

PUNE INTERNATIONAL CENTRE



Institutional and Policy Reforms to Accelerate Agriculture Growth in Maharashtra

AUGUST 2019

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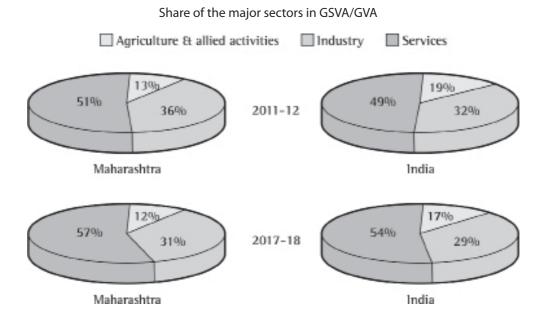
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1. Introduction

Maharashtra is one of the largest, prosperous and developed states in India by economic indicators. While the all-India per capita income for 2017-18 was Rs. 1, 14,958¹, the corresponding figures for Maharashtra were Rs. 1, 76,102 i.e. about 1.5 times of the all-India number. The major sectors which contribute to this growth in 2017-18 were services 57 per cent, industry 31 per cent, and the primary sector contributes 12 per cent to the GSDP². Maharashtra's economy is estimated to grow at 7.5 per cent in 2018-19. 'Industry' and 'Services' sectors are expected to grow at 6.9 percent and 9.2 percent respectively. Whereas, 'Agriculture & allied activities' sector is expected to register an average 0.4 percent growth³ in 2018-19. The graph below gives information about India's and Maharashtra's sector-wise share in Gross State Value Added (GSVA)/ Gross Value Added (GVA).



The share of agriculture in the net state domestic product of Maharashtra declined steeply from 36 per cent in 1961-62 to 11.9 per cent in 2017-18. The comparable share for Indian agriculture was 47 per cent and 17 per cent. Yet, in terms of the proportion of the labor force engaged in agriculture in Maharashtra which was 46.1 per cent as per 2011 census. Maharashtra's economy continues to be predominantly agrarian as the majority of the population is dependent on agriculture directly or indirectly. Thus, the crucial dependence of its rural labor force in agriculture is quite evident and is unlikely to diminish drastically in the near future. Along with this agriculture development in Maharashtra over the last three decades has been unequal

across regions with Western Maharashtra (WB) much ahead of the other regions Marathwada, Vidarbha, and Konkan. The key challenges that the sector faces are i) low productivity ii) lack of diversification iii) water and iv) post-harvest facilities. In view of the elimination of regional imbalance and accelerating diversified employment opportunities, it is necessary to rethink policies and strategies for reshaping Maharashtra agriculture.

Apart from the direct impact of agricultural growth on the generation of rural employment and incomes its significant secondary linkages with the development of rural non-farm sectors are very crucial. Trade in agricultural outputs, as well as inputs, services required by the sector and processing of agricultural products, open up additional and more significant avenues for labor absorption. Maharashtra being an important producer of processing crops cotton, sugarcane, groundnut, and quite a few horticultural crops, such secondary linkages of agriculture assume added importance to its rural economy. In the context of the new liberalized trade environment for farm products such backward and forward linkages can be leveraged with greater vigor. Recently the Government of India announced a major policy initiative in the agriculture sector namely 'doubling of farmers' income by 2022. As agriculture is State subject, each state needs to adopt different strategies as per their agriculture conditions and development stages in terms of growth rates and the level of farmer income. Thus, careful assessment of agriculture's past performance and, based on it, of the future prospects of growth is all the more necessary.

More specifically, our objectives are:-

- (i) To examine issues and challenges in land reform.
- (ii) To understand the challenges and issues of 'Seed and Fertilizers Revolution'.
- (iii) To identify efficient and improved agricultural water management.
- (iv) To review the Domestic and International trade Policies related to Agriculture including Minimum Support Price Schemes (MSP).
- (v) To review the generation and maintenance of agriculture data, including rainfall, which is often inaccurate and inadequate.

The round table conference was organized by Pune International Centre (PIC) on 1st September 2018, to discuss the above-mentioned problems and finding possible and realistic solutions to problems faced by Maharashtra's Agriculture Sector. Five broad themes mentioned above were taken up for the discussion namely land reforms, seeds and fertilizers, water management, agriculture trade policies, and agricultural data. Agriculture experts were invited to present their expert opinion on mentioned themes. This policy paper is an outcome of the expert's discussion.



2. Land reforms

In the post-independence period, the theme of land reforms assumes great importance and emphasis. Under the Indian Constitution, land reform is a state subject and all states began implementing their own land reform laws. The state of Maharashtra followed suit and the abolition of intermediary tenures was taken up, soon after independence, including the abolition of:

- 1. khoti tenure in coastal districts,
- 2. Malguzari and izardar tenures in the Vidarbha districts,
- 3. jagirdari tenure in the Marathwada districts,
- 4. the Revenue Patel Watans in Western Maharashtra and
- 5. Patwari Watans in the former Hyderabad, in 1965.

The abolition of these tenures land rights and Watans resulted in the intermediaries becoming revenue-paying occupants of only such lands as were under their personal cultivation while on the remaining land the tenants secured occupancy rights.

The amended Tenancy Acts required that in Western Maharashtra and Vidarbha regions all recorded tenancy arrangements be terminated. Landlords were permitted to retain land under certain circumstances and tenants were also free to voluntarily surrender land to their landlords. Finally, with effect from1st April 1957, the "tillers day", the tenants in possession of the leased land were declared as owners of the land, subject to payment of the price. In Marathwada, the law did not require the termination of all existing tenancies. Tenants were made owners of only a part of the land and the remaining land was to continue under their tenancy as long as they did not surrender it.

The Tenancy Act in Maharashtra also provides that a new tenancy can be of only one year's duration and at the end of one year the tenant will be entitled to own (on payment of a prescribed price) so much of the leased land as the Act entitles him to, provided he applies to the Agricultural Lands Tribunal within one year of the commencement of tenancy. This provision of, leaving the tenant vulnerable, if he fails to reward/ apply for the tenancy in with tribunal. In other words, lessor preferred oral agreements and was resentful for the written/rewarded tenancy.

The original intent of the restrictive tenancy laws no longer holds any relevance. Today, these restrictions have detrimental effects on not only the tenant for whose protection the laws were

originally enacted but also on the landowner and implementation of public policy. The tenant lacks the security of tenure that he would have if laws permitted 'him and the landowner' to freely write transparent contracts. In turn, this discourages tenant from making longterm investments in land and also leaves his feeling perpetually insecure about continuing to maintain cultivation rights. Furthermore, it deprives tenant potential access to credit by virtue of being a cultivator. Short duration tenancy reduces the incentive of the tenants to care for the development of the land. In fact, they (especially fixed rent tenants) may use inputs like chemical fertilizers excessively during the short duration of the contract to maximize return without caring for the natural fertility of the land. Another adverse outcome of the restriction on leasing is the reduction of an occupational mobility in rural areas. In fear of losing ownership of land on account of being an absentee landlord, many landowners do not want to lease out their land. In spite of having the options of migration and taking up employment in the nonfarm sector, many landowners are forced to be in agriculture even if they lack the skills and motivation to be in agriculture, resulting in lower production efficiency. Another main reason for low productivity is land fragmentation. Land fragmentation is positively and significantly associated with inefficiency (Manjunatha A. V. et al. 2013).

Keeping in view the unintended outcomes of the existing tenancy law and the changing realities of the countryside, the restrictive provisions in the tenancy laws should be scrapped. The leasing in and out of the land should be made legal and hassle-free. Landowners are able to lease out land without the fear of losing it, even if they are absentee owners. If the landowners should be able to lease out land without the fear of losing the ownership, they may not prevent the recording of the tenancy and will also make land available for lease under long-duration contracts. Introducing the recording of a tenancy contract is the first step towards improving the welfare of the tenants. If tenancy could be recorded the tenants would be able to avail themselves of credit, insurance, and other opportunities. Further, recoding of tenancy should reduce the exploitation of the tenants by the lessors. The lessors can potentially exploit the tenants not only by charging higher rent but also through interlinked markets. The lessors may extract exorbitant interest rates on credit offered to the tenants. Introducing the recording of tenancy should bring respite at least to some extent for the tenants from such exploitation by facilitating their access to credit and other opportunities. Long duration contracts will improve the incentive of the tenants to invest in the land and to take care of the natural fertility of land through judicious use of inputs like chemical fertilizers. If the landowners do not hesitate to lease out the land, more land will be available in the lease market, which will improve access to land for tenant households with the scarcity of land. It is important that reforms should take place in tenancy law which will facilitate hassle-free leasing arrangement. This will not only boost

the owner if least it for long agriculture but industrialization too. At present no corporate can take land on lease directly from farmers. Instead, they have to give contracts to farmers which termed as 'contract farming'. Simultaneously agricultural land for non-agricultural use requires permission from the appropriate authority, which can take a long time. State governments can address this barrier by either an amendment of the law to permit non-agricultural use or by the introduction of time-bound clearances of applications for the conversion of agricultural land use in the implementing regulations. The reform opens up another avenue to the provision of land for industrialization: long-term land leases that allow the owner to retain the ownership while earning rent on his land. In addition, he will have the right to renegotiate the terms of the lease once the existing lease expires. Therefore, the introduction of transparent land leasing laws that allow the potential tenant or sharecropper to engage in written contracts with the landowner will be path-breaking reform. The tenant will have an incentive to make an investment in the improvement of land, the landowner will be able to lease land without fear of losing it to the tenant and the government will be able to implement its policies efficiently. Simultaneous liberalization of land use laws will also open up an alternative avenue to the provision of land for industrialization that is fully within the state's jurisdiction and allows the landowner to retain ownership of their land.

To improve the wellbeing of farmers, promote the development of farming and communities, and provide reliable infrastructure government need to create a transparent and efficient agriculture land market.

The Government may intervene in the land distribution structure to solve specific natural resource problems, alleviate problem situations in small communities, or take advantage of land acquisition opportunities such as the sale of estates. The scope of these actions may be limited either spatially or by the type of action required. No single action in isolation will save the complex land distribution problems of the country. However, a combination of Government actions may constitute good pilot projects to test the feasibility of innovative ideas, train personnel in land redistribution undertakings, and show effective results in the short term. Included among limited direct interventions are the following.

i. Redistribution of Waste Land:

Acquisition of wasteland that is for sale provides the Government with another type of opportunity to undertake limited direct intervention in the redistribution of lands. This wasteland can be given on lease to non-farming entities for a long durations. While doing this government need to ensure that the title right of land is not transferred and land cannot be mortgaged for

further investment. This will protect the right of the farm owner and also it boosts the private investment. The precise contribution to redistribution that this type of intervention can is related to the kind of participation that those who are going to use the land. Various alternatives can be used, each involving different degrees of integration of the farmers into the undertaking:

- a) Individual operations: Land is distributed among farmers on a freehold basis. Capital is provided by loans on an individual basis and each small farmer operates independently, repaying the loans directly to the lending agency.
- b) Joint operations: Like individual operations, except that for specific tasks both land and labor are pooled and paid according to the amount of labor and capital provided (e.g., harvesting of the crop, irrigation).
- c) Group farming: Much the same as joint operations except that the pooling of resources and joint operations center on farm enterprises operated in common (e.g., bananas in common, food crops individually).
- d) Cooperative farming: Land and capital are cooperatively owned and individuals will have reversion rights. Wages are paid according to the amount of work performed, and payments on land and capital are made on the basis of contributions by individuals to the cooperative farming venture.
- e) Collective farming: Dr. B.R. Ambedkar in 1947 came out with a solution of collective farming. He felt that neither consolidation of holdings nor tenancy legislation will improve agriculture productivity. Under collective farming, all farm enterprises are operated collectively. Land and all capital are owned collectively, ordinarily without reversion rights. Wages are paid with no payment for land or capital individual members may have contributed. The process of collectivization must be completely voluntary and gradual then only it will be successful.
- f) Corporate farming: Center for Rural Affairs define corporate farming as a system where the farm owner, the farm manager and the farmworker are different people. Maharashtra allows agribusiness firms to buy and operate large landholding for R&D and export-oriented production purposes only. Recently Maharashtra government allowed corporate farming on government wasteland. Government needs to think about the large scale farming through contract farming on lands leased by agribusiness companies. Corporate farming through contract farming can ensure precision farming, drip irrigation and quality standards (Dash, 2004).

A combination of these types of integration may be used to suit specific circumstances. The final decision on the degree of integration may vary according to institutional and technological requirements.

Comprehensive direct intervention:

As an alternative to the restricted scope of limited direct intervention, the Government may choose to speed up the land redistribution process aiming at a state-wide impact. This comprehensive direct intervention can be land purchase and disposal programs that speed up and stimulate the conditions of a competitively functioning land market (land bank)

Landbank:

To speed up the land redistribution process that is slowly taking place through market mechanisms, the Government may decide to increase the land supply on the market to match the foreseeable demand. To facilitate the process the Government may form a land bank that would acquire properties for sale on the open market (or expropriate land, when necessary), which in turn would be sold to industry or farmers in appropriate sizes once the land is developed. Besides this function of adjusting the supply of land to demand, the land bank may fulfill other tasks. The most important would be to ensure full and rational land utilization and prevent subdivision of lands below viable economic size. The land bank can fulfill these aims by attaching conditions to the transfer of land to industry or farmers. A convenient system is to effect the transfers by lease for the number of years required to pay for the land. During the lease period, the industry or farmer must comply with the farm production plan as a condition for continuing in the program. At the end of the established period the land becomes a freehold under a final limitation giving the land bank first choice of the property in case of sale and the right to acquire it for reallocation to one heir, with compensation to the others, should the holder have died.

Realization of the multiple benefits of a more egalitarian development of agriculture is dependent upon choices that the Government makes on land redistribution and on its efforts to promote new forms of organizing the systems of production. Land redistribution can only play a meaningful role within the wider context of other agricultural development activities. The benefits of a land redistribution process can only be fully enjoyed if an integrated transformation of the agricultural sector occurs. Existing constraints on marketing, capital and the availability of inputs must also be removed to achieve the transformation.

3. Seeds

The seed is the single most important input in crop production. It carries the genetic potential of the variety and determines the ultimate productivity of all other inputs. The main role of other inputs in crop production is to exploit to the maximum genetic potential of the seed. Therefore, the seed is and should always be the basic prerequisite of any food security scheme. It is estimated that farmers in the country currently lose approximately INR 1050 billion every year to pests and diseases. If pests' growth is not stopped at a critical time, it results in massive crop loss, sometimes as high as 70 per cent (Gharde Yogita et al. 2018).

The prime solution to this problem is Genetically Modified (GM) crop that can withstand pests, droughts and increase productivity. GM crops need to pass the government norms about the safety and cost-effectiveness of variety before their use as certified seed.

Genetic modification in crops involves altering a seed's DNA in order to, say, increase its resistance to pests and insects. These changes can mean a huge boost to productivity and overall food supply. In the West, GM foods are fairly common; the US, for instance, cultivates eight crops using this technology.

In India, there's just one: Bt cotton. Bt stands for Bacillus thuringiensis, a bacteria that naturally produces a protein—a biological pesticide—that kills the common crop pest bollworm. It was approved for use in India in 2002, and since then has helped make the country the second-largest cotton manufacturer in the world. Today, GM seeds account for over 90 per cent of cotton sown in India.

As per research GM crop technology adoption has reduced chemical pesticide use by 37 percent, increased crop yields by 22 percent and increased farmers profit by 68 percent (Wilhelm Klümper & MatinQaim, 2014). Therefore adopting technology that will lead to higher crop productivity is essential to feeding the growing Indian population.

The World Health Organization (WHO) has forward and approved GM crops as being free if alleged risk. Its guidelines have observed as follows: "GM foods currently available on the international market have passed safety assessments and are not likely to present risks for human health," the WHO guidelines note. "In addition, no effects on human health have been shown as a result of the consumption of such foods by the general population in the countries where they have been approved"⁴.

The government needs to resume field trials which were stuck in limbo in India since 2010 due to an unofficial moratorium. The government currently is evaluating individual reports on certain crops but there is no umbrella policy in place yet. Agriculture universities can play a major role in field trials of GM crops. The government needs to encourage agriculture universities for such field trials and the results of these experiments will help the government to form the concrete framework for field trials of GM crops.

In India, some environmentalists have called GM crops "toxic" and hazardous to health. Some have expressed concerns their consumption could "transfer antibiotic resistance, toxicity, and allergenicity." They argue that since genetic modification is a pretty recent technology, the effects of prolonged consumption of GM foods on human health aren't known. However, the general consensus of the roundtable expressed the desirability of allowing the trials and use of GM technology.

It may be instructive to compare the policies pursued in China. China faces similar food security challenges with the largest population. China, though, has been using GM crops for the last two decades. Today, with just 7 per cent of the global arable land, China feeds 22 per cent of the world's population. Such a boost is needed in India—and fast. The government needs to take bold and decisive steps in case of GM crop issue as earliest.

Another solution to this problem is the production and distribution of foundation seed. The State Seed Corporation did a great job in initial years in meeting the seed requirement is not dealing with lot many varieties. The best way would be to study the seed requirement of each village for the different crop it grows and provides foundation seed required to a few select farmers from the village to grow. The villagers register indent with farmer producer and collect the seed at harvest. There is no processing, storage and transport cost and so the seed will be much cheaper. There would be no scope for adulteration as well. Maharashtra State Seed Corporation (MSSC) should exclusively produce the foundation seed to meet the requirement using the taluka seed firms.

Maharashtra has four agriculture Universities. In initial years the research output from these institutions supported the state's agriculture development significantly. With the passage of time, they seem to have lost their shine, are not in a position to meet the challenges of changing times. We need to have a fresh look at our Universities and the way they need to move forward to be able to contribute to the development of our agriculture in a substantial way tuned with the needs of the future. They need to be equipped to be able to get into new frontiers of research having the potential to address current and future challenges of agriculture in the state.

4. Efficient and improved agricultural water management and Crop Diversification

Groundwater is the major source of the irrigation needs of irrigated agriculture. Currently, about half the area under irrigation in the country is irrigated from groundwater sources. Excessive reliance and exploitation of large-scale groundwater development have led to a fall in the water table in many areas. Overexhaustion groundwater is leading to declining water table levels and failure of tube-wells. Pumping costs are rising, as is the energy consumption. In the coastal areas, this has led to the ingress of seawater, with serious environmental implications.

Despite massive investment in irrigation the state has so has been able to bring only 20 percent of its net sown area under irrigation. 80 percent of the cultivable area still remains rain-fed. More of it is in Marathwada and Vidarbha which are lagging behind in development. The state for long had emphasized on integrated soil and water conservation work on watershed basis following the ridge to valley approach with the seminal principle of people's active participation. Area treatment with a ridge to valley approach harness and use every drop was the foremost principle followed in planning and development of the watershed. Now under the new program of "Jalayukta Shiwar" area treatment is given a go by and full focus is on 'Nala' deepening and widening with a cement 'Bandhara' at the mouth of the watershed. A whole program is a machine and contractor driven. Obviously focus will be on high turnover works and not the small interventions involved in area treatment. Without area treatment, the soils from the watershed will erode and fill the 'Bandhara' down below making whole investment infructuous. It is therefore highly desirable, to revert back to the old approach of detailed area treatment on the ridge to valley basis and prevent the use of contractor and machinery. The whole effort should be of the villagers by the villagers and for the villagers.

We have hundreds of successful example of villages being able to harvest the entire rainfall, supplement groundwater, avoid water-intensive crops and yet go for remunerative cash crops under irrigation and address the problem of drinking water for humans and livestock. The villagers do a water budgeting and strictly adhere decisions taken in the interest of the community as a whole.

One of the important subject of round table conference 'Water Management and Budgeting' was addressed by experts. It was argued that Maharashtra has the largest number of dams in India, but much lower irrigation compared to the national average of 45per cent. It has pending

projects with a balance cost of Rs. 90,000 crores. Maharashtra state's irrigation potential is 49 lakh hector. Out of 49 lakh hector, a total of 24 lakh hectors is irrigated. In Maharashtra 87 major, 297 medium and 3526 minor irrigated projects have been completed. 78 major, 128 medium and 543 minor projects are waiting to be completed. And the irrigation capacity created is 49 lakh hectares. Incomplete and decade-old projects are not in whose vicissitude. The 'Sanatan Prashna' has remained unmistakable for the fact that the dry-land area has reduced due to this construction-lovers.

Further issue of 'Water Management' was discussed. Water management means to make available water budget and water supply programs in the dam; The time of the canal and arrangement and proper maintenance; Water Harvesting; Measuring water and soaked areas; Keeping the account for the harvest season; Announcing water accounts at the end of the year; To take measures to remove the errors that have been detected this year and to arrange this cycle will be better every year. If a few minor projects are omitted, the above methodology is not implemented. The smaller the project, the more neglected it is. The true nature of those projects is that of 'Watchmen Managed Project'! Many projects have destroyed canals and drainage system. Tale farmers do not get water. If we leave a hundred acres of water from the canal, then only 20-25 per cent of the crop comes to the root of the crop. Water management was neglected due to water conservation management. Laws, rules, notifications, and agreements are required to handle the irrigation projects. But that does not happen at all. To implement the legal process, the law has to be filled by appointing officers, fixing their jurisdictions and providing them rights, etc. Maharashtra has one, not two, there are nine irrigation laws. But eight of them do not have rules. The absence of rules means nothing is prescribed by the law. Due to the implementation of the law, good provisions of the law are not in force.

In order to regulate the water in the state, Maharashtra enacted the Maharashtra Water Resources Regulation Authority Act 2005. A semi-judicial independent authority was established. Important provisions of the Act of river bank administration and Integrated Water Plan instead of the Irrigation Development Corporation. It was to be implemented within six months of the act. But even after thirteen years, those provisions have not yet been implemented. The law does not have rules for the authority that has the responsibility of water-law.

The State Government has taken a policy decision on 23rd July 2001 on the formation of cooperative Water Users' Associations (WUAs) and handing over the area for the irrigation management to WUAs, on all irrigation projects. The policy seeks:

- 1. To reduce the gap between irrigation potential created and actual area irrigated
- 2. To increase the water use efficiency of irrigation management
- 3. To restrict expenditure on maintenance and repair of the irrigation system and
- 4. To recover water charges effectively.

So far 1656 WUAs are formed under MMISF Act, 2005 and 1395 under co-operative Act, 1960 with CCA 707975 ha and 512918 ha respectively.

Even though these WUA are working in Maharashtra, they have been facing serious problems. The most important problem and difficulties reported are inadequate field channels, lack of or inadequacies of government support or funding, lack of training to members, difficulties in handling extreme water scarcity, high cost of maintenance, high cost of electricity, non-availability of water in the canal, complaints from tail-reach farmers, and lack of freedom in determining water rules.

Another important issue is water quality. Changes in water quality are adversely affecting agriculture and vice-versa. Inefficient and/or overuse of fertilizers and pesticides in agriculture and untreated disposal of industrial and urban wastes are leading to increasing contamination by such elements as lead, zinc, copper, chromium, cadmium particularly in areas having high industrial activity.

Another serious problem is climate change which is affecting agriculture in a number of ways including rainfall. A study was did on Maharashtra by The Energy and Resources Institute (TERI) on impending climate change and its impact on the state have clearly indicated, increase in rainfall all over the state though there are regional variations. Increase in surface runoff is projected in certain catchments e.g., sub-catchments of Godavari are expected to have increased runoff in the month of July. It is also projected that the increase in the number of low rainfall days in south-central Maharashtra indicates dry periods in this region which is likely to have an impact on water resources. The number of dry spells will increase, so also the duration of each dry spells. This will pose significant problems for rain-fed agriculture. Protecting the crop during the dry spells through protective irrigation will require the support of groundwater or water from small water harvesting structures. Cropping pattern, varieties will have to change. Farmers will have to go for more judicious use of water with the help of technology and cultural practices. Govt. needs to prepare a blueprint of the action plan and implement it straight away to be fully prepared to mitigate the impact of impending changes.

Following are the recommendations:

- No new irrigation projects should be started, till the ongoing ones have made substantial progress.
- Project wise time schedule of completion should be worked out and the required budget provision should be compulsorily made available.
- Dams to root through drip and sprinkler should be attempted in all projects where the dam is complete but canals are not dug, to avoid time overrun and cost overrun on account of delay in land acquisition and increase in cost.
- Downstream dams should be filled up to eighty percent before storage accumulation in upstream dams are allowed so that in case of a deficient monsoon so that the deficiency is equally shared.
- 100 percent sugarcane should be on a drip through incentives and disincentives through integrated projects covering large area through one system.
- Promote efficient use of irrigation water in districts with plantation crops, such as Aurangabad, Amravati, Bhandara, Nagpur, Nasik, and Jalgaon, through continued subsidies for drip and sprinkler irrigation systems and farm ponds, combined with extensive awareness campaigns for smaller and less educated farmers.
- There is a requirement for diversified cropping systems in perspective of climate-related risks. Cultivation of pulses can be an imperative strategy for Climate Resilient Agriculture (CRA). Pulses are legumes which enhance soil fertility. Thus, diversification to pulse cultivation can prompt to a win-win situation in terms of achieving self-sufficiency and raising soil fertility (S Mahendra Dev, 2016). As per the Indian Institute of Sugarcane Research, (IISR), Lucknow, Maharashtra uses the highest amount of water for sugarcane production in the country. According to IISR report published in 2016, Maharashtra uses 292 liters of water for the production of one kilogram of sugarcane. Sugarcane is the highest water-intensive crop which requires 1500-2500 mm of rainfall/water whereas general crops require 300-500 of rainfall/water to complete the growth cycle⁵. So Maharashtra agriculture must think about 'more crops from fewer drops' and with less environmental impact.
- In recent years frequent and intense extreme weather events such as droughts, frost is becoming more frequent. Agriculture is most vulnerable to climate change. For a better and reliable forecast of weather, automatic weather stations need to be installed in every village places like Grampanchayat, government schools, colleges, etc.
- With the ever-increasing diversion of irrigation water for non –irrigation purposes it has become essential to recycle the used water back in agriculture after appropriate treatment. Mandate water recycling and reuse by Govt., Municipal Corporation, and

- private sector industries and encourage early adoption through tax concessions. The Govt. should come with a policy on sewage treatment and wastewater recycling.
- Installing a floating solar panel on large water bodies can be another solution. Floating solar panels are becoming very popular in developed countries like Japan, USA. Floating solar panels gives a dual benefit. First it generates energy and second, it can reduce evaporation in dry climates by as much as 90 percent.
- Bring essential amendments in State groundwater legislation to prevent over-exploitation of groundwater. There should be a complete ban on digging new irrigation wells in dark category water shade. There should be a limit on the depth to which one can go.

Water Pricing:

Given the continuous and ever-expanding water demand, water resource scarcities, degradation of the water environment, and water security issues are becoming increasingly serious.

The agricultural irrigation sector is one of the dominant users of water resources. Generally, capital investments are required to move water from the natural water bodies to significantly large fields. The very long gestation period in constructions and longer life of the asset created the governments have to take initiative in planning financing and operating cost of projects. In many cases, government agencies also get involved in running and managing irrigation schemes. In stark contrast, the price of water is generally low, which neither objectively reflects the scarcity of water resources nor contributes to solutions for water resource problems. Although provisions are made to recoup part of the financial and amortization costs and cover the entire O&M costs. Tariffs are charged only when the scheme becomes operative. When water is taken from aquifers, most or all capital is privately provided by the farmers themselves or by small-scale collective organizations. In such a situation, there are often no water prices or tariffs.

Irrigation water pricing is a contentious policy issue, it is primarily focused on 'publicly' created 'surface water' sources and where infrastructures have been built to deliver water from the source to the fields. These infrastructural facilities are created through three types: private, public or joint public-private. Farmers often pay very low prices for water delivered and used which do not always cover O&M costs. They pay much less than households or industry, although price comparisons need to be made with caution. Firstly there is not proper metering of power consumption for agriculture and irrigation purpose. The lack of a proper measure of users and pricing incentives to reduce water consumption results in careless and wasteful use of water. It would be difficult to promote the efficient use of available water without the appropriate level of incentives/disincentives through pricing.



The typical methods of pricing include calculating shadow prices for various types of water resources using mathematical models, using the full cost of water resources, or using farmers' willingness to pay for water as a reference for pricing. Policy Makers should adopt a one water pricing method and should implement across the state for all types of uses of water.

Extension Services:

Extension services are critical to providing crop management advice – such as the type, amount and relative importance of farm inputs, crop choices, irrigation scheduling, and market options – and to improve agricultural and livestock practices. It is the duty of the government to ensure that extension officers are available free of charge and assist farmers where and when needed. Previously Maharashtra was having good extension service network. Agriculture department was providing good extension services to farmers. Now, extension services in Maharashtra have almost vanished.

5. Domestic and International Policies related to Agriculture

Agricultural produced are most sensitive to market forces of demand and supply. Farmers are greatly affected by these price fluctuations. Therefore to avoid unwarranted fluctuations at prices the government declares 'Minimum Support Price' (MSP). Farmer is encouraged for higher investment and adoption of modern technologies because of the guaranteed price and assured markets. The government of India declares MSP for 22 crops and Maharashtra government declare for 19 crops in 2017-18 before the sowing season. Again there are problems with MSP. One case study of Tur Daal is given below to understand the issues of MSP.

Market Failure Case Study of Tur Dal:

Thousands of farmers especially from Marathwada region responded to the state government's appeal to plant more pulses in the wake of the dire shortage and spiraling prices caused by the drought in 2016. Aided by a good monsoon, there was a bumper crop in the year 2017, from the increased area under tur cultivation-1,394,300 hectares-a rise of 163 percent. Tur dal production in the state was estimated at 11.71lakh metric tonnes in 2017 against the 4.4 lakh metric tonnes in 2016. Again the government revised this estimation fifteen days later. New estimation showed no change in the area but increased in the yield. Revised estimated figures showed the production of Tur to 20.35 lakh tonnes which were record-high production. The Government of Maharashtra announced the minimum support price (MSP) 5050 per quintal. As soon as the farmers reached to markets with their Tur prices collapsed below MSP due to a large number of arrivals. But, the government failed to purchase offered at that price by the farmers. Private traders started offering far less-between Rs 2,600 and Rs 3,000 per quintal. And farmers were forced to sell their Tur dal to private traders as there were a huge delay and inability from the government in the procurement of Tur Dal. This happened because of two reasons. First agriculture department did not have reliable data of Tur Dal production. Then the estimations made by the department of agriculture were too off the mark and unreliable. Perhaps the government did not expect the bumper production of Tur. The second reason was the lack of adequate storage. The government was not having enough space to store the procured Tur. Therefore government procuring agencies were delaying the procurement. As a result of this, farmers were forced to sell their Tur Dal to private traders. Private traders took advantage of this and they purchased Tur Dal from farmers at Rs. 2,600 to 3,000 per quintal which was way below declared MSP. Plausibly a part of low price purchased Dal was resold to the government at MSP Rs. 5050. In this entire process, only traders made money.

The failure to procure and give the MSP to the farmer was a complete failure and case of mismanagement. Government intervention did not work up to the desired extent which results in farmer's distress. This kind of failure leads to popular and politically demanding farm loan waiver schemes. Though these schemes are economically incorrect they are politically correct especially when elections are around the corners. In recent years farm loan waiver demand has become a habit. Between 2009 and 2017, the Agri NPAs have gone up sharply from less than 2per cent to6per cent of the loan book. In the year 2017–18 all PSU banks write-offs agriculture loan worth of 1,28,229crores⁶. Though banks write-off these loans from their accounts the actual burden vested on the state government budget and not on the banks.

These farm loan waivers are having its own ill effects. First, it increases the fiscal deficit of the state government. Second, it creates a kind of moral hazard for lenders. As farm loan waivers are almost like peer pressure to default. Farm loan waivers may appear to be visually simple, yet the damage they do to state finance is much more multifaceted than is visible on the outside. The MSP procurement system needs to improve and make it more effective. The following steps can be used.

- 1. Farmers awareness is very much important. The information about MSP needs to be disseminated at the lowest level so that the knowledge would increase the bargaining power of the farmers.
- 2. Most of the time MSP rates are announced after the sowing season beings or at the time when the farmers have already initiated the necessary preparation for sowing a particular crop. MSP should be announced well in advance of the sowing season so as to enable the farmers to plan their cropping.
- 3. After the harvest farmers need to register online and within seven days of registration procurement should be completed at the nearest center.
- 4. After the procurement within seven days, online payment should be made to the farmer's bank account.
- 5. The government needs to improve the procurement facilities such as drying yard, weighing bridge, etc. More godowns should be set up and maintained properly for better storage and reduction of wastage.

MSP insulate farmers from unfavorable market conditions by assuring them a minimum return for their products.

The government has created a number of institutions to address the needs for institutional reforms. Unfortunately, no concrete work has been done to date to boost agriculture productivity. Gaps in physical infrastructure and logistics hamper the establishment of efficient agro-food supply chains and drive up transaction costs, particularly for small and marginal farmers. While India's quality of roads, railroads, ports, air transport, and electricity supply is better than its neighbors in South Asia, it lags considerably behind the average of East Asian economies. Aside from road transport and freight services quality, inter-state checkpoints and other checks during transit add to delays and uncertainties in the supply chain. Market infrastructure also suffers from unintended impacts of regulations in domestic markets for agricultural products: many government-regulated wholesale markets (mandis) do not have the facilities needed for handling, grading and storing perishable agricultural products and the regulatory environment has deterred private sector involvement. Limited connectivity and inadequate storage infrastructure lead to post-harvest losses and impact farmers' incomes as well as their incentives to produce. The highest post-harvest losses are registered for fruit and vegetables (ranging in 2015 between 4 per cent and 16 per cent of total output, depending on the state), followed by sugarcane, pulses, livestock, oilseeds, and cereals. Losses occur at all levels of the supply chain: at the farm gate, during transportation, wholesale, and retail. Moreover, the shares of high-value sectors in food processing are low: for example, fruit and vegetables and meat products account for less than 5 per cent and 8 per cent of the total value of output respectively, compared to cerealbased products (21 per cent) and oilseeds (18 per cent). In the case of milk production, only 22 per cent of cities and towns are served by organized milk distribution networks and only 15 per cent of milk marketed is packed.

The food processing and retail sectors have been growing rapidly over the past decade, supported by the reforms in the enabling environment for business and increased private investment and growing demand due to rising per capita incomes. Although, both sectors still have a dualistic structure: food processing, with a relatively small (in number of units) but capital-intensive organised segment coexisting with a pervasive, mostly rural, and more labour-intensive unorganised segment; food retail, dominated by unorganised and semi-organised retailers like Kirana stores (mom-and-pop stores), grocers and provision stores that account for 98per cent of food sales, while larger chains and stores are mostly reaching big cities and towns. Major constraints in the development and growth of both sectors include the absence of adequate connectivity infrastructure, the inadequacy of information and marketing linkages, lack of reliable quality of electricity supply, the absence of cold chain systems and assured and continuous supply of raw material. This problem is further exacerbated by the existence of large numbers of small and marginal producers.

Indian agriculture has increasingly become integrated with world markets: agro-food trade export as a share of agricultural GDP was just 5 per cent in1990 when economic reforms started but reached 16 per cent in 2016. However, it is still low compared to the share of India's total merchandise exports and imports as a percent of India's GDP, which increased from 14.7 per cent to 42 per cent over the same period (OECD/ICRIER, 2018). Moreover, India's participation in agricultural global value chains (GVCs) mirrors the constraints and challenges encountered at the level of domestic agro-food chains and is weaker than its engagement in manufacturing or services GVCs. In terms of sourcing inputs from value chains (buying from GVCs), India's strongest linkages are in wheat, beverages and tobacco products, bovine meat, and dairy products, but overall the sector has low global backward integration (selling inputs to GVCs), particularly for processed food products.

In Maharashtra, the share of agriculture and allied activities sectors in the total Gross State Value Added (GSVA) is about 12.2 percent during 2016-17 as against 15.3 percent during 2001-02 which shows a declining trend over the period, whereas the major portion of the population is still dependent on the agriculture sector⁷. Though the share of agriculture and allied activities is decreasing, there is an increase in the consumption of fruits and vegetables, milk and milk products, poultry, meat, fish and flowers due to changing lifestyle.

In recent year the production of fruits, vegetables and flower in Maharashtra is increasing mostly because of shade house, poly house and Greenhouse. The Maharashtra state is a number one exporter of grapes, mango, pomegranates, banana, sapota, custard apple, and papaya. Maharashtra state ranked second in the export of other fresh fruits and mango pulp. In the case of exports of vegetables like onion, green chili, bottle gourd, okra, sweet corn, garlic, and cucumber Maharashtra state ranked number one. Though Maharashtra is a leading exporter of fruits and vegetables, there are growing challenges state is facing. During the discussion in the conference the growing challenges for export and import were listed. According to him, there are ten main challenges namely quarantine regulation, pesticide residues, food safety, traceability, non-tariff barriers, import of patented varieties, good logistic support, strong backward linkages for quality production, cluster development approach and packaging development.

To overcome these challenges it was suggested that the separate EXIM policy for agriculture and allied sector. It was also suggested that to formulate National Agriculture Export Policy in line with the vision to double the farmer's income and increase the share of agricultural exports. By making policy changes in the Agricultural Produce Market Committee (APMC) act allowing the contract farming for the purpose of exports, liberalizing labour laws in industries concerning

agricultural products, promoting Good Agricultural Practices (GAP), working on quality assurance system, planning for pre and post-harvest infrastructure creation for further value addition, incentivizing value addition and food processing industries, etc. could be included as part of the State's Export Policy.

An approach of developing product-specific clusters in different agro-climatic zones of the country would help in dealing with various supply-side issues viz., soil nutrients management, higher productivity, adoption of a market-oriented variety of crop, use of good agriculture practices, etc. Integration of processors/exporters with farmers will ensure better returns and a stable market. The State Governments may identify such clusters which have a high potential of export and work with related agencies for facilitating export from those clusters.

To boost high value and value-added agriculture export, focusing on perishable, there is a need for good infrastructure and logistic. Creating a series of cold chain facilities for perishables, creating vapor heat treatment and irradiation facilities to enable export to specific markets, etc. are some of the interventions which need to be initiated by the State Governments. State Governments need to identify the infrastructure bottlenecks, issues relating to logistics and then identify sectors which are amenable to private investment/foreign direct investment (FDI) and sectors where the government has to invest. Inland Container Depots (ICD) with good revenue models could be thought of in the private sector whereas cold chain logistics, warehouse, rail and road infrastructure, etc. would require public funding. For example to create a cold chain supply (CCS) network government can adopt a public-private partnership (PPP) model. A clear action plan on the infrastructure gap would enable the State and Central government to identify resources for such infrastructure.

Another important issue of agriculture export is the most stringent regulatory policy implemented by the importing countries. Measures related to technical barriers to trade (TBTs) and to sanitary and phytosanitary (SPS) standard have become important dimensions of any trade policy. Exporting promotion bodies like The Agricultural and Processed Food Products Export Development Authority (APEDA), Marine Products Exports Development Authority (MPEDA) need to deal with issues pertaining to market access, viz. Pest risk analysis, risk assessment of food products, submission of documents relating to animal disease control programs, etc. efforts for accessing new markets. In order to achieve the objectives of the SPS agreement, we need to bring in domestic reforms. Our residual testing laboratories and other pre-export infrastructure should be at par with international best practices. State government needs to address the concerns of exporters relating to national standards, harmonizing it with Codex or



other international standards, import clearance of ingredients by Food Safety and Standards Authority of India (FSSAI), risk-based inspection/client accreditation system for quicker export/import clearance could also be discussed in this platform.

As a part of the ease of doing business, the government needs to take initiatives for online transaction and to reduce the paper the paperwork of exports different software likes ICEGATE of Customs, DGFT's software, Phytosanitary Certificate, Export Development Authorities' software need to be linked with each other.

Day by day it is becoming necessary and important to establish and maintain a single supply chain and standards for the domestic and export market. There has to be a convergence of policy related to quality standards set for the domestic market and those set for the export market. This is particularly challenging for unorganized and fragmented sectors such as fruits & vegetables, livestock, and dairy where traceability continues to elude. As a result, India's agricultural produce often tends to fall short of standards laid by importing nations. Limited control over farm practices and domestic marketing also allow vested and competing interests to spread fears and stifle trade.

Minimum Export Price Policy:

Minimum export price (MEP) is the price below which domestic traders are not allowed to export certain notified commodities from India. MEP is imposed to tackle the rising domestic prices or the demand-supply mismatch in the country. MEP is the quantitative restriction on trade. At present Potato are under the MEP restrictions. In 2015, the Government of India has removed the Onions from MEP restrictions.

The state government has successfully evolved the mechanism to deal with SPS certification mainly for exports. System of registration and residue testing certification in exports needs to be gradually extended to domestic markets as well. The state should involve Block/Taluka level higher education institutions in evolving laboratory set-ups and use them for a variety of purposes varying from soil/water testing to residue certification.

There is an increasing need to set up a stable and predictable 'Agriculture Export Policy' which targets for reviving the whole value chain from export-oriented farm production and processing to transportations, infrastructure, and market access. The Agricultural Export Policy must be dovetailed with the existing structure for agriculture and surplus agriculture produce. There is a need to create an approach that will convey a stable source of income into the pockets of farmers through vital export opportunities.

6. Agriculture data and related issues

Given the overwhelming significance of information and data in planning and policymaking, it is alarming to acknowledge how immense the data vacuum is. All aspects of agriculture policymaking e.g. food security, land ownership, irrigation, seeds and fertilizers, production and agriculture export each of these require different types of data information for policy responses and actions. It is necessary to evolve and build a system of capturing, observing and measuring data that affords 'commercial intelligence' necessary for effective pooling responses and interventions.

This 'information vacuum' is a great concern despite the government's efforts, agriculture sector lacks reliable data.

Agriculture data needs to be reliable, and with 'high-frequency' that will reflect the necessary details and scope of the problem at a granular level. The finer the level of details of the data, the more precise and accurate the solutions can be. Upon collection and storage, the data should be sliced by region, crop, rainfall, humidity, etc for management and monitoring purpose. It should also be updated regularly with the help of other public/private institutions involved in data management.

The Union government should establish a central-level institution with branches at state-level for data management. The institution should facilitate appropriate standardized collection, validation, and dissemination of data through various sources and channels. It should also serve as a one-stop repository of all government-collected data and facilitate the third-party assessment of the validity of data. Appropriateness of interventions or solutions hinges on the accuracy, and timely availability of data.

The Government of Maharashtra needs to set up a high-level committee to address the problems related to integrity and timeliness of the agriculture data. The committee should submit a report within the fix time period and the findings of the committee should be made public for suggestions.

7. Regional Imbalance

Though Maharashtra state is a developed state, the development is very uneven across regions of the state. Geographically Maharashtra state is divided into five regions i.e. Konkan, Western Maharashtra, Khandesh, Marathwada, and Vidharbha. Marathwada and Vidharba are less developed and backward regions compared to other regions. Majority of the areas in Marathwada and Vidharbha depend on traditional dryland agriculture. Low rainfall condition, scarcity of irrigation, lack of micronutrients in soil, and because of frequent pest attack farmers are often exposed to higher risk in these two regions which result in loss of income. Making agriculture profitable business is a task in these regions. To overcome this challenge following measures can be implemented region wise. Few suggestions are taken from the Kelkar Committee report.

- 1. The regional watershed mission for Vidarbha, Marathwada and Rest of Maharashtra should be created for the execution of the program in the next five years.
- 2. Mission mode program on dry-land agriculture should be created in convergence with the watershed mission and target of increasing productivity of dry-lands within next 10 years should be the mandate of the mission.
- 3. Micro-irrigation shall be made compulsory for sugarcane as well as for all horticulture crops in the future. Vidarbha and Marathwada shall be provided special incentives for the next 5 years to convert all fruit crop area with micro-irrigation to achieve higher water productivity.
- 4. 'Maharashtra Agro-engineering company' should be established for the implementation of Micro-irrigation program for sugarcane, horticulture and other crops by converging and merging budget of all schemes and departments. The proposed company shall be headed by professional agricultural engineers and support team for scientific execution of the program.
- 5. To address the issue of dry land, initiate 'Mission Mode' program for the development of dry-land agriculture in Marathwada, Vidarbha, and parts of Western Maharashtra.
- 6. To promote the horticulture in backward regions of Marathwada and Vidarbha, a program like 'Horticulture Mission' need to be implemented.
- 7. Separate Regional mission on agricultural mechanization in Vidarbha, Marathwada Konkan and Western Maharashtra.
- 8. Exemption of taxes on agricultural machinery

- 9. Region-wise agro-processing industries/parks need to be encouraged to promote agriculture and to protect agriculture produce from market price fluctuations. There is great potential for the cotton processing industry, soya food processing, fruits and vegetable processing industry in Vidharbha and Marathwada region.
- 10. Micro-irrigation equipment's and equipments required for small farms need to be given subsidy.
- 11. Innovative and Best Practices in agriculture need to be promoted at a large scale level.

6. Concluding Remarks

In the last three years, Indian agriculture has witnessed a spate of agitations symptomatic of lasting distress in an agrarian economy. Two agitational demand which became an expression of such distress has been 'debt-relief' and old chronic demand for raising minimum support prices. Union government has responded by this by declaring scheme for doubling of income of farmers. In fact, these two demands have been the rallying points of all farmers' agitations since independence. The popular support for them among farmers notwithstanding, one must realize that such schemes and policies will not work enough unless provided by certain structural reforms in agriculture. Round table, therefore did not deliberate on these issues, (except the market reforms related dimensions) and focused on the structural reforms in land, water, technology, and market structure.

We are that the effective execution of a technology development strategies proposed in the earlier section, combined significant expansion in irrigation, promotion of new irrigation technology, making necessary modifications to extent of infrastructure of water resource system, recycling-reuse of water, pricing of 'water' may enable many small farms to cross the threshold of economic viability. Further support to them may also come from the expansion in the rural non-farm employment opportunities particularly in trading of farm inputs and services and trading and processing of farm produce associated with accelerated land-intensive agronomic growth. We believe that this would provide much-needed respite to the small and marginal farmers before they eventually move out of the farm sector for getting ingested in more productive and paying activities. The policy should aim at about the prospects of stepping up growth in agriculture in Maharashtra, reducing its inter-regional disparity and simultaneously make it serve the goal of poverty alleviation. What is desirable is a political commitment to promoting investments for the development of irrigation and other infrastructure and technologies for agriculture, without neglecting the development backlogs of various regions and districts within them.

References

¹Economic Survey of Maharashtra 2018-19.

²Economic Survey of Maharashtra, 2018-19.

³Economic Survey of Maharashtra, 2018-19.

4http://www.Who.int/foodsafety/areas_work/food-technology/faq-gentically-modified-food/en/

5https://claroenergy.in/5-most-water-intensive-crops/

6http://pib.nic.in/newsite/PrintRelease.aspx?relid=181636

⁷Economic survey of Maharashtra 2017-18.

Dash, M, (2004): "Political Economy of Contract Farming", Mainstream, Vol. 42, Issue, 52

Dev Mahendra S. (2016), "Water Management and resilience in Agriculture", Economic & Political Weekly, Vol. 51, Issue 8, pp. 21-24.

Manjunatha A.V., Anik A R, Speelman S., Nuppenau E.A., (2013), "Impact of land fragmentation, farm size, land ownership and crop diversity on profit and efficiency of irrigated farms in India", Land Use Policy, Vol. 31, p.p. 397-405.

Gharde Y, Singh P. K. Dubey R.P, Gupta P. K., (2018), "Assessment of yield and economic losses in agriculture due to weeds in India", Crop Production, Vol. 107, pp. 12–18.

Wilhelm Klümper, MatinQaim, (2014), "A Meta-Analysis of the Impacts of Genetically Modified Crops", PLoS ONE 9(11): e111629. doi:10.1371/journal.pone.0111629

OECD/ICRIER (2018), "Agricultural Policies in India, OECD Food and Agricultural Reviews", OECD Publishing, Paris.

Economic Survey of Maharashtra, 2017-18

http://www.Who.int/foodsafety/areas_work/food-technology/faq-gentically-modified-food/en/https://claroenergy.in/5-most-water-intensive-crops/

http://pib.nic.in/newsite/PrintRelease.aspx?relid=181636

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