. Who else has felt like him that all Indians are his own flesh and blood? When love came to the door of India that door was opened wide. At Gandhi's call India blossomed forth to new greatness, just as once before, in earlier times, when Buddha proclaimed the truth of fellow-feelings and compassion among all living creatures." - Gurudev Rabindranath Tagore on the ascent of Mahatma Gandhi as a messiah of the dispossessed.

The Nobel laureate, Gurudev Rabindranath Tagore has beautifully portrayed how Mahatma Gandhi reached out to the thousands of dispossessed across the length and breadth of the country by speaking their own language. He talks of how both Gandhi and Buddha had instilled the spirit of fellow-feelings and compassion amongst the people. The depth of Gandhi's approach to reach out to the last person has been stressed by his non-violent action throughout his interventions during India's freedom struggle. His *Talisman* is a poignant reminder of the necessity to not only think but also act for the benefit of the last person in the society. Amongst the groups of dispossessed, Gandhi tried to address, farmers remained a pivotal group, which actually gave shape to his evolution from Mohandas to Mahatma. One of those farmers who actually became a catalyst in this process was Rajkumar Shukla from Champaran, Bihar.

The ingenuity and perseverance of Rajkumar Shukla with which he succeeded to invite Gandhi to Champaran to initiate the struggle of the peasants against the unjust Tinkathiya System is a significant feature of the chequered history of our freedom struggle. Champaran was a struggle of the people and an important experiment of truth and ahimsa. Gandhi was clear as he wrote in his autobiography



that his objective in Champaran was to inquire into the condition of the Champaran agriculturists and understand their grievances against the indigo planters. For this purpose, he said he needed to meet thousands of ryots. After meeting the peasants, Gandhi wrote in his autobiography: "That day in Champaran was an unforgettable event in my life and a red-letter day for the peasants and for me." He further observed: "In this meeting with the peasants I was face to face with God, Ahimsa, and Truth."

Later on, in 1939, speaking in a public meeting at Benaras, Gandhi observed: "Just a few decades ago, I never knew what Hindustan was nor did Hindustan know what I was. I came to Champaran in 1917 with a view to redressing the grievances of the peasantry who were mere toys in the hands of the planters. I came here with my heart open and had no other instrument for the fight except the armament of truth and non-violence."

It was again his work with the peasants of Champaran from where Gandhi's constructive work evolved. The peasants there were not only fearful but totally ignorant. He noted in the autobiography that unless the peasants were engaged in variety of initiatives like education, health, sanitation, their condition might not improve. He said he was convinced that work of 'permanent nature was impossible without proper village education'.

In fact, Gandhi did not stop at just trying to provide primary education to the peasants.

He described the condition of the village in his autobiography: "The villages were insanitary, the lanes were full of filth, the wells surrounded by mud and stink and the courtyards unbearably untidy. The elder people badly needed education in cleanliness. They were all suffering from various skin diseases. So, it was decided to do as much sanitary work as possible and to penetrate every department of their lives."

Another important farmer struggle which Gandhi led was the Kheda Satyagraha. A condition of famine had arisen in the Kheda district of Gujarat due to widespread failure of crops. The farmers wanted the revenue assessment for the year suspended. When the pleas of the farmers were not heard, Gandhi motivated the farmers to resort to Satyagraha.

An important common thread in both the Champaran and Kheda Satyagraha was that Gandhi was able to instil amongst the farmers the spirit of fearlessness. For instance, during the Kheda Satyagraha, Gandhi writes in his autobiography, "The main thing was to rid the agriculturists of their fear by making them realize that the officials were not the masters but the servants, in as much as they received their salaries from the tax payers."

Writing further on his experiences of Champaran and Kheda, Gandhi said, "An illiterate farmer can represent the difficulties of the agricultural classes much better than an Indian learned but without experience in that particular field. I wish, therefore, to see an ever-increasing number of delegates from among farmers, weavers, carpenters, blacksmiths, shoe-makers and other such groups. I, for one, think that no substantial progress in the country is possible so long as patriotic farmers do not attend our political and social conferences in numbers proportionate to their numerical strength. The understanding of farmers' conditions which, through direct experience, I acquired in few months in Champaran and Kheda cannot be had from any number of books." (Collected Works, VOL. 21: 1 JULY, 1920 - 21 NOVEMBER, 1920)

The importance Gandhi attached to the farmers can be gauged by this saying, "If Swaraj is attained by the effort of the whole people, as it must be under non-violence, the kisans must come into their own and have the uppermost voice. ...If the legislature proves itself to be incapable of safeguarding Kisan's interests, they will, of course, always have the sovereign remedy of civil disobedience and non-cooperation." (The Mind of Mahatma Gandhi)

Elsewhere, he had written, "India lives in farmers' huts. The weavers' skill is a reminder of India's glory, and so I feel proud in describing myself as a farmer and weaver." (Collected Works, VOL. 18: 1 MAY, 1919 - 28 SEPTEMBER, 1919) Again, he points out, "Years ago, I read a poem in which the peasant is described as the father of the world. If God is the Provider, the cultivator is his hand. What are we going to do to discharge the debt we owe to him? So long we have only lived on the sweat of his brow." (The Mind of Mahatma Gandhi)

For Gandhi, farmers being in touch with the soil had an educated mind. He had pointed out, "A farmer cannot work without applying his mind. He must be able to test the nature of his soil, must watch changes of weather, must know how to manipulate his plough skilfully and be generally familiar with the movements of the stars, the sun and the moon. The farmer knows enough of astronomy, geography and geology to serve his needs. He has to feed his children and has, therefore, some idea of the duties of man, and, residing as he does in the vast open spaces of this earth, he naturally becomes aware of the greatness of God. Physically, it goes without saying, he is always sturdy. He is his own physician, when ill. Thus, we can see, he does have an educated mind." (VOL. 13 : 12 MARCH, 1913 - 25 DECEMBER, 1913)

To conclude, Gandhi's own experience with farmers in Champaran and Kheda followed by the expansion of his Constructive Programme which included the thrust on rural industries, helped in his articulation of the importance of peasants. He wanted farmers to become peasants by their choice and not be forced to take up the profession due to circumstances. He wrote, "I do not want the power of a Hitler; I want the power of free peasant. I have been trying to identify myself with the peasants all these years, but have not succeeded in doing so. What, however, differentiates me from the kisan today is that he is a kisan and labourer not by choice but by force of circumstances? I want to be a kisan and a labourer by choice, and when I can make him also a kisan and a labourer by choice, I can also enable him to throw off the shackles that keep him bound today and that compel him to do the master's bidding." (The Mind of Mahatma Gandhi)

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e-NAM: GAME CHANGER IN AGRICULTURAL MARKETING

Rekha Dhanai

With the launch of Electronic National Agriculture Market or e-NAM, Government has attempted to revolutionize Indian agriculture for ever. The main aim of e-NAM is to improve the marketing aspect of the agriculture sector with one license for the entire state and with single point levy.

E-NAM or Electronic National Agriculture Market is a pan-India trading portal launched in April 2016. It is a trading portal for farm produce which aims to create a unified national market for agricultural commodities by integrating Agriculture Produce Market Committees (APMC). E-NAM is a device to create a national network of mandis which can be accessed online. It seeks to influence the physical infrastructure of the mandis through an online trading portal. It also enables buyers situated in state or even outside the state to participate in trading. The main aim of e-NAM is to improve the marketing aspect of the agriculture sector with one license for the entire state and with single point levy. Through e-NAM an entire state becomes a market for sellers and the market fragmentation within the same state gets abolished. Working with e-NAM improves the supply chain of commodities and reduces wastages which can be seen in some states involve in online trading. e-NAM driving agricultural trade towards the remunerative prices for farmers by plugging the trade malpractices in mandis. While the farmer is the primary stakeholder, e-NAM also provides traders, commission agents and exporters better business opportunities through a unified and extensive marketplace. At the mandis across the country, farmers are slowly but surely getting a better deal.

Performance of e-NAM since 2016

e-NAM facilitates profits through better marketing. Real-time information on prices creates healthy competition among buyers and increases

farmers' negotiation capabilities. E-NAM is transforming the way India trades in farm produce and has roped in 585 mandis across the 16 states and 2 Union territories, linking more than 1,65,04,866 farmers, 1,25,167 traders and 69,842 commission agents. E-NAM trades in 150 commodities, and goods worth Rs 52,173 crore have been traded so far. The portal is available in 8 languages like Hindi, English, Telugu, Odiya, Bangla, Tamil, Gujarati and Marathi. Through interconnection of mandis, farmers have just been exposed to an entirely new way of conducting business which enabling them to get higher returns, induce more transparency and use technology for maximum benefits. No wonder, that National Agriculture Market has already been hailed as a game changer by providing maximum benefits to sellers and buyers with other marketing facilities.

**Table 1: No. of Stakeholders in e-NAM
(as on 31st August, 2019)**

State/ Union Territories	18
Traders	1,25,167
Commission Agents (CAs)	69,842
Service Provider	0
FPOs	823
Farmer	1,65,04,866
Total	1,67,00,698

(Source:enam.gov.in)

e-NAM provides a simple technological way to the farmers as it allows trading of commodities at mandis through mobile and web applications. For faultless operations, it makes three major changes in the agricultural marketing laws of states like provides electronic trading, single trading licences that are valid in all mandis in a state and a single-window levy of transaction fees which makes e-NAM a transparent system for regulated fair trade. Farmers get fair payments and are spared the tricks employed by unscrupulous traders to



Table 2: List of mandis doing online trade in 16 states/2 union territories with Registered Traders and Unified Licenses on e-NAM

(As on 31st August 2019)

S. No.	State/UT	Mandis registered on e-NAM	Mandis doing Online Trade	Registered Traders on e-NAM	No. of Unified licenses issued by State
1	Andhra Pradesh	22	8	2,771	2,231
2	Chandigarh	1	1	49	0
3	Chhattisgarh	14	0	3,008	16
4	Gujarat	79	3	9,018	14
5	Haryana	54	6	9,844	33
6	Himachal Pradesh	19	3	1,931	12
7	Jharkhand	19	0	1,835	502
8	Madhya Pradesh	58	1	19,892	1,580
9	Maharashtra	60	8	16,271	0
10	Odisha	10	0	752	751
11	Puducherry	2	0	107	0
12	Punjab	19	0	1,208	0
13	Rajasthan	25	2	11,689	11,691
14	Tamil Nadu	23	0	2,026	6
15	Telangana	47	3	5,321	5,317
16	Uttar Pradesh	100	39	32,976	241
17	Uttarakhand	16	5	4,563	4,563
18	West Bengal	17	2	1,906	0
	Total	585	81	1,25,167	26,957

(Source:enam.gov.in)

manipulate the prices. Online payments are picking up, the mobile app is seeing more users by the day and traders are gradually shifting from traditional auctioning practices to e-NAM, indicating a growing acceptance of new technology. Finally, the mandis become farmer-friendly. There are 1,25,167 traders registered on e-NAM and a total of 26,957 unified licenses issued by States as on 31 August 2019.

e-NAM A Step Forward

e-NAM is a great solution for all stakeholders. NAM provides the farmers more options for sell of their produce at nearest mandi or even in inter-state. For the traders, NAM offers the opportunity to access a larger national market. Bulk buyers, processors, exporters etc. benefited by being able to participate directly in trading at the local mandi level through the NAM platform, thereby reducing their intermediation costs.

Taking National Agriculture Market or eNAM, a step forward, a farmer from any state sold their crops to the traders in other state. Similar inter-State transactions between e-NAM mandis in Uttarakhand and Uttar Pradesh in vegetable crops such as potatoes, brinjal and cauliflower since 2019 have commenced.

The Ministry of Agriculture & Farmers' Welfare continuously conducted a series of coordination meetings with the States and Mandi board officials to facilitate inter State trade between the e-NAM States. As a result of these meetings the States have now facilitated licensing of traders of each other for inter-State trade on the e-NAM portal.

One of the major issues that hinders seamless transactions on eNAM is the non-availability of a trading license for traders other than those from the home State. The Government has been pushing the States to adopt a universal license for uninterrupted trading between states.

The e-NAM platform has an inter-state dashboard to promote inter-state trade. So far, 585 regulated markets in 18 States/Union Territories have been integrated with the e-NAM platform and another 415 markets are expected to be on the platform by March 2020.

With the gradual integration of all the major mandis of states into NAM ensuring common procedures for issue of licenses, single levy of fee and movement of produce. By integrating more stakeholders with NAM in future, we can expect significant benefits through higher returns to farmers,

Table 3: List of commodity trade on eNAM

Commodity Category	No. of Commodities	Commodity
Food grains/ Cereals/ pulses	25	Arhar, Arhar Dal Split, Bajra, Barley, Basmati rice, Buck Wheat, Chana Dal Split, Chana whole, Horse Gram, Jowar, Kabuli Chana Whole, Lobia, Maize, Masoor whole, Moong Dal Split, Moong whole, Moth, Oats Raw, Paddy, Ragi, Rajma, Urad Dal Split, Urad whole, Wheat, White Peas
Oilseeds	13	Castor seed, Cotton Seed, Kusum seed, Linseed, Mustard seed, Neem Seeds, Nigar Seed, Peanut kernel, Pongam seeds, Sal Seed, Sesame seed, Soyabean, Sunflower seed
Fruits	29	Amla, Apple, Apricot, Banana, Ber, Cherry Red / Black, Custard apple, Grapes, Guava, Jackfruit, Jamun, Kinnow, Lemon, Litchi, Mango, Musk melon, Orange, Papaya, Papaya Raw, Peach, Pear, Pineapple, Plum, Pomegranate, Raw Mango, Sapota, Strawberries, Sweet orange, Watermelon
Vegetables	40	Banana Raw, Beetroot, Bhindi/Okra, Bitter gourd, Bottle gourd, Brinjal, Cabbage, Capsicum, Carrots, Cauliflower, Cluster beans, Colocasia vegetable, Coriander leaves, Cucumber, Drumstick, Fenugreek Leaves, Garlic, Ginger, Green chillies, Ivy gourd, Jimikand (Suran), Lobia Pods, Mustard leaf, Onion, Pea, Pointed gourd, Potato, Pumpkin, Reddish, Ribbed celery, Ridge Gourd, Safed Petha, Sem, Snake Guard, Spinach, Sweet Corn, Sweet potato, Tapioca, Tinda, Tomato
Spices	14	Ajwain, Black Pepper Whole, Cardamoms Whole, Cloves Whole, Coriander whole, Cumin, Dried Raw Mango Slices, Dry Ginger, Fennel seed, Fenugreek seed, Large cardamom, Red chilli, Tejpata, Turmeric
Misc	29	Areca nut (betel nut), Bamboo, Betel leaves, Carnation, Chhappan Kaddu, Coconut, Coconut with Husk, Cotton, Gladiolus, Groundnut with pods, Guar seed, Isabgol, Jaggery, Jute Seeds, Mahua flower, Mahua Seed, Marigold, Nutmeg Whole, Persimmon, Raisins, Raw Cashew nut, Raw Jute, Rittha, Rose Cut Flower, Saffron, Tamarind, Tender coconut, Tuberose, Walnuts In-shell
Total	150	

(Source:enam.gov.in)

lower transaction costs to buyers and stable prices and availability to consumers.

But this process needs more use of e-NAM by farmers and traders. Higher number of traders would help in creating a more competitive environment which in turn would secure higher incomes for the farmers. For the farmers, reduced cost of transporting and licensing would directly benefit them. To increase its adoptability, many initiatives have been undertaken by the government such as:

- Simplifying registration of farmers on the portal
- Intensifying payment options
- Extending e-NAM trading in six languages with availability of portal in 8 languages.

e-NAM as a Game Changer

Many advantages of e-NAM which can change Indian agriculture trade sector for ever:

- No middlemen involved in buying-selling of agri-products; hence better deal for farmers
- Less transaction cost
- Single license valid across all connected mandis
- Single point levy of all products
- Quality testing procedure introduced for buyers and sellers

These advantages of e-NAM continuously attract the farmers to trade their produce through this online portal. The higher registration of traders and APMCs with more transaction on the portal made it a big game changer in agriculture trading sector. In future NAM not only becomes the big service provider to the farmers and traders but consumers will also benefited by produce price stability and availability.

e-NAM such things still needs improvement

Niti Ayog's review on e-NAM has found that many mandis are ill-equipped to access the quality of produce. Without quality assaying quality assurance could not be provided to the potential buyers. It has also been reported that at some mandis auctions were occurring in the traditional way and data was entered into the e-NAM portal after the complete transaction. This defeats the purpose of an online portal. Therefore, a need to improve the assaying bodies for quality assurance to the buyers and also timely interaction is needed for changing tradition way of auction to e auction on e-NAM.

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PUBLIC–PRIVATE PARTNERSHIP IN AGRICULTURE SECTOR

Usha Das and Souvik Ghosh

The Government of India has been emphasising to create a facilitating environment for investments in infrastructure building following PPP approach. It redefines the role of public sector as a facilitator and enabler and private sector as financier, builder and also the operator of the service or the facility. Innovative technologies, operational efficiency, managerial effectiveness and access to additional finances can be ensured through successful implementation of PPP.



A public–private partnership (PPP, 3P or P3) is a long-term cooperative arrangement between two or more public and private sectors. Historically, such a mix of public and private endeavours is used by the government. However, a greater use of various PPP arrangements by the governments across the globe has been observed since late 20th century and early 21st century.

There is no consensus definition of PPP. They can be realized both as a governance mechanism and a language game. When understood as a language game or brand, hundreds of different types of long-term contracts with a wide range of risk allocations, funding arrangements and transparency requirements are covered under the PPP. And as a brand, the PPP concept is closely associated with concepts like privatisation and the contracting out of government services.

Genesis of PPP

The PPP Cell set up in 2006 in the Department of Economic Affairs (DEA), Ministry of Finance, Government of India, acts as the Secretariat for Public PPP Appraisal Committee (PPPAC), Empowered Committee (EC) and Empowered Institution (EI) for the projects proposed for financial support through Viability Gap Fund (VGF). According to the World Bank, with close to 1500 PPP projects in various stages of implementation, India is one of the leading countries in terms of readiness for PPPs. As per the 2015 Infrascope Report of the Economist Intelligence Unit, India ranks first in the world in operational maturity for PPP projects, third for sub-national PPP activity and fifth in terms of having an ideal environment for PPP projects (www.pppinindia.gov.in).

Maharashtra is the pioneering state in adopting P3 model in case of major infrastructure development projects (more than 50 per cent). During 2000s, other states like Karnataka, Madhya Pradesh, Gujarat and Tamil Nadu also adopted this model.

Dimensions of PPP In Indian Agriculture

India is now one of the fastest growing economies in the world with a targeted annual growth rate of over 8 per cent. An upgrade of the country's infrastructure services is the necessity for the economy to grow at this pace and in this context the PPPs have been recognised as one of the most effective mechanisms to achieve this.

Annual average growth rate of Indian agriculture has been around 2.7 per cent during the past years, making it the slowest growing sector. The challenges being faced by the agriculture sector underlines an urgent need for innovations brought via partnerships between private and public sectors.

Maharashtra, the first state to take this innovative path, rolled out its Maharashtra Public-Private Partnership for Integrated Agricultural Development (PPPIAD) project to develop integrated value chains for selected crops through PPP and co-investment.

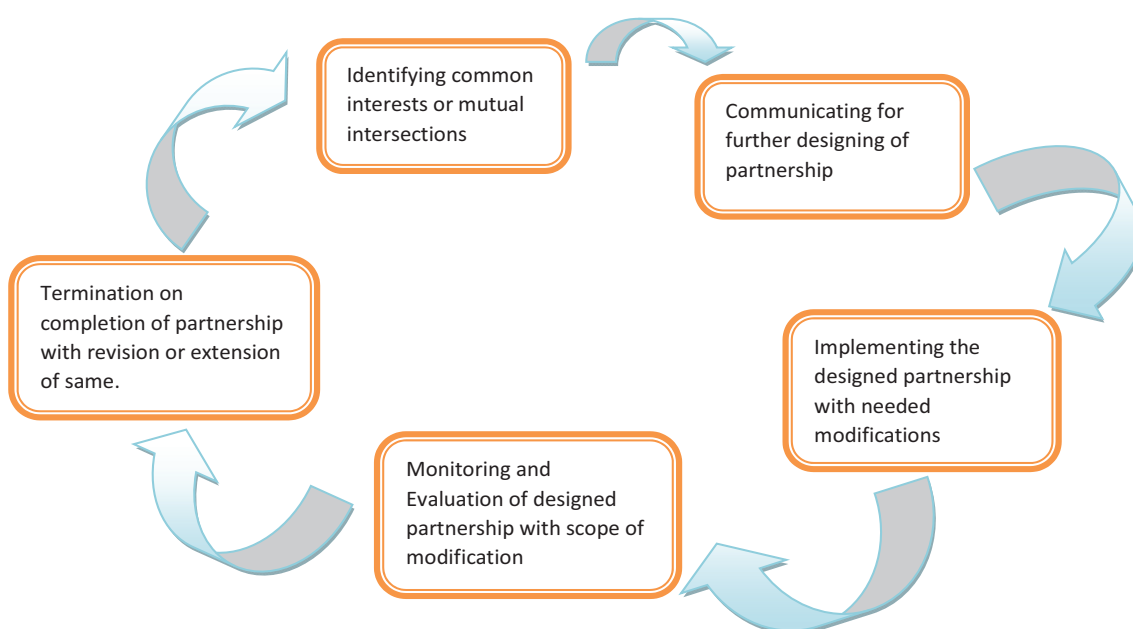
During recent past, in agriculture, partnerships have been emerging within and between public sectors. However, successful partnerships between public and private sectors are challenged by issues like high transaction costs of operationalising and coordinating the partnerships, different objectives of each sector, negative perceptions and mutual mistrust as well as uncertainty about actual benefit and outcome from PPP. Hence, developing partnerships needs policy support and enabling environment to meet the production target set aside for 2020 and 2030.

The building of partnership occurs through five different stages which may also end up in a cyclic form. (See Fig. 1)

A major game changer for the agricultur sector can be the PPP model. PPPs can transform the sector at multiple levels bringing together the collective power of all the stakeholders in the agricultural ecosystem.

PPP approach is adopted in various facets of agriculture such as research and development, quality enhancement, crop production, extension and marketing. Functional and operational factors of the PPP linkage tend to differ from field to field based on the capability of partners, budget and timeframe.

Figure-1



PPP Approach In Various Facets of Agriculture

PPPS In Research

Many of the studies on PPPs focused on agricultural biotechnology, biosafety regulation, Intellectual Property Rights (IPR) and ways in technology transfer in support of pro-poor in developing countries. Several research programmes in India actively sought increased links with private stakeholders as partners and research users which need variety of institutional innovations and incentives for better coordination of PPP leading to greater ownership of outputs and their effective promotion. Few of such initiatives are mentioned below:

Agriculture Biotechnology Support Programme (ABSP) II model in which Mahyco, Indian Institute of Vegetable Research (IIVR), Tamil Nadu Agricultural University (TNAU), Coimbatore and University of Agricultural Sciences (UAS), Dharwad are involved in development of transgenic brinjal varieties resistant to fruit and shoot borer. In this partnership, funding is provided by ABSP and regulatory support by DBT, while Mahyco provided the cry gene and IIVR has been responsible to develop the resistant varieties.

In vegetable biotechnology PPPs have been emerged under the aegis of Collaboration on Insect Management for Brassicas in Asia and Africa (CIMBAA) involving ICAR, India, Asian Vegetable Research and Development Center (AVRDC), Taiwan, University of Melbourne, Australia, Natural Resources Institute, University of Greenwich, UK and University of Cornell, USA.

Since acquiring a Euro-Retailer Produce Working Group Good Agricultural Practices (EUREPGAP) certificate individually is costly in India for the small and medium grape farmers for export marketing, Mahagrapes has managed to provide cooperatives with certification and other support by involving Maharashtra State Agricultural Marketing Board (MSAMB), National Research Centre on Grapes, National Cooperative Development Commission (NCDC), Agricultural Processed Food Products Export Development Authority (APEDA) and National Horticulture Board (NHB). Thus, member farmers were had to pay just Rs.1200 for certification that is much less than the cost of individual membership (Royand Thorat, 2006).

The World Bank funded NAIP project of ICAR established market-oriented collaborative alliances comprising public and private partners resulting in

51 value chains covering marigold, cotton, agro-forestry, cobia, nutraceuticals, improvement in *Trichogramma* production, etc. (Babu *et al.*, 2011).

Some of the frontline areas of biotechnology research and development where PPP is visible are vaccines using recombinant technology, Enzyme Linked Immunosorbent Assay (ELISA) testing kits for disease detection, gene silencing, stem cell and gene therapy (APCoAB, 2007).

PPP for gender mainstreaming in agriculture was implemented with action research mode in six states of India for facilitating farm women to access technology and market (Ponnusamy *et al.*, 2012). Joint industry and cross-institutional thrust in partnerships could help to maximise the networking possibilities and deliver valuable products for the farmers through a result-oriented research in agriculture.

PPPS in Extension

PPPs cover a wide range of areas including extension services which could enhance technology adoption for sustainable development. Agricultural Technology Management Agency (ATMA) facilitated commodity-based groups to partner with private agencies in production and marketing of basmati rice and medicinal plants in Bihar, maize in Andhra Pradesh and mango in Maharashtra (Srinath and Ponnusamy, 2011).

Monsanto India Limited (MIL) has been an important partner in the agriculture through its multiple partnerships with state governments. It has made links with more than nine lakh farmers through PPPs and has helped to improve production and incomes. Many farmer beneficiaries of these PPPs gain more produce, get fair returns for their produce in the markets and have realized their aspiration for a better life. These success stories confirm the far-reaching benefits of these partnerships.

Extension reforms with PPP are recommended to reach the unreached. It is difficult to get immediate results as PPP in extension will take considerable time for change in the mindset of the farmers in terms of participation, adoption and acceptance. Partners of PPP in extension should have the rapid and sustainable rapport with the targets continuously until the objective of the study is achieved. Institutions should really come

forward to share their knowledge, technology and resources with others voluntarily, since PPP is a win-win approach.

National Institute of Agricultural Extension Management (MANAGE) prepared a roadmap with Department of Agriculture and Dhanuka Agritech Group, a pesticide company, which has a partnership with Department of Agriculture in Madhya Pradesh, aims to provide a number of services to Hoshangabad district farmers.

PPPS In Market and Infrastructure Development

The Model APMC Act of Government of India encourages direct marketing to enable the farmers get the best price for their produce and create partnerships with banks, finance and logistics companies for lowest cost financing and marketing. This attracts private investment in creation of much needed marketing infrastructure, create competition and ensure better service to the farmers (Anonymous, 2005).

In India, ICRISAT's Hybrid Parents Research Consortia brings together 34 small and medium-sized domestic firms for the purpose of commercialising sorghum, millet, and pigeon pea hybrids, thus contributing to the commercial viability of both domestic seed firms and the wider seed market in India. Direct marketing like ITC e-choupal and the National Dairy Development Board model of public-private partnership provides a viable alternative for small farmers.

To overcome the shortcomings and challenges in the storage of food grains, the government, through Food Corporation of India (FCI), adopted a phased implementation plan to build modern steel grain silos with a capacity of 10 million metric tons by 2020 through PPPs.

According to Ministry of Agriculture and Farmers' Welfare, Government of India, the area under micro-irrigation as of 2016 was only about 8.6 million hectares i.e. about 5 per cent of the total area of cultivable land in India. PPP can facilitate the use of micro-irrigation resulting in enhanced irrigation efficiency. Integrated micro-irrigation networks are being developed through PPPs.

Impact of PPP Models In Agriculture

The impact of PPP depends on involvement

of institutions in collaborating and combining all available public and private skills. The impact of PPP has been realised through positive changes in marketing aspects of farm produce, reduction of risks and uncertainties, social mobilisation, capacity building of farm families, and economic empowerment of farmers (Ponnusamy, 2013).

Knowledge Management

Knowledge management strategies in the context of PPP could result in increased production and better service delivery. A successful PPP approach in Patna district of Bihar has brought replacement of traditional rice varieties with basmati rice, cultivation of medicinal and aromatic plants and mushroom. Similarly, it influenced crop diversification from groundnut and paddy to maize in Chittoor District of Andhra Pradesh and with expansion of maize area farmers obtained an increased income (Srinath and Ponnusamy, 2011).

High-End Technologies Development

PPPs have facilitated the development of high-end technologies, which have improved efficiency in management and institutional intellectual property management skills and information database on available technologies in the public sector. PPP approach has facilitated the development of super sorghum through partnership of nine globally reputed institutions and completion of rice genome sequencing in 2004 (Khush, 2005).

Building Farmers' Resilience to Environmental Shocks and Minimising Risks and Uncertainties

PPPs help the agricultural sector to deal with weather shocks, and enable farmers to de-risk themselves through insurance, etc. Risks and uncertainties related to crop failure, natural calamities, pest and diseases infestation and natural resource management can be minimised through PPP. PPP approach has addressed food safety-related barriers in the export of grapes in India (Narrod *et al.*, 2007).

Farm Mechanisation

John Deere, a leading farm implements manufacturing company has established eight Agricultural Implements Resource Centers each covering 600 acres of cultivated land in Gujarat. This

PPP has helped to promote mechanised farming in tribal region (Reddy and Rao, 2011).

Social Mobilisation

Developmental departments develop partnership to create a better social linkage through SHGs, Farmer Interest Groups (FIGs), Commodity groups, Farmers' Clubs, farmers cooperative societies, etc. Agricultural Technology Management Agencies (ATMA) facilitated creation of large number of FIGs in different states in India which collaborate with private extension players resulting in direct marketing of many farm produce (Srinath and Ponnusamy, 2011). UAS, Bangalore took initiative to form Rural Biofuel Growers Association that mobilised farmers of 75 villages to be part of a self-sustaining entrepreneurial model (APAARI, 2012). A producer group consisting of tribal men and women farmers was formed in Khurda district of Odisha in 2011 to produce and sell maize through PPP mode (Ponnusamy, 2014).

Productivity Enhancement

ICAR and Department of Biotechnology, Government of India have initiated the dialogue with Monsanto for transfer of Bt cotton technology in India. Subsequently, Mahyco partnered with Monsanto, and introduced Bt cotton in India (APCoAB, 2007). It resulted in an increase of area and productivity of cotton and real cost of production reduced (Ramasundaram *et al.*, 2011).

The beneficial impact of biotechnology has been witnessed through remarkable turnaround and breakthroughs that have been made in the cereal production industry. This success can be replicated in oil seeds and pulses, which are highly import-intensive, through PPPs.

Economic Empowerment of Farm Women

The PPP between Kerala Agricultural University, DBT and Cadbury India during past 23 years trained 250 women and established 28 cocoa chocolate units in different parts of Kerala. Kudumbasree Project Mission of Department of Agriculture, women SHGs and Nadukkora Agro-processing centre partnered in Pineapple project through PPP that could produce 25000 tonnes of pineapple in 500 ha and directly employed 12500 women (Rajendran *et al.*, 2010). In Coimbatore district of Tamil Nadu, PPP in vegetable marketing

has increased the income level of farm women by 20 per cent (Thangamani *et al.*, 2012). A PPP approach in Odisha facilitated maize production among tribal farm women resulting in improved knowledge level, productivity and income. Organic farming promoted by Assam Agricultural University through PPP enhanced the knowledge and market skills of farm women (Ponnusamy *et al.*, 2012). PPP has been found to do gender mainstreaming making it possible for farm women to increase the access of technologies, inputs, credits and markets and eradicating gender differences and discriminations in rural area (Ponnusamy, 2013).

Investing in Smarter Value Chains

Food-processing industry, one of the sunrise sectors within the agricultural domain, supported by investments by the government and the private sector, can provide farm extension services, enhance price realisation, cut out intermediaries and improve the supply chain through forward and backward linkages.

Catalysed by the World Economic Forum's New Vision for Agriculture (NVA), the Maharashtra PPIAD aims to develop integrated value chains. After beginning with 11 projects in 2012–13, it has encompassed 33 value-chain programmes in 2014–15 with more than 60 participating companies. It has reached almost half a million farmers with the focus on 15 key crops with a target to reach five million by 2020.

Government of India is developing pilot PPP projects to streamline post-harvest supply chains of major perishable agriculture and horticulture commodities through a "hub and spoke" model, consisting of farm collection points and primary processing centres, backed by institutional mechanisms for forward and backward linkages.

Limitations of PPP Models in Agriculture

Private sector seed companies in India tend to concentrate on hybrids where returns are high and assured. However, a better PPP model has been lacking to benefit of farmers especially for cultivating parental lines of hybrid seed (Ramasundaram *et al.*, 2011).

Resource poor farmers lack capacity to raise their own capital to finance agro-processing infrastructure. The agro-processing facility that depends on a single commodity grown by small-

scale farmers carrying high levels of production risk, the problems associated with surety of supply of raw materials, mode of procurement and rate fixing, affect cooperation and coordination between the partners.

The private extension services focus on resourceful areas, resource-endowed farmers and limited to the profitable crops and areas, thus varying widely (Sulaiman and van den Ban, 2003). PPP approach has been less in case of disadvantageous areas and non-commercial crops.

Challenges of PPP Approach and Way Forward

The PPP has been a recent initiative and still a new approach in India. A reasonable time is imperative to assess the effects and impact of any economic phenomenon. A major part of PPP in India has actually taken place during the last 10 years or so. The reports and reviews indicate the positive influence of PPP sector on Indian economy. The enabling environment has been created by the central and the state governments to harness the private sector investments indulging in such partnerships. However, there are some instances and cases where the PPPs have not been an outright success.

Each PPP approach is unique and no two PPP contracts are the same. It is difficult to standardise a PPP format because of the parameters used in structuring of PPP cannot be the same every time. It can differ on various grounds such as the sector involved, the model adopted, nature and type of infrastructure required, etc. The role, responsibility and risk sharing of the central and state governments are circumstantial and are likely to vary from one contract to another.

The lack of transparency is one of the most discussed problems related to PPP. The long time taken for creation of PPP arrangement and number of formalities required to follow happen to be another issue in implementation of PPP approach. Undue political favours in many cases are gained by the private party from their public sector counterpart. The lack of transparency is also discussed in case of user-based projects in which underhand nexus between the government and private sector is often mentioned.

A PPP project has to mainly pass through four main phases viz. Project preparation, project

procurement, project development and operations. Each of these stages require a careful handling, planning and clear-cut demarcating lines of work. The formal contracts can define only the formal mechanisms, however, it is difficult to foresee the steps and solutions to unforeseen problems and/or circumstantial issues which may crop up while the project is underway in a PPP contract.

Conclusion

The Government of India has been emphasising to create a facilitating environment for investments in infrastructure building following PPP approach. It redefines the role of public sector as a facilitator and enabler and private sector as financier, builder and also the operator of the service or the facility. Innovative technologies, operational efficiency, managerial effectiveness and access to additional finances can be ensured through successful implementation of PPP. Partnerships between public and private sectors combine and draw upon the best features of both sectors to render quality services. There are some successful PPP models in agriculture, however, it is a long way to go to have desired successes in Indian agricultural sector. PPPs like the Maharashtra PPPIAD project are indeed the way to go for India's agricultural sector. They are proving to be an important step in renewing and rejuvenating rural economies and leading them to inclusive and sustainable growth. Besides the advantages of PPP, there are number of limitations and challenges in implementation of this approach that require more focused attention and policy advocacy forging partnerships rising above vested interests. India has set the goal of doubling farmers' income in real terms by 2022–23 compared to 2015–16 that requires significant investment. Thus, a more concerted emphasis is warranted to engage the private sector in agriculture through PPPs.

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IRRIGATION TECHNIQUES TO GET PER DROP MORE CROP

Dr. Khadeeja Priyan

Water is the most critical input for crop cultivation and the efficient use of available water resources is vital for sustainable agriculture development. Since more than 80 per cent of available water is used for irrigation, high priority has been given to water conservation and irrigation water management.

Agriculture with allied activities is the single largest use of water in many parts of India. Water is the most critical input for crop cultivation and the efficient use of available water resources is vital for sustainable agriculture development. Since more than 80 per cent of available water is used for irrigation, high priority has been given to water conservation and irrigation water management. Hence, the adoption of precision irrigation and other water saving technologies are essential. Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) has been launched in the year 2015 with the vision of extending the coverage of irrigation 'Har Khet Ko Pani' and improved water use efficiency 'More Crop Per Drop' in a focused manner where Micro Irrigation has been given paramount importance. Micro Irrigation mainly in the form of sprinkler irrigation and drip irrigation has become the fastest growing water saving technology worldwide and has the potential to increase the quality of produce. This will ultimately contribute to improved water use efficiency "More Crop Per Drop".

India's Agricultural Area

The Government classifies agricultural areas as 'rainfed areas' and 'irrigated areas'. Areas where irrigation is less than or equal to 30 per cent of the net sown area are called 'rainfed' and more than 30 per cent of the net sown are known as irrigated

areas. According to NITI Aayog, Government of India statistics, irrigation consumes 84 per cent of water and it is estimated that 52 per cent of cropped areas are without irrigation. India's irrigated agriculture has two parts: (i) Surface (canal) irrigation development due to high public investment by the States and (ii) Over development of groundwater resources due to private tube well development. The share of ground water sources for irrigation has been increased from 28.7 per cent (1950-51) to 62.4 per cent (2012-13) but the share of canal in net irrigated area has been decreased from 39.8 per cent to 23.6 per cent. Ground water sources are over-exploited in many regions and are chronically water stressed in some regions. The country has high dependence on groundwater. The annual utilizable water resources in the country are estimated as 690 Billion Cubic Metre (BCM) from surface water and 447 BCM from groundwater. Augmentation of water supply initiatives may be water control measures, bench marking of irrigation projects, reforms in water harvesting norms, refocusing on tanks and ponds. Demand management initiatives may be Micro irrigation techniques such as drip and sprinkler, improving soil health, weather based crop insurance, market improvement and capacity building. Small water harvesting structures integrated with Micro Irrigation techniques can provide improved water use efficiency in rainfed areas.



Micro Irrigation Technologies

Micro irrigation technologies mainly sprinkler irrigation and drip irrigation not only helps in water saving but also in reduction in fertilizer usage, labour expenses and other inputs and input costs. It enhances crop productivity and improves soil health. The saved water can be used for extended coverage of area under irrigation for a longer duration. All these advantages will ultimately lead to environmental sustainability. Many research studies have shown that Micro irrigation systems can save water up to 40 per cent–50 per cent over conventional flood irrigation methods along with enhanced agricultural productivity.

Improved Irrigation Methods

Since 8th Plan, Department of Agriculture, Cooperation & Farmers Welfare (DAC&FW) has been promoting Micro irrigation (MI) methods like drip irrigation and sprinkler irrigation. Later MI was launched as Centrally Sponsored Scheme (CSS) in 2005 -06. It was up-scaled to National Mission on Micro Irrigation (NMMI) in 2010. National Mission for Sustainable Agriculture (NMSA) was formed in the year 2014-15 and Micro irrigation was considered as on-farm water management component of NMSA. It was taken under 'More Crop Per Drop' component of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) launched on 1st July, 2015. Micro irrigation is an integral component of PMKSY to maximise water use efficiency at field level.

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) has been launched with the motto of providing 'Har Khet Ko Paani'. The scheme aims at providing end-to-end solutions in irrigation supply chain viz., water resources, distribution network, farm level applications and improved water use efficiency. Both Central and State Governments promote this technology and in the FY 2015-16 the funding pattern under PMKSY has been fixed as 50:50 per cent between Central and State Governments. The main objective of PMKSY is to achieve convergence of investments in irrigation sector at field level.

A Micro irrigation Fund (MIF) with an initial corpus of Rs. 5000 crore was allocated in the Union Budget 2017-18. This budget is to help the States to mobilize additional resources for increasing the coverage under Micro irrigation through special and innovative initiatives by State Governments. As per the data given in the official website of PMKSY, total area covered under Micro irrigation by the year

2018-19 is 11.58 Lakh Ha. The area covered under drip irrigation is 5.75 Lakh Ha and that of sprinkler irrigation is 5.83 Lakh Ha. The other interventions such as the potential created for protective irrigation is 1.30 Lakh Ha.

Impact of Micro Irrigation

Global agriculture System has conducted an impact study in the year 2014 on NMMI and the adoption of MI and the following benefits were reported. MI offers enhancement of crop productivity due to judicious use of water and other inputs. Sampled beneficiaries in 13 States were studied. The benefits are noticed in terms of (i) Increase in irrigated area 8.41 per cent from the same source of water, (ii) Crop productivity was increased in fruits and vegetables 42.3 per cent and 52.8 per cent respectively, (iii) Reduction in irrigation cost by 20 per cent -50 per cent with an average 32.3 per cent, (iv) Reduction in energy consumption by about 31 per cent, (v) Reduction in the use of chemical fertilizers by 7 per cent- 42 per cent with an average 28 per cent. Overall Farmers income was increased by 20 per cent-68 per cent with an average increase of 48.5 per cent. Benefit-cost ratio was greater than one across the states. It also ensures additional benefits like non-exploitation of groundwater, reduction in the cost of weeding and relief from water scarcity induced labour migration.

Micro Irrigation methods reduce conveyance losses, evaporation, runoff, deep percolation losses. Another advantage of this technology is that it will be functional with small water wells also. Due to focussed water application, the overall efficiency of water in drip irrigation and sprinkler irrigation are 80-90 per cent and 50 -70 per cent respectively. This is much higher than that of surface flooding (30-40 per cent). Water application efficiency was reported as 30-70 per cent for flooding, 60-80 per cent for sprinkler and 90 per cent for drip irrigation. Surface water moisture evaporation is same for sprinkler and flooding (30-40 per cent) whereas the same is only 20-25 per cent in drip irrigation.

PMKSY has major strengths such as focus on sustainable growth concept, convergence of various schemes and removal of redundancies, greater responsibility and accountability at district level. But the major shortcomings are lower fund allocation than previous year, delay in fund disbursement, area ceiling limit and difficulty in district level implementation. As per the Census 2011, there are 640 districts in India and hence, there should be 640 district plans are to be approved and the total allocation of 1075 crores is to be distributed within these districts.

Large and medium farmers in India comprises only 15 per cent but they hold more than 55 per cent of the land. Small and marginal farmers are entitled to obtain a subsidy up to 55 per cent of the total cost of the system and for other farmers up to 45 per cent. Tribal farmers and area in dark zones are entitled for additional benefits. It has been observed that highest adoption of this technology is in medium category farms (2-10 Ha), and the next is from small farms (1-2 Ha). Farmers of marginal farms (less than 1 Ha) and large farms (>10 Ha) have so far not appreciated it due to subsidy regulations. Two States Andhra Pradesh (AP) and Gujarat have set up their own ways to implement MI. AP has set up Andhra Pradesh Micro Irrigation Project prior to Centrally Sponsored Scheme with dedicated team working with Directorate of Horticulture. The project was launched with the objectives of water conservation, additional area under cultivation with existing water resources, enhancing crop production, productivity and quality, judicious use of ground water, saving in power consumption and cost of cultivation. The area under cultivation has seen a steady rise after the implementation of the programme. States AP, Maharashtra and Gujarat top in the list of area coverage and total subsidy advanced. Gujarat is one of the high performing states in India and this State has established 'Gujarat Green Revolution Company (GGRC) Limited' in 2005 for successful implementation of Government schemes for MI. GGRC provides all necessary infrastructures for crop cultivation, facilitates cultivation under adverse climatic conditions, helps to develop market linkage for the produces and to enhance economic conditions of the small and marginal farmers. Prior to the establishment of GGRC, the average annual achievement were 0.015Mha/year (1991-2005) and is increased to 0.128 Mha/year recently.

Micro Irrigation is suitable for any farmable land slopes and generally for all kind of soils. It is widely used for vegetables and horticultural crops. It has many advantages if managed properly: (i) High water application efficiency (ii) Easily implement even if the fields are irregular shapes (iii) Uniform application of fertilizers (iv) Reduction in weed growth and cost of cultivation (v) Reduction in energy consumption and (vi) Operational at low pressures. A study conducted by Namara, et al., (2005) in Gujarat and Maharashtra shows that Micro Irrigation is justified technically and economically for the cultivation of cotton, Banana and groundnut. The study shows that all the socioeconomic variables such as membership in a high caste group, poverty index, and share of income from off farm and non-farm activities had significant impact on the decision to adopt MI and well to

farmers were most likely to adopt this technology.

Conclusion

Water scarcity in various parts of the country has created awareness about Micro Irrigation systems and its implementation results in significant economic and social benefits in the country. Since water being a critical resource for agriculture, every drop of it is significant for overall farm efficiency. Micro Irrigation is a proven water conservation technology practised all over the world. Economic return is very important for the adoption of any new technology. Since soils are not rich in nutrients, required nutrients to the soil through integrated Nutrient Management will enhance soil health and the yield of the crops. Farmers are convinced to adopt this technology due to enhanced production & productivity of different crops, reduction in inputs costs and flexibility to introduce new crops. The saved water can be used to increase the area under irrigation or for the reclamation of degraded / waste land. All the positive outcomes contribute to food security in the country. Hence, Micro Irrigation Technology should be popularized with adequate credit facilities and support from the Government.

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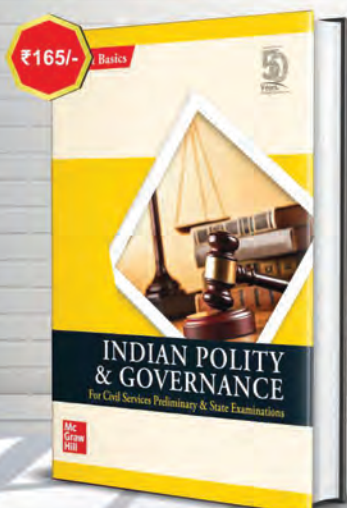
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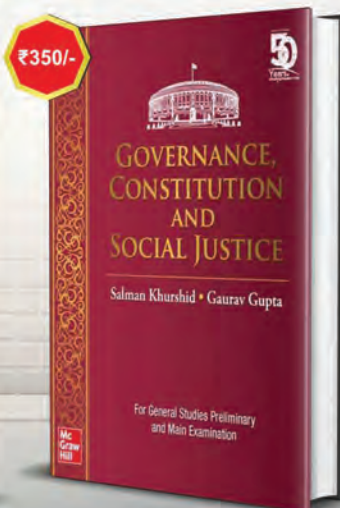
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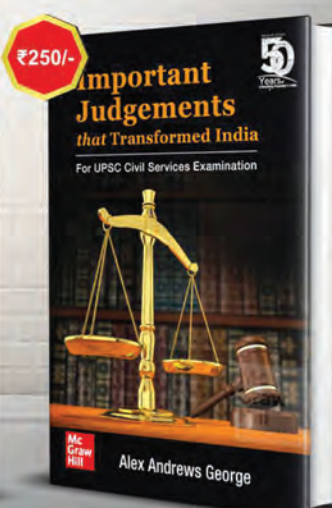
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NON-FARM ACTIVITIES TO ACCELERATE AGRI GROWTH

Dr. H.L. Sharma

The importance of agriculture in the economy of the country is brought out by the fact that out of the total 313 million main workers, 166 million (53 per cent) are engaged in agriculture and allied sector. Rural Entrepreneurship is one of the key instruments for ameliorating the economic lot of vast majority of people living in poverty in rural India. Rural areas provide abundant raw material from agricultural, horticultural and animal produce to start entrepreneurship in the field of food processing.

India is predominantly a rural economy, where the mainstay of people is agriculture only. More than 50 per cent population of the country is directly dependant on agriculture and allied sector. Though, the contribution of primary sector to the country's GDP has steadily decelerated from 53.71 per cent in 1950-51 to 17.25 per cent in 2018-19; yet the declining share of this sector does not undermine its significance in employment generation, foreign exchange earnings and providing food security to the increasing population of the country. The importance of agriculture in the economy of the country is brought out by the fact that out of the total 313 million main workers, 166 million (53 per cent) are engaged in agriculture and allied sector.

Indian agriculture is characterized with the presence of excess manpower in the form of large scale under-employment, disguised unemployment as well as high seasonal unemployment. According to an estimate nearly 25 per cent of manpower engaged in agriculture is disguisedly unemployed. This means that net contribution of 25 per cent manpower involved in agriculture is almost nil or negligible. If this surplus manpower is withdrawn from its present occupation to some other gainful activity in non-farm sector, it can contribute to the national output.

The sector wise trends in the growth of Real Gross Value Added (GVA) reveal that during the last decade, primary sector witnessed a meager growth rate as compared to secondary and tertiary sectors (Table 1 & Fig. 1). This has led to wide inter-sectoral, inter-regional and inter-personal variations in the distribution of income and wealth. The NSSO survey on Household Consumption Expenditure for the year 2011-12 also brings into light that more than one fifth (22.4 per cent) of rural households with agriculture as their principal occupation were having income below poverty line. Not only had this, farmers'

income in relation to non-farm workers, also stood very low. In 2011-12 income per farmer was just 32 percent of the income of non-agriculture worker. This disparity was quite alarming and required a policy response to raise the income of farmers at faster rate.

Realizing the need to boost income of rural households, particularly those involved in farming sector, the GOI in the union budget 2016-17 had announced its resolution to double the farmers' income by the year 2022, when the nation will celebrate 75th year of Independence.

In order to achieve this gigantic goal within the stipulated time period it is imperative to give impetus to farm as well as non-farm activities. In addition to boost income from crop cultivation, the focus of attention should be on promoting allied and non-farm activities in rural areas so that farmers can get gainful employment in these activities during the slack season.

First and foremost, it is necessary to adopt modern integrated farming with large involvement in the ancillary activities like animal husbandry, horticulture & forestry, vegetable growing, bee keeping, sericulture, poultry and fisheries etc.

Among the ancillary activities, animal husbandry being an integral part of farming in India is at the top. It is not only a supplementary source of income, but also provides livelihood to agricultural households during the phases of seasonal unemployment. Its importance to the farmers can be gauged from the fact that in the gross domestic agricultural product, the contribution of animal husbandry is more than 25 per cent. Nearly, 70 per cent of the farmers are involved in animal husbandry possessing around 80 per cent of the total livestock. India has been the largest producer of milk in the world for the last two decades with over 155 million tonnes of production

and per capita availability of 337 grams per day as against the world average of 299 grams.

The diverse agro climatic conditions in India make it possible to grow almost all types of horticultural products like fresh fruits, vegetables, root & tuber crops, flowers, aromatic and medicinal crops, spices and plantation crops. Its annual production of fresh fruits reached at the level of 91.4 MT from an area of 6.4 million hectares in 2015-16. Vegetables are also an important part of horticulture sector. They constitute about 59 per cent of horticulture production in India. The production of vegetables stood at 166.6 MT from an area of 9.6 million hectares in 2015-16. India has made a remarkable progress in the production of flowers also. Its total production of loose & cut flowers reached at 2.24 MT in 2015-16. In fact, India has emerged as the second largest fruit and vegetable producer in the world after China. The country occupies first position in the world in the production of fruits like mango, banana, sapota, pomegranate & aonla and vegetables like peas & okra. India has the honour to be the largest producer, consumer and exporter of spices and spice products in the world.

Food Processing

Processing of agricultural produce is an important aspect of commercialization of agriculture in India. It enables to fetch fair and remunerative price to the producers through value addition in their agricultural produce. Presently,

Table 1: Sector Wise Annual Growth Rates of Real GVA (per cent)

Year	Primary Sector	Secondary Sector	Tertiary Sector	Total
2009-10	1.5	9.5	10.6	8.6
2010-11	8.3	7.6	8.8	8.9
2011-12	4.4	8.5	6.8	6.7
2012-13	1.4	3.6	7.9	5.4
2013-14	4.8	4.2	7.2	6.1
2014-15	1.2	6.7	9.6	7.2
2015-16	2.1	9.5	9.0	8
2016-17	6.8	7.5	8.5	7.9
2017-18	5	6	8.6	6.9
2018-19	2.7	7.5	7.6	6.6
Average	3.82	7.06	8.47	7.23

Source: *Economic Survey: 2018-19, Volume 2, A12-13*

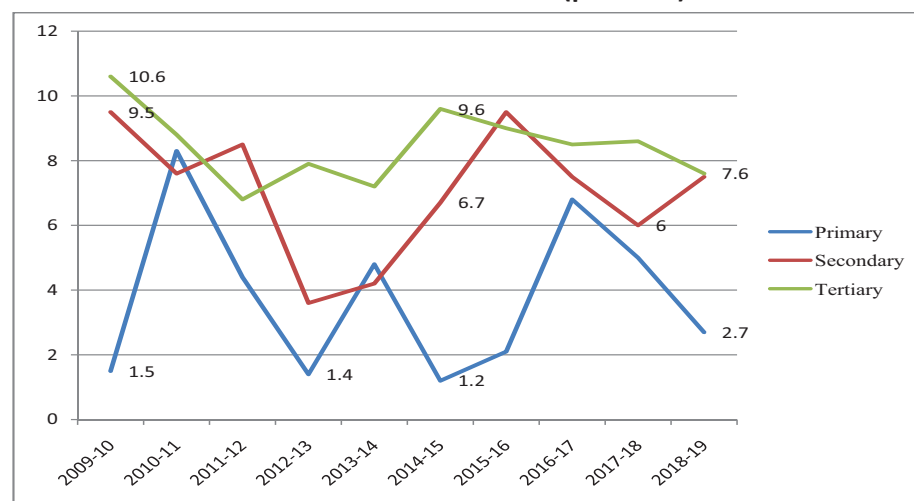
processing of fruits and vegetables is only 2 per cent in India in comparison to 80 per cent in USA, 78 per cent in Philippines, 70 per cent in France and Brazil, 40 per cent in China. With a huge agriculture sector, abundant livestock and cost competitiveness, there are vast opportunities to the rural entrepreneurs in the field of food processing. The most important point in food processing is that a sizeable portion of raw material being local and rural based is comparatively cheap and fresh. There is an enormous and ever increasing demand for canned fruits, juice, jam, jelly, sauce, pickle and honey etc. in rural, semi-urban and urban areas. Farmers can start these activities on part

time basis to supplement their income during the slack season in farm sector. It has a very high employment potential with significantly low investment. Thus, there is an ample scope for the expansion of food processing sector particularly in rural areas of the country.

Agribusiness and Rural Entrepreneurship

Rural Entrepreneurship is one of the key instruments for ameliorating the economic lot of vast majority

Figure 1: Sector Wise Annual Growth Rates of Real Gross Value Added (per cent)



Source: *Economic Survey: 2018-19, Volume 2, A12-13*

of people living in poverty in rural India. Rural areas provide abundant raw material from agricultural, horticultural and animal produce to start entrepreneurship in the field of food processing. Some other activities which can fetch employment to the surplus manpower of agriculture sector are; blacksmithy, carpentry, pottery, tailoring, repairing of agriculture machinery & tools, shoe making, bamboo products, lac production and work on handlooms etc. These activities may be started on group basis by forming self-help groups of farmers. In fact all the states of the country due to their varied agro-climatic conditions have some location specific strengths which provide an ample opportunity to the budding entrepreneurs. The establishment of rural enterprises will not only provide job opportunities to the unemployed and under-employed rural youth, but will also help in making the full utilization of agricultural product.

Skill Development

While most of the developed countries of the world face the risk of an ageing workforce, nearly 62 per cent of total population of India is in working age group (15 to 59 years) and more than 54 per cent of the total population is below 25 years of age. On the basis of its demographic dividend, India is poised to become the fourth largest economy in the world after USA, China and Japan. However there is huge gap in terms of skill training in India. Here only 4.69 per cent of the total work force has undergone formal skill training as compared to 68 per cent in UK, USA, 80 per cent and 75 per cent in Germany. As per the report of National Skill Development Corporation (NSDC), it is estimated that there is an additional requirement of 120.79 million (approx. 12 crore) skilled manpower in India by the year 2022 in twenty four key sectors. Of this, approximately 101.19 million job opportunities are likely to be created for skilled rural youth, in eleven sectors during the ensuing 3-4 years (Table 2).

Government Initiatives

With a view to double farmers' income by the year 2022, various steps & measures have been taken by the Government to give impetus to farm and non-farm activities in rural areas. The main focus is on strengthening and reviving agriculture and creating additional employment opportunities in allied and non-farm sector in the rural economy

Table 2: Additional Requirement of Skilled Manpower in Major Sectors by 2022 (Persons in Million)

Sr. No	Sector	Additional Skilled Manpower Requirement
1	Building, Construction and Real Estate	31.13
2	Domestic Help	4.88
3	Food Processing	4.40
4	Furniture and Furnishing	7.18
5	Gems and Jewellery	3.59
6	Handlooms and Handicrafts	6.14
7	Leather and Leather Goods	3.72
8	Retail Business	17.35
9	Security	4.83
10	Textile and Clothing	6.31
11	Transport & Logistics	11.66
TOTAL		101.19

Source: *National Policy for Skill Development and Entrepreneurship*, 2015, p. 52.

through launching various schemes.

Firstly, a great emphasis is being given on the development of rural infrastructure including power, irrigation, road, transport and communication etc to promote non-farm activities in a big way. In order to improve rural infrastructure by connecting rural habitations with main roads, **Bharatmala Project** has also been launched with special emphasis on rural area including the tribal and backward hinterland.

In order to strengthen and enhance power supply in rural areas, **Deen Dayal Upadhyaya Gram Jyoti Yojana** was launched on July 25, 2015 with an estimated outlay of Rs. 43033 crore. It envisaged 100 per cent village electrification by March 2019. Subsequently, **Pradhan Mantri Sahaj Bijali Har Ghar Yojana** (Saubhagya) scheme was launched on 25th September, 2017, to provide energy access throughout the country. As per saubhagya portal of Ministry of Power, out of 21.69 crore rural household in the country, 20.92 crore (96 per cent) were electrified up to 15th December, 2018.

With a view to empower the rural youth by developing their innovative entrepreneurial skills and promote employment in agri-based vocational areas, a programme named as **Skill Training of Rural**

Youth (STRY) has been launched. It offers modular skill training opportunities to rural youths (above 18 years of age) in farm and non-farm sector in accordance with the requirement of local agro-based industries. As per the National Policy for Skill Development and Entrepreneurship 2015, all the state governments are being encouraged to set up Kaushal Vardhan Kendras (KVKs) at Panchayat level for mobilizing and imparting skills pertaining to local employment/ livelihood opportunities to school drop-outs, adolescent girls, housewives and rural youth.

A skill training and placement programme of the Government named as Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY) was launched on 25 September 2014. It occupies a unique position among the skill training programs due to its focus on the rural poor youth in the age group 15-35 years who due to their poverty driven constraints could not get formal education and marketable skills. Under this programme it is mandatory to give minimum 160 hours of training in soft skills, functional English and computer literacy etc. to transform rural poor youth into an economically independent and globally relevant workforce. Presently DDU-GKY is being implemented in 568 districts of the country.

In order to train women with no access to formal skill training facilities, particularly in rural area, a programme named as, *Support to Training and Employment Program for Women* (STEP) was launched by the Ministry of Women and Child Development. The program aims at imparting skill training in several sectors such as agriculture, horticulture, food processing, handlooms, traditional crafts like embroidery, hospitality, computer and IT services.

On 7th October 2017, *Pradhan Mantari Gramin Digital Shiksha Abhiyan* (PMGDISHA) was launched to impart digital literacy in rural areas with the aim to empower at least one person per rural household with crucial digital literacy skills. Under this *abhiyan*, rural people between the age group of 14 to 60 years are being trained without any fees to operate computers, tablets, smart phones, etc and access government e-services, undertake digital payment, compose e-mails through the use of internet.

Recently, Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) yojana has been launched to

augment the income of families of small and marginal farmers with land holding up to 2 hectares, subject to certain exclusions. The scheme aims at supplementing the financial needs of the SMFs to enable them to take care of expenses related to their occupation as well as domestic needs. This would also protect them from falling in the clutches of money lenders to meet out their petty expenses. Under this scheme a sum of Rs. 6000/- per year is to be transferred in three equal installments into the bank accounts of eligible farmers. All these programme and schemes provide an excellent opportunity for the rural people to start their enterprise as full time as well as part-time basis in farm as well as non-farm sector.

In order to double farmers' income by the year 2022, there is an urgent need to increase farm productivity, improve market access and to develop the small industrial and service units in rural areas, where the surplus manpower of agriculture sector can find work. To attract unemployed educated youth into agribusiness and agri-preneurship special impetus on creating scientific temper and fostering innovative spirit among the rural youth is also required. An appropriate policy coupled with a strong strategy to promote and strengthen the rural non-farm sector deserves to be at the top priority of Government and policy makers.

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FIRST COPY OF "THE REPUBLICAN ETHIC (VOL-2)" AND "LOKTANTRA KE SWAR (KHAND-2)" PRESENTED TO PRESIDENT RAM NATH KOVIND



Hon'ble Minister of Environment, Forest & Climate Change and Information & Broadcasting Shri Prakash Javadekar presented the first copies of the books 'The Republican Ethic (Vol-2)' and 'Loktantra ke Swar (Khand-2)' to the Hon'ble President of India Shri Ram Nath Kovind. Secretary I&B Shri Amit Khare and Principal Director General, Publications Division Dr. Sadhana Rout are also seen.

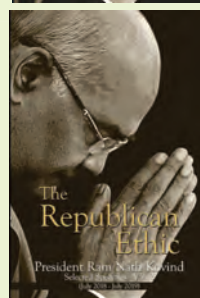
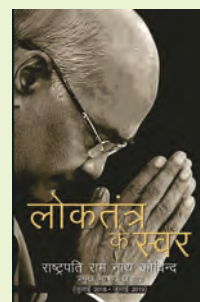
Minister of Environment, Forest & Climate Change and Information & Broadcasting, Shri Prakash Javadekar, called on the Hon'ble President of India, Shri Ram Nath Kovind at Rashtrapati Bhavan on September 6, 2019 and presented the first copies of the books "The Republican Ethic" (Vol-2) and "Loktantra ke Swar" (Khand-2) to him. He was accompanied by Secretary I&B, Shri Amit Khare and Pr. DG, Publications Division Dr. Sadhana Rout.

The Hon'ble President complimented the Ministry of Information and Broadcasting and Publications Division, for bringing out these titles in a time-bound manner with an aesthetic layout. Shri Javadekar apprised the President that the books will be available for purchase on e-platforms like Amazon and Google Play in order to meet the demands especially the young readers.

Both the books - 'The Republican Ethic' and 'Loktantra ke Swar' are the second volumes of selected speeches of the President Shri Ram Nath Kovind delivered by him in his second year in office. Both the volumes have 95 speeches each, categorised in eight sub groups. These are: Addressing the Nation, Window to the World, Educating India, Equipping India, Dharma of Public Service, Honouring our Sentinels, Spirit of the Constitution and Law, Acknowledging Excellence and a special section on Mahatma Gandhi, commemorating his 150th birth anniversary.

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