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Challenges and Opportunities**

S.Mahendra Dev



Indira Gandhi Institute of Development Research, Mumbai

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S.Mahendra Dev

Indira Gandhi Institute of Development Research (IGIDR)
General Arun Kumar Vaidya Marg
Goregaon (E), Mumbai- 400065, INDIA
Email (corresponding author): profmahendra@igidr.ac.in

Abstract

This paper examines the roles and challenges of small holding agriculture in India. It covers trends in agricultural growth, cultivation patterns, participation of small holding agriculture, productivity performance of small holders, linking small holders with markets including value chains, role of small holders in enhancing food security and employment generation, differential policies and institutional support for small holders and, challenges and future options for small holding agriculture including information needs. It also provides lessons from the experience of India on small holding agriculture for other countries.

Keywords: Small and marginal farmers, food security, livelihoods, value chains, institutions

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1. INTRODUCTION AND BACKGROUND

Agriculture plays a pivotal role in the Indian economy. Although its contribution to gross domestic product (GDP) is now around one sixth, it provides employment to 56 per cent of the Indian workforce. Also, the forward and backward linkage effects of agriculture growth increase the incomes in the non-agriculture sector. The growth of some commercial crops has significant potential for promoting exports of agricultural commodities and bringing about faster development of agro-based industries. Thus agriculture not only contributes to overall growth of the economy but also reduces poverty by providing employment and food security to the majority of the population in the country and thus it is the most inclusive growth sectors of the Indian economy. The 12th Five Year Plan Approach Paper also indicates that agricultural development is an important component of faster, more inclusive sustainable growth approach.

The structural reforms and stabilization policies introduced in India in 1991 initially focused on industry, tax reforms, foreign trade and investment, banking and capital markets. The economic reforms did not include any specific package specifically designed for agriculture. In the post-reform (since 1991) period, India has done well in some indicators such as economic growth, exports, balance of payments, resilience to external shocks, service sector growth, significant accumulation of foreign exchange, Information technology (IT) and stock market, improvements in telecommunications etc. GDP growth was around 8 to 9% per annum in the period 2004-05 to 2007-08. India is now 2 trillion dollar economy. Investment and savings rates were quite high 32 to 36%.

However, there have been exclusion problems in the country. In other words, real development in terms of growth shared by all sections of the population has not taken place. We have problems of poverty, unemployment, inequalities in access to health and education and poor performance of agriculture sector. One of the excluded sector during the reform period was agriculture which showed low growth and experienced more farmers' suicides. There are serious concerns on the performance of agriculture sector in the country. The post-reform growth was led by services. Commodity sector growth (agriculture+industry) has not been higher in the post-reform period as compared to that of 1980s. Particular worry is agriculture sector which showed lower than 2% per annum in the decade of mid-1990s to mid-2000s. There are also concerns on food security and livelihoods.

Small holdings agriculture which is the focus of this paper is important for raising agriculture growth, food security and livelihoods in India. It may be noted that Indian agriculture is the home of small and marginal farmers (80%). Therefore, the future of sustainable agriculture growth and food security in India depends on the performance of small and marginal farmers.

¹ Paper presented at "Emerging Economies Research Dialogue" Beijing, China, 14-15 November 2011 organized by ICRIER.

Agricultural Census data shows that there were about 121 million agricultural holdings in India in 2000-01. Around 99 million were small and marginal farmers. Average size has declined from 2.3 ha. In 1970-71 to 1.37 ha. In 2000-01. Small and marginal farmers account for more than 80% of total farm hhs. But their share in operated area is around 44%. Thus, there are significant land inequalities in India.

The role of small farms in development and poverty reduction is well recognized (Lipton, 2006). The global experience of growth and poverty reduction shows that GDP growth originating in agriculture is at least twice as effective in reducing poverty as GDP growth originating outside agriculture (WDR, 2008). Small holdings play important role in raising agricultural development and poverty reduction.

The objective of this paper is to examine the role and challenges of small holding agriculture in achieving agricultural growth, food security and livelihoods in India. The paper also shows that market oriented reforms are not sufficient and government intervention and other support are needed for small holdings to achieve the above goals. It is known that small farmers face several challenges in the access to inputs and marketing. They need a level playing field with large farms in terms of accessing land, water, inputs, credit, technology and markets.

Small holdings also face new challenges on integration of value chains, liberalization and globalization effects, market volatility and other risks and vulnerability, adaptation of climate change etc. (Thapa and Gaiha (2011). Recent “world-wide processes of farm change – commercialisation of increasing proportions of input and output: institutional developments such as super markets; privatization of key aspects of technical progress, and of output and process grades and standards – now indicate large farm focus” (p.59, Lipton, 2006). Therefore, support is needed for small holdings in the context of these world-wide processes of farm change. There are also high returns from investments in agricultural R&D, rural roads and other infrastructure and knowledge generation.

The paper is organized as follows. Section 3 gives a brief background on agricultural growth and policies on agriculture. Section 3 examines the roles and challenges of small holding agriculture in India. It covers trends in agricultural growth, cultivation patterns, participation of small holding agriculture, productivity performance of small holders, linking small holders with markets, role of small holders in enhancing food security and employment generation, differential policies and institutional support for small holders and, challenges and future options for small holding agriculture including information needs. Section 4 provides lessons from the experience of India on small holding agriculture for other countries.

2. BACKGROUND

One of the paradoxes of the Indian economy is that the decline in the share of agricultural workers in total workers has been slower than the decline in the share of agriculture in the GDP. For example, the share of agriculture and allied activities in the GDP declined from 57.7 per cent in 1950–1 to 15.7 per cent in 2008–9 (Table 1). The share of agriculture in total workers, however, declined slowly from 75.9 per cent in 1961 to 56.4 per cent in 2004–05 (Table 1).

Between 1961 and 2004-05, there was a decline of 34 percentage points in the share of agriculture in GDP while the decline in share of agriculture in employment was of only 19.5 percentage points. As a result, the gap between labour productivity in agriculture and non-agriculture increased rapidly.

In terms of growth, the performance of agriculture in the post-Independence era has been impressive as compared to the pre-Independence period. The all crop output growth of around 2.57 per cent per annum in the post-Independence period (during 1949–50 to 2007-8) was much higher than the negligible growth rate of around 0.4 per cent per annum in the first half of the last century. As a result, India achieved significant gains in food grains and non-food grain crops.

The highest growth rate of GDP from agriculture and allied activities of 3.9 per cent per annum in recent years was recorded in the period 1992-3 to 1996-71 (Table 2). If we look at decadal average 1980s recorded the highest growth rate of more than 3 per cent per annum. In the post-reform period, it declined to 2.76 per cent per annum. The deceleration in the growth rate of GDP from agriculture between the first half of the 1990s and the later period is glaring. It is disquieting to note that during the 1997–8 to 2004–5, agriculture growth was only 1.6 per cent per annum (Table 2). Fortunately, it recorded growth of 3.5 per cent per annum during 2004-05 to 2010-11. 12th Five Year Plan (20012-17) aims to achieve 4% growth in agriculture. Significant fluctuation in growth of agriculture is a matter of concern (Fig1).

Extensive cultivation has characterized Indian agriculture during the pre-1965 era, and intensive cultivation in the post-green revolution period. There has been significant increase in the use of modern inputs in Indian agriculture. During the period 1950–1 to 2003–4, the percentage of net irrigated area to net cultivated area increased from around 17 to 41. During the same period, fertilizer consumption showed a significant rise from less than 1 kg/ha to 90 kg/ha. Similarly, the percentage of area under high yielding varieties (HYVs) to cereals cropped area has risen from 15 in 1970–1 to 75 in the late 1990s. The share of agriculture in electricity consumption also rose from 4 per cent in 1950–1 to nearly 30 per cent in recent years. All this led to a significant increase in agricultural output over time.

It may be noted that agriculture is a ‘state subject’ under the Constitution of India. However, the central government plays a crucial role in shaping agricultural policies. Although Indian agriculture is in private hands, government policies have greatly influenced its pace and character.

Broadly, agricultural development policies over time can be divided into four sets of policy packages: (a) institutional reforms; (b) public investment policies; (c) incentive policies; and (d) reforms and globalization policies. The relative importance of the first three sets has varied over time.

Thus, during the first three Five Year Plans (1950–65), the institutional reforms and public investment packages dominated. The central and state governments enacted a number of laws regarding land reforms. These laws mainly relate to three aspects: abolition of zamindari system, land ceiling and redistribution of land, and tenancy reforms. The government was successful in abolishing the zamindari or intermediary system after paying compensation to the zamindars.

The land ceiling laws were not effective although there was redistribution of some land to the beneficiaries. The tenancy reforms were more successful in two states, West Bengal in the east and Kerala in the south, than in others. West Bengal succeeded in giving ownership rights to tenants, particularly sharecroppers (*bargardars*). Some efforts were made to consolidate fragmented holdings in India since Independence. In some parts of north and north-west India these efforts were relatively successful.

There was significant public investment in agriculture during 1950–65. To achieve the objective of self-sufficiency in food grains, there was massive investment particularly in constructing irrigation reservoirs and distribution systems. Another important policy during this period was the expansion of institutional credit which helped reduce informal sources that had been exploitative in respect of interest rates and terms and conditions.

During the 1967–90 period, incentive policies for adoption of new technology and public investment policies dominated government strategy in agriculture. After the humiliating experience with import of food grains in the mid-1960s, there was a vigorous drive for achieving self-sufficiency in food grains by stepping up public investment in irrigation and introduction of new technology through incentives. There was a need to increase domestic food production at a faster rate by much higher productivity without upsetting the agrarian structure. Luckily at that time new high-yielding dwarf varieties of wheat and rice were available in Mexico and the Philippines respectively. Yields increased significantly for wheat initially and later for rice. This breakthrough is popularly known as the ‘green revolution’. The productivity improvement associated with the green revolution is best described as forest- or land-saving agriculture. It may be noted that without the green revolution it would not have been possible to lift the production potential of Indian agriculture.

Incentive policies focused on both inputs and output. Subsidies for inputs like irrigation, credit, fertilizers, and power increased significantly in the 1970s and 1980s. The objective of the subsidies is to provide inputs at low prices to protect farmer interests and encourage diffusion of new technology. Similarly, on the output side, there has been a comprehensive long-term procurement-cum-distribution policy in the post-green revolution period. The government announces the support prices at sowing time and agrees to buy all the grains offered for sale at this price. To support these operations, institutions like the Food Corporation of India (FCI) and the Agricultural Prices Commission (APC) were established in the mid-1960s.

In the post-reform period, economic reforms in India since 1991 have improved the incentive framework and agriculture has benefited from reduction in protection to industry. The terms of trade for agriculture have improved and private investment has increased. Export of commodities, particularly cereals, has risen and there has been some progress on market reforms in terms of removing domestic and external controls. However, there were also concerns about agriculture and food security in the 1990s. There has been emphasis on price factors at the cost of non-price factors like research and extension, irrigation, and credit. Economic reforms have largely neglected the agricultural sector and only in the last few years have domestic and external trade reforms in the sector started.

Trade policies in India during the last five decades have been highly interventionist and discriminating against agriculture. There has been pessimism regarding international trade in agriculture.

Trade liberalization in agriculture has been faster towards the end of the 1990s in tune with WTO agreements. There has been considerable progress in the liberalization of export controls, and quantitative controls on imports and on decontrol of domestic trade. The 11th Five Year Plan focused on 'faster and inclusive growth'. An important aspect of 'inclusive growth' in the 11th Plan is its target of 4 per cent per annum growth in GDP from agriculture and allied sectors. A detailed agenda for action is spelt out in Mid-term appraisal of 11th Five Year Plan covering improved access to water, improvement in the supply of good quality seeds, replenishment of soil nutrients, improvements in agricultural research and extension, reforms in land tenancy and improvements in agricultural marketing which is particularly important for perishable produce. The 12th Five Year Plan is going to focus on small and marginal farmers and resource poor regions.

3. ROLES, CHALLENGES AND OPPORTUNITIES FOR SMALL HOLDING AGRICULTURE IN INDIA

In this section, we examine the role, challenges, policies and opportunities for small holding agriculture in India. India is a big country with 1.2 billion population. One state's population is closer to that of Europe. Therefore, there is also a need to look at regional level to bring out the variations.

3.1. Role of Small Holding Agriculture

Structure of land holdings: India is a land of small farmers. According to Agricultural Census 2000-01, there were an estimated 98 million small and marginal holdings out of around 120 million total land households in the country. As shown in Table 3, the share of marginal and small farmers accounted for around 81% of operational holdings in 2002-03 as compared to about 62% in 1960-61. Similarly, the area operated by small and marginal farmers has increased from about 19% to 44% during the same period. Recent data for 2005-06 shows that the share of small and marginal farmers in land holdings was 83% (Chand et al, 2011). **Thus, the small holding character of Indian agriculture is much more prominent today than even before.** The average size of holdings in India declined from 2.3 ha. in 1970-71 to 1.33 ha. in 2000-01. It may be noted that 63% of land holdings belong to marginal farmers with less than 1 ha. The average size of marginal holdings is only 0.24 at all India level. The average size of small holdings is 1.42 ha. Table 4 shows average size of holdings by farm size. The average size of marginal holdings varies from 0.14 ha. in Kerala to 0.63 ha. in Punjab.

Access to Irrigation: The access to irrigation has increased for all categories of farmers. It is the highest for marginal farmers followed by small farmers. Table 5 indicates that the percentage of area under irrigation for small farmers increased from 40 in 1980-81 to 51 in 2000-01. On the other hand, for large farmers it rose from 16 to 31% during the same period. It may, however, be noted that large farmers capitalize on cheaper sources like canals while small farmers have to rent water. About 40 per cent of the irrigated area for large farmers was from canals while it was less than 25 per cent in the case of small and marginal farmers (NCEUS, 2008).

Access to Fertilizers and Area under HYV: The fertilizer per hectare is inversely related to farm size for both irrigated and unirrigated areas (Table 6). It increased from marginal farmers in irrigated areas from 100 kgs. in 1980-81 to 252 kgs. in 2001-02. In fact, the per hectare consumption for all farm sizes was similar on irrigated areas in 1981-82 but it rose faster for marginal farmers and small farmers in 2001-02. This is true in the case of unirrigated areas also.

Similarly, the percentage of area under high yielding varieties (HYV) is also inversely related to farm size (Table 7). In the irrigated areas, the coverage of area under HYV was 89%, 86% and 78% respectively in marginal, small and large farmers in 2001-02. In the case of unirrigated areas, the coverage was above 50% for marginal, small and semi-medium but it was only 30% for large farmers in 2001-02.

Cropping Intensity: Multiple cropping index is higher for marginal and small farmers than that for medium and large farmers. For marginal farmers, cropping intensity increased from 134 in 1981-82 to 139 in 2001-02 (Table 8). In the case of large farmer, it rose from 116 to 121 during the same period. The differences across farm sizes persisted over time.

Cropping Patterns: Do small and marginal farmers grow high value crops? Table 9 shows cropping patterns by size of farms. Birthal et al (2011) provide four conclusions from these cropping patterns: (a) small and marginal farmers allocate larger proportion of their cultivated land to high value crops like fruits, and vegetables ; (b) small and marginal farmers seem to have comparative advantage in growing vegetables than fruits because of quick returns in the former; (c) small and marginal farmers allocate larger proportion of rice and wheat than other farmers; (d) small and marginal farmers allocate lower proportion of land to pulses and oilseeds.

Farm Size, output and productivity: The contribution to output is higher for marginal and small farmers as compared to their share in area. The share of these farmers was 46.1% in land possessed but they contribute 51.2% to the total output of the country (Fig 2 and Table 10) at all India level in 2002-03. There are significant regional variations in their contribution to output. The share of output is less than the operated area in ten states (Table 10). In rest of the states, the reverse was true. The contribution of small and marginal farmers to output ranges from 19% in Punjab to 86% in West Bengal. It is less than 50% in 9 out of 20 states. In the Eastern states, the share of both area and output are high for these farmers. On the other hand, in some of the states in Central, Western and North-Western regions, medium and large farmers still dominate in both area and output.

In terms of production, small and marginal farmers also make larger contribution to the production of high value crops. They contribute around 70% to the total production of vegetables, 55% to fruits against their share of 44% in land area (Birthal, 2011). Their share in cereal production is 52% and 69% in milk production. **Thus, small farmers contribute to both diversification and food security.** Only in the cases of pulses and oilseeds, their share is lower than other farmers.

There has been debate in India on the relationship between farm size and productivity. The results of NSS 2003 Farmers' survey has empirically established that small farms continue to be produce more in value terms per hectare than the medium and large farms. Fig 3 shows that value of output per hectare was Rs.14754 for marginal farmers, Rs.13001 for small farmers, Rs.

10655 for medium farmers and Rs.8783 for large farmers. **It shows that from efficiency point of view, small holdings are equal or better than large holdings.** Table 11 indicates large regional variations in the value of output per hectare. For marginal farmers, it varies from Rs.29448 in Punjab to Rs.7177 in Rajasthan. This is also true for large medium and large farmers – it ranges from Rs.28983 in Punjab to Rs.4213 in Rajasthan. In many states, small holdings have higher value of output per hectare than large farms. However, in the case of states like, Kerala, Madhya Pradesh, Uttar Pradesh, Himachal Pradesh and Tamil Nadu, the large farms have higher productivity (in value terms) than marginal farmers. In the case of Punjab, the differences in productivity are not large across farm sizes.

3.2. Small Holders and Livelihoods

We have mentioned above that 98 million out of total 120 million farm holdings are small and marginal farmers. The sustainability of these farmers is crucial for livelihoods in rural areas and for the entire country. It is true that small holdings have higher productivity than medium and large farms. But, as our discussion below shows that it is not enough to compensate for the disadvantage of the small area of holdings. The cost of cultivation per hectare is also high on small and marginal farmers than medium and large farms (Table 12). At the all India level, net farm income per hectare for small holdings is higher than large holdings (Table 13). The data at state level shows that in 9 out of 20 states, the reverse is true – net farm income per hectare is in large holdings higher than small holdings².

However, the monthly income and consumption figures across different size class of land holdings show that marginal and small farmers have dis-savings compared to medium and large farmers. The average monthly income of farmer households is comprised of income from wages, net receipts from cultivation, net receipts from farming of animals and income from non-farm business. The average monthly consumption of farmer households is comprised of total food and non-food expenditure.

According to NSS 2003 data, the monthly consumption of marginal farmers was Rs.2482 and monthly income was Rs.1659 (Table 14 and Fig 4.1). It shows that they have dis-savings of Rs.823. The dis-savings for small farmers were Rs.655. On the other hand, for large farmers, monthly income and consumption respectively were Rs.9667 and Rs.6418 with savings of Rs.3249. Table 14 and Figs 4.2 to 4.7 provides state wise details on monthly income and consumption according to farm size. As NCEUS (2008) says “*consumption expenditure of marginal and small farmers exceeds their estimated income by a substantial margin and presumably the deficits have to be plugged by borrowing or other means*” (p.12). NCEUS (2008) also indicates that the poverty for small holding farmers is much higher than other farmers. The need for increase in productivity and incomes of small holdings and promotion of non-farm activities for these farmers are obvious.

3.3. Issues and Challenges for Small Holders

There are many issues and challenges for small holding agriculture in India. NSS Farmers’ survey of 2003 brought out many issues relating to small and marginal farmers. Based on this Survey, NCEUS (2008) says that “some of the general issues that confront marginal-small farmers as agriculturalists are: imperfect markets for inputs/product leading to smaller value

² On returns to farming, see Sarthak and Mishra (2011)

realizations; absence of access to credit markets or imperfect credit markets leading to sub-optimal investment decisions or input applications; poor human resource base; smaller access to suitable extension services restricting suitable decisions regarding cultivation practices and technological know-how; poorer access to ‘public goods’ such as public irrigation, command area development, electricity grids; greater negative externalities from poor quality land and water management, etc” (p.7). This sub-section discusses some of the key issues and challenges relating to small holding agriculture.

Role of women: The importance of women in agriculture has been increasing. The share of rural females in agriculture was around 83 per cent in 2004-05 as compared to 67% among rural men, showing the importance of women in agriculture in rural areas. Percentage of women among marginal farmers (38.7%) is higher than that for large farmers (34.5%) in 2004-05. These proportions have increased over time. Agriculture is becoming increasingly feminized as men are migrating to rural non-farm sector. They work in “land preparation, seed selection and seed production, sowing, in applying manure, fertilizer and pesticides, weeding, transplanting, threshing, winnowing and harvesting etc as well as in animal husbandry and dairying, fish processing, collection of non timber forest produces (NTFPs), back yard poultry, and collection of fuel wood, fodder and other products for family needs” (GOI, 2007). Despite their importance, women are continually denied their property rights and access to other productive resources. Protecting women’s rights in land, enhancing infrastructure support to women farmers, and giving legal support on existing laws, will facilitate recognition for women as farmers and enable them to access credit, inputs, and marketing outlets.

Social Groups: The proportion of socially disadvantaged groups such as Scheduled Castes (SCs) and Scheduled Tribes (STs) is higher among marginal and small farmers than that of medium and large farmers. Around 22% of semi-marginal and marginal farmers are from SCs compared to 7.8% in medium and large farmers. SCs have more than half of their holdings of less than half a hectare. Similarly, 15.6% of small farmers belong to STs compared to 14.9% among medium and large farmers. The distribution of land ownership among STs is better than SCs. However, the quality of STs land is probably of the lowest quality. Social identity of farmers is also seen to mediate access to economic resources and outcomes. Even after accounting for quantity and quality of land owned by socially deprived classes, their access to information, marketing, credit and publicly provided inputs and extension services are lower. This shows that they possibly suffer from discrimination in the delivery of public services as well as market (NCEUS, 2008).

Land Issues: Land and tenancy security: National Commission on Enterprises for Unorganized Sector argued that there is a strong evidence that relatively successful implementation of even a modest package of land reforms dramatically improve the prospect of the poor. Regaining small and marginal farmers, they own and cultivate some land but it is a limiting factor for getting resources. Therefore, tenancy security is important for small holding farmers.

Land relations are extremely complicated and this complexity has contributed significantly to the problems facing actual cultivators. Unregistered cultivators, tenants, and tribal cultivators all face difficulties in accessing institutional credit and other facilities available to farmers with land titles. One priority is to record and register actual cultivators including tenants and women cultivators, and provide passbooks to them, to ensure that they gain access to institutional credit and other inputs. As part of the reforms, lease market should be freed and some sort of security

for tenants has to be guaranteed. This will ensure availability of land for cultivation on marginal and small farmers. The land rights of tribals in the agency areas must be protected. There is considerable scope for further land redistribution, particularly when waste and cultivable lands are taken into account. Complementary inputs for cultivation (initial land development, input minikits, credit, etc.) should be provided to all assignees, and the future assignments of land should be in the name of women.

On land market, the Report of the Steering Committee recommended the following. “Small farmers should be assisted to buy land through the provision of institutional credit, on a long term basis, at a low rate of interest and by reducing stamp duty. At the same time, they should be enabled to enlarge their operational holdings by liberalizing the land lease market. The two major elements of such a reform are: security of tenure for tenants during the period of contract; and the right of the land owner to resume land after the period of contract is over” (Planning Commission, 2007a). Basically, we have to ensure land leasing, create conditions including credit, whereby the poor can access land from those who wish to leave agriculture.

Low level of formal education and skills: Education and skills are important for improving farming practices, investment and productivity. Table 15 gives literacy levels and mean years of education for unorganized self employed agriculture workers by farm size. It shows that literacy and mean years of education are lower for small holding farmers compared to medium and large farmers. For example, literacy among males and females for marginal farmers respectively were 62.5% and 31.2% while the corresponding numbers for medium and large farmers were 72.9% and 39% (Table 15). Similarly, mean years of education for males among marginal farmers was 3.9 as compared to 5.3 for medium and large farmers. It is important for small holding farmers to have a reasonable level of awareness regarding information on agriculture. The low level of farmers’ education limits public dissemination of knowledge. The NSS farmers’ Survey clearly shows that awareness about bio-fertilizers, minimum support prices and WTO is associated with education levels which are lower for marginal and small farmers.

Credit and Indebtedness: Small holdings need credit for both consumption and investment purposes. Increasing indebtedness is one of the reasons for indebtedness among these farmers in recent years. Table 16 shows that overall indebtedness is not higher for small and marginal farmers compared to large farmers. However, the indebtedness for the small & marginal farmers from formal institutional sources is lower than large farmers and the reverse is true in the case of informal sources. The dependence on money lenders is the highest for sub-marginal and marginal farmers (Table 17). Table 18 shows that the share of formal source increases with the size of land. At all India level, the share of formal source varies from 22.6% to 58% for small and marginal farmers while it varies from 65 to 68% for medium to large farmers. Dependence of small and marginal farmers on informal sources is high even in states like Andhra Pradesh, Punjab and Tamil Nadu. For example, small and marginal farmers of Andhra Pradesh have to depend on 73% to 83% of their loans on informal sources. This indicates very low financial inclusion for Andhra Pradesh. The NSS data also shows that across social groups, the indebtedness through formal sources is lower for STs as compared to others.

Globalization challenges: Increasing globalization has added to the problems faced by the small holding agriculture. The policies of huge subsidies and protection policies by developed countries have negative effects on small holding farmers in developing countries. If support is

not given to small farms, globalization may become advantageous for large farms. There has been adverse impact of trade liberalization on the agricultural economy of the regions growing crops such as plantation, cotton and oil seeds in which foreign trade is important. With liberalization, the issue of efficiency has become highly relevant as domestic production has to compete with products of other countries. In the recent years domestic prices of several agricultural commodities have turned higher than international prices. India is not able to check import of a large number of commodities even at high tariff. This is true not only in the case of import from developed countries where agriculture is highly subsidized but also in the case of products from developing countries. India is facing severe import competition in the case of items like palm oil from Malaysia and Indonesia, spices from Vietnam, China and Indonesia, tea from Sri Lanka and rice from Thailand and Vietnam (Planning Commission, 2007). To compete in the global market, the country needs to reduce various post-harvest costs and undertake suitable reforms to improve efficiency of domestic markets and delivery systems. To be able to successfully compete in a liberalized trade regime, therefore, there is need for a paradigm shift from merely maximizing growth to achieving efficient growth. For farmers, perhaps the single most adverse effect has been the combination of low prices and output volatility for cash crops. The effect of volatility in international prices on domestic agriculture should be checked by aligning tariffs with the changing price situation.

Impact of climate change: Climate change is a major challenge for agriculture, food security and rural livelihoods for millions of people including the poor in India. Adverse impact will be more on small holding farmers. Climate change is expected to have adverse impact on the living conditions of farmers, fishers and forest-dependent people who are already vulnerable and food insecure. Rural communities, particularly those living in already fragile environments, face an immediate and ever-growing risk of increased crop failure, loss of livestock, and reduced availability of marine, aquaculture and forest products. They would have adverse effects on food security and livelihoods of small farmers in particular. In order to have climate change sensitive and pro-poor policies, there is a need to focus on small farmers. Agriculture adaptation and mitigation could provide benefits for small farmers. The coping strategies would be useful to have long term adaptation strategies. There is a significant potential for small farmers to sequester soil carbon if appropriate policy reforms are implemented. The importance of collective action in climate change adaptation and mitigation is recognized. Research and practice have shown that collective action institutions are very important for technology transfer in agriculture and natural resource management among small holders and resource dependent communities.

Water problems: Water is the leading input in agriculture. Development of irrigation and water management are crucial for raising levels of living in rural areas. Agriculture has to compete for water with urbanization, drinking water and industrialization. As mentioned above, small holding agriculture depend more on ground water compared to large farmers who has more access on canal water. Ground water is depleting in many areas of India. Marginal and small farmers are going to face more problems regarding water in future. Therefore, water management is going to be crucial for these farmers (more on this below).

Diversification: There has been diversification of Indian diets away from foodgrains to high value products like milk and meat products and vegetables and fruits. The increasing middle-class due to rapid urbanization, increasing per-capita income, increased participation of women

in urban jobs and impact of globalization has been largely responsible for the diet diversification in India. Hi-value products have caught the fancy of the expanding middle class and the result is visible in the growing demand for hi-value processed products. There is growing demand for non-foodgrain items in India. The expenditure elasticity for non-cereal food items is still quite high in India. It is thrice as high when compared to cereals in the rural areas and over ten times as high in urban areas. Per capita consumption of fruits and vegetables showed the highest growth followed by edible oils. Diversification to high value crops and allied activities is one of the important sources for raising agricultural growth. Since risk is high for diversification, necessary support in infrastructure and marketing are needed. Price policy should also encourage diversification. Small and marginal farmers can get higher incomes with diversification. But, there are risks in shifting to diversification as the support systems are more for food grains. There is a need for support systems for diversification to help the small holder farmers.

Risk and vulnerability: There is enough evidence to suggest that poor and poorest of the poor households are vulnerable to a range of risks affecting individuals, households or whole communities which can have a devastating affect on their livelihoods and well being. They have higher exposure to a variety of risks at individual or household level. Some of them are (a) health shocks: illness, injury, accidents, disability; (b) labour market risk: many work in informal sector and have high risk of unemployment and underemployment; (c) harvest risks, life cycle risks, social risk and special risks for vulnerable groups. In addition, they have community risks such as droughts, floods, cyclones, structural adjustment policies etc. Small and marginal farmers are vulnerable to all these risks. Most of the coping mechanisms followed by households are: borrowing, sale of assets, spending from savings, assistance from relatives and govt., expanded labour supply, child labour, bonded labour, reducing consumption, migration etc. Comprehensive social protection programmes are required to address the negative effects due risks and vulnerabilities. India has many social protection programmes. The present major schemes for the poor in India fall into four broad categories: (i) food transfer like public distribution system (PDS) and supplementary nutrition (ii) self employment (iii) wage employment and (iv) social security programmes for unorganized workers. The effectiveness of these programmes have to be improved so that small and marginal farmers can also benefit from these programmes. Crop insurance programmes and future markets have to be strengthened to reduce risks in price and yields.

3.4. Opportunities for Small Holding Agriculture

Inspite of above challenges, there are many technological and institutional innovations which can enable marginal and small farmers to raise agricultural productivity and increase incomes through diversification and high value agriculture.

Before going to technological innovations, we discuss below the policy issues under research and extension in agriculture. These are applicable to small and marginal farmers.

3.4.1. Research and Extension

The yield growth for many crops has declined in the 1990s. Technology plays an important role in improving the yields. The National Commission on Farmers also indicates that there is a large knowledge gap between the yields in research stations and actual yields in farmers' fields. There

seems to be a technology fatigue in Indian agriculture. The yield gaps given by the Planning Commission (2007) are the following.

The 2003-05 data show very large yield gaps:

- Wheat: 6% (Punjab) to 84% (M.P.)
- Rice: Over 100% in Assam, Bihar, Chattisgarh and UP
- Maize: 7% (Gujarat) to 300% (Assam)
- Jowar: 13% (M.P.) to 200% (Karnataka)
- Mustard: 5% (Haryana) to 150% (Chattisgarh)
- Soybean: 7% (Rajasthan) to 185% (Karnataka)
- Sugarcane: 16% (A.P.) to 167% (M.P.)

A fresh look at the priorities of Indian agricultural research system is necessary in light of emerging prospects. There is only marginal increase in the funds for research in the recent budgets. Of course states have to take a lead in research and extension. It is known that India spends only 0.5 per cent of GDP on agricultural research as compared to more than 1 per cent by other developing countries. There is considerable potential for raising the effectiveness of these outlays by reordering the priorities in agricultural research and redefining the relative roles of public and private sectors in research and extension³.

A review of the research and development activities of the Indian Council of Agricultural Research (ICAR) system during the first two years of the 10th Plan revealed several weaknesses. Some of these are (a) there is inadequate emphasis on the needs of rainfed areas, which account for over 60% of cultivated area; (b) crop bias with major focus on rice and wheat; (c) proliferation of programmes resulting in resources being spread thinly and lack of focus in areas of relevance and opportunity; (d) inadequate priority to emerging challenges, particularly post-harvest, marketing and environmental conservation; (e) the multiplicity of institutes with overlapping mandates has led to duplication of research work; (f) lack of accountability, less emphasis on multidisciplinary research, weak interaction among researchers, extension workers and farmers and the private sector and, excessive centralization of planning and monitoring. A thorough reform of ICAR system is needed to address these weaknesses.

There is a need to shift away from individual crop-oriented research focused essentially on irrigated areas towards research on crops and cropping systems in the dry lands, hills, tribal and other marginal areas⁴. Dry land technology has to be improved. In view of high variability in agro-climatic conditions in such unfavourable areas, research has to become increasingly location-specific with greater participation or interaction with farmers. Horticulture crops that are land-saving and water-saving should be encouraged in dry land areas. Research has to be improved on horticulture crops.

Progress in post-harvest technology is essential to promote value addition through the growth of agro-processing industry. Private sector participation in agricultural research, extension and marketing is becoming increasingly important especially with the advent of biotechnology and

³ More on research and extension, see Rao (2005)

⁴ See Swaminathan (2007) on research and technology

protection being given to intellectual property. However, private sector participation tends to be limited to profitable crops and enterprises undertaken by resource rich farmers in well endowed regions. Moreover, private sector is not interested in research for better techniques of soil and water management, rainfed agriculture, cropping systems, environmental impact and long term sustainability. Therefore, the public sector research has to increasingly address the problems facing the resource-poor farmers in the less endowed regions. The new agricultural technologies in the horizon are largely biotechnologies. Effective research is needed to have biotechnologies suitable to different locations in India.

Regarding extension, the existing Training and Visit (T and V) system of extension is top-down in its approach and there is little participation by the farmers. There is a need to take corrective steps to deal with the near collapse of the extension system in most states. In the absence of public provision of such services, the resource poor and gullible farmers are becoming the victims of exploitation by the unscrupulous traders and money lenders interested in selling inputs such as seeds, fertilizers and pesticides. There is, therefore, an immediate need for reforming and revitalizing the existing agricultural extension system in the country. The main ingredient of reforms should be : (a) active involvement of farmers through user groups/associations; (b) participation by the private sector and the NGOs; (c) increasing use of media and information technology including cyber kiosks to disseminate the knowledge on new agricultural practices and the information on output and input prices; and (d) building gender concerns into the system, for example, by manning the extension services predominantly by women⁵.

The returns to investment on research and extension will be much higher on agricultural growth as compared to other investments.

3.4.2. Technological Innovations

It may be noted that agricultural technologies are ‘scale neutral’ but not ‘resource neutral’ (Singh et al, 2002). Small holder-oriented research and extension should give importance to cost reduction without reduction in yields. Therefore, new technological innovations are needed. “These include low external input and sustainable agriculture approaches based on ecological principles but without the use of artificial chemical fertilizers, pesticides or agro-ecological principles but without the use of artificial chemical fertilizers, pesticides, or genetically modified organisms; and biotechnology” (Thapa and Gaiha, 2011).

The need for adopting the methods of an evergreen revolution has become very urgent now. As Swaminathan (2010) mentions, among other things, there are two major pathways to fostering an evergreen revolution. The first is organic farming. Productive organic farming needs considerable research support, particularly in the areas of soil fertility replenishment and plant protection. The other pathway to an evergreen revolution is green agriculture. In this context, ecologically sound practices like conservation farming, integrated pest management, integrated nutrient supply and natural resources conservation are promoted. Green agriculture techniques could also include the cultivation of crop varieties bred through use of recombinant DNA technology if they are good in resisting to biotic and abiotic stresses or have other attributes like improving nutritive quality (Swaminathan, 2010).

⁵ See Rao (2005)

Zero Tillage: Cultivation practices such as zero-tillage (which involves injecting seeds directly into the soil instead of sowing on ploughed fields) combined with residue management and proper fertilizer use can help to preserve soil moisture, maximize water infiltration, increase carbon storage, minimize nutrient runoff, and raise yields. It is expanding rapidly in India. In 2005, in the rice–wheat farming system of the Indo-Gangetic plain, farmers adopted zero-tillage on 1.6 million hectares; by 2008, 20–25 percent of the wheat in two Indian states (Haryana and Punjab) was cultivated using minimum tillage. (WDR, 2010).

Public Sector Led Improved Technologies: Public sector led improved technologies have been helping small farmers in India. The improved wheat varieties in Punjab and technology of single cross hybrid for maize have significantly contributed in enhancing yields in small farms. Mysore’ study (2010) on horticulture shows that one of the driving forces for horticulture development in India is due to ‘easy-to-fit’ technologies in the system. The study highlights a number of public sector driven improved technologies. These include: (a) productivity enhancing technologies; (b) input saving technologies; (c) nutrient balancing technologies; (d) value adding technologies. The small interventions reduced crop damage, increased production and raised income both in domestic and export markets. There are also technologies regarding efficient water management (more on this below).

Rural women play a significant role in animal husbandry and are directly involved in major operations like feeding, breeding, management and health care. As the ownership of livestock is more evenly distributed with landless laborers, and marginal farmers, the progress in this sector will result in a more balanced development of the rural economy, particularly in the reduction of poverty and malnutrition. As Singh et al (2002) mention, priorities for live-stock technology development are animal health, nutrition, and reproduction.

Nutrient Management: Nitrogen applied in fertilizers, manures, biosolids and other N sources are not used efficiently by crops. Management strategies to improve the nitrogen use efficiency of crops which reduce fertilizer requirements focus on fertilizer best management practices. A note written for IFPRI by Flynn (2009) says that the best practices should look at application type, application rates, application timing and application placement. For example, balancing application rates of nitrogen with other required nutrients including phosphorus, potassium and sulphur is a major way of improving nitrogen use efficiency. Similarly, appropriate nitrogen application rates are important in order to have effectiveness on yields.

Another way is switching to organic production which can reduce fertilizer use. Better use of existing organic sources of nutrients, including animal manure, crop residues, and nitrogen-fixing crops such as legumes. Such organic nitrogen sources may also contribute to raising sequestration of carbon in soils (Flynn, 2009). However, yields have to be maintained with organic farming as compared to cultivation with chemical fertilizers.

Bio-technology: The term biotechnology covers a wide range of scientific techniques and products that can be used in numerous ways to boost and sustain the productivity of crops, livestock, fisheries and forests. Though agricultural biotechnology is used synonymously with genetic modification by general public, there are many techniques in biotechnology apart from genetic modification. The other techniques are –genomics and bioinformatics, marketed-assisted

selection, diagnostic procedures, micro propagation, tissue culture, cloning, artificial insemination, embryo transfer and other technologies (Rao and Dev, 2010).

Recently India had two revolutions in technology. One is BT cotton and the other is hybrid maize. Studies on Bt cotton showed that small farmers benefited from the introduction of this technology. A study on four districts of Andhra Pradesh (Warangal, Nalgonda, Guntur, Kurnool) examined, among other things, whether the benefits of Bt Cotton technology are shared by all groups of farmers across social categories and size groups (Rao and Dev, 2010). The green revolution technologies have been utilized by upper strata of farmers and later gradually spread to other strata. But in the case of biotechnological application, the small farmers and SC and ST farmers also made use of the technology well since the beginning. The small farmers growing Bt cotton have significantly improved their position compared to the non-Bt growing small farmers. The net income improved by 69 per cent and farm business income improved by 108 per cent. This clearly shows that the small farmers are better off with Bt cotton than without Bt cotton. Same is the case with Scheduled Castes (SCs). Bt cotton led to improving the net income by 59 per cent. The farm business income is higher by three times than non-Bt farmers from SCs. Therefore, it is very clear that the farmers from SCs, who are also generally small farmers, got benefited from adopting this technology.

Information technology: Changes in information technology will help in a big way to improve agri-business and incomes of small farmers. Indian private companies and NGOs are global leaders in providing information to farmers, as a spinoff from India's meteoric rise as a world leader in ICTs. **E-Choupal** has expanded access to internet in rural areas. Up to 6,400 internet kiosks were set up between 2000 and 2007 by ITC Limited, one of the largest agricultural exporters. It reaches about 4 million farmers growing a range of crops - soybean, coffee, wheat, rice, pulses or shrimp - in over 40,000 villages. They get free information in their language about local and global market prices, weather forecasts, farming practices and crop insurance. It serves as a purchase centre, cutting marketing costs and allowing farmers to obtain a bigger farm price. The M. S. Swaminathan Research Foundation established Knowledge Centers in Pondicherry in 1997. With the support of the Indian Space Research Organization, centers in each village are connected by satellite to a hub at Villianur. The women self-help groups use the centers' computers to manage their business accounts and coordinate their activities, using video links with the other villages.

The declining costs of ICTs are giving small farmers much greater access to information. Mobile phone coverage in India is expanding at breakneck speed. Nokia sold several lakhs of new mobile phone handsets, and new subscriptions are averaging 6 million a month, many in rural areas. Computers are now being linked through mobile phone networks to greatly expand the scope of information. By linking communication technologies to market exchanges in commercial centers, even small farmers can overcome the enormous informational asymmetries that limit their bargaining power in traditional supply chains. The revolution in mobile phones is helping the small farmers to get information about crop prices and input prices and other related information on agriculture.

3.4.3. Institutional Innovations

Small holding agriculture faces many challenges. But, a number of innovative institutional models are emerging and there are many opportunities for small and marginal farmers in India. Institutions relating to (a) land and water management, (b) group or cooperative approach for

inputs and marketing and, (c) value chains and super markets can enhance productivity, sustainability and incomes of small holding agriculture.

Institutions for sustainable land and water management

Development of irrigation and water management are crucial for raising levels of living in rural areas⁶. Major areas of concern in irrigation are: decline in real investment, thin spread of investment, low recovery of costs, decline in water table, wastages and inefficiencies in water use and, non-involvement of users. Both investment and efficiency in use of water are needed. Major areas of reforms needed in irrigation are: stepping up and prioritizing public investment, raising profitability of groundwater exploitation and augmenting ground water resources, rational pricing of irrigation water and electricity, involvement of user farmers in the management of irrigation systems and, making groundwater markets equitable (Rao, 2005). In a recent study, Shah et al (2009) indicate that the impact of the drought of 2009 is expected be less severe than the drought of 2002 due to ground water recharge in the last few years. Ground water can be exploited in a big way in Eastern region. Watershed development and, water conservation by the community are needed under water management. New watershed guidelines based on Parthasarathy Committee's recommendations were accepted by the Central Cabinet in March 2009. The implementation has to be stepped up in order to obtain benefits in rainfed areas. National Rainfed Area Authority has big responsibility in matters relating to water conservation and watershed development. Assets created under NREGS can help in improving land and water management.

Environmental concerns are among the policy priorities in India. Particularly degradation of land and water is alarming. Watershed development under the new guidelines, in general, has an overall positive impact on environment. However, groundwater tables are depleting at an alarming rate. The *de facto* privatization of groundwater and subsidized power supply are the main culprits. There has been a neglect of minor irrigation sources like tanks. Shortage of drinking water has accentuated and quality of water has declined over time.

An integrated approach is needed for water resources management in the country. An appropriate strategy should integrate institutional approaches with market principles. Since institutional innovation (Water user associations) is already in place for canal irrigation, it is time now to implement volumetric pricing. There is a need to de-link water rights from land rights in order to ensure equity and sustainability.

Institutions like the water user associations (WUAs) and watershed committees are important for water management. The experience of Andhra Pradesh shows that the impact of WUAs has been encouraging in these areas, especially in terms of providing irrigation to tail end farmers. This has been made possible by cleaning of canals and water courses and monitoring of water losses by the WUAs. Area under paddy is reported to have increased significantly following reforms. However, much of the reported increase could be statistical because of underreporting of irrigated area before reform, as this meant lesser payment of water tax to revenue department. Paddy yields are reported to have increased by 40%. Long term solution for effective functioning of WUAs is awareness building and promoting participatory monitoring and evaluation. Unlike in the case of canal irrigation, WUAs are not found to be effective in respect of tank irrigation due to insufficient allocations.

⁶ On land and water management, see Vaidyanathan (2006)

In the case of land and forestry, watershed approach and Joint Forest Management are crucial for protecting the environment. The critical issue is sustainability of these programmes. Although watersheds have shown positive economic impact, the social issues are missing. More participatory approach and involvement of women would lead to sustainability of watershed development approach. In the case of JFM, the focus is more on high income areas like timber. Low value products constituting sources of livelihoods for the poor have low priority. Customary rights of the tribals on *podu* (shifting cultivation) have to be recognised. Awareness and involvement of the civil society is a precondition for checking environmental degradation. Environmental movements would have a discerning impact in this regard.

Another concern is the land degradation due to excessive use of fertilizers and pesticides. Government has programmes such as Integrated Pest Management (IPM) and Integrated Nutrient Management (INM). Keeping in view the ill effects of pesticides and also National Policy on Agriculture, Integrated Pest Management Approach (IPM) approach has been adopted as a cardinal principle and main plank of plant protection in the country in the overall crop production programme. Besides ongoing activities, the thrust area will be pertaining to Pest Risk Analysis (PRA) and post entry quarantine surveillance. This has become essential in the light of WTO agreement, which will facilitate more and speedier movement of plants, planting materials globally.

Women's collectives: Women's cooperatives, producer women's groups and other forms of group efforts, where they do not already exist, should be promoted to overcome constraints of small and uneconomic land holdings, for the dissemination of agricultural technology and other inputs, as well as for marketing of produce (Agarwal, 2010). There has also been greater emphasis on women's collectives. For example, Deccan Development Society (DDS), an NGO enables women from landless families to access various government schemes to establish claims on land, through purchase and lease. There are "four critical steps that ensured local food security in an experiment by the Deccan development society in Andhra Pradesh where the 'sangams' – women's collectives (i) improved 6,000 acres of degraded land, (ii) dalit women took cultivable land on lease, (iii) organised their own public distribution of grains with accent on coarse cereals consumed by 65 per cent of our rural population; built grain banks at village level, and (iv) made systematic collection and preservation of seed varieties" (Krishnaraj, 2006).

Raturi's study (2011) shows that Gujarat and Andhra Pradesh have tried to put in place different institutional environment to make a fundamental change in the institutional arrangement for supporting rural development and agriculture sector. In Gujarat, state government introduced *Krishi Mohatsav*. A month long intensive campaign is launched during the month of May each year. "Over 100,000 government officials from the Chief Minister down to staff at the taluka level from over 15 departments of the government, and over 1500 scientists, are involved in the program" (Raturi, 2011). This *Mohatsava* serves as an institutional platform at the village level and proved to be an important support for farmers.

An initiative in Andhra Pradesh based on the Self Help Group (SHG) provides another example of an institutional platform for agriculture. The Community Managed Sustainable Agriculture (CMSA) programme was initiated by the Society for Elimination of Rural Poverty (SERP) in Andhra Pradesh in 2004. The mandate of the program is to eradicate poverty and to improve

livelihoods of the poor. It may also help in nutrition because of improvements in livelihoods. The initiative aims to address the major causes of agriculture distress and helps farmers in adopting sustainable agricultural practices. CMSA has now reached 8033 villages in 503 mandals of all 22 districts (Raturi, 2011). It covers about 2.7 million acres and benefit about 1.05 million farmers.

Institutions for Marketing of Small Holdings

For small and marginal farmers, marketing of their products is main problem apart from credit and extension. In recent years , there has been some form of contract arrangements in several agricultural crops such as tomatoes, potatoes, chillies, gherkin, baby corn, rose, onions, cotton, wheat, basmati rice, groundnut, flowers, and medicinal plants. There is a silent revolution in institutions regarding non-cereal foods. New production –market linkages in the food supply chain are: spot or open market transactions, agricultural co-operatives and contract farming (Joshi and Gulati, 2003).

One of the most successful producer organization is the Indian dairy cooperative which in 2005 had a net work of more than 100,000 village level dairy cooperatives with 12.3 million members (see BIRTHAL et al 2008).

Contract farming has a potential to help the small and marginal farmers overcome constraints in accessing inputs, credit, extension and marketing. In recent years, there has been some form of contract arrangements in several agricultural crops such as tomatoes, potatoes, chillies, gherkin, baby corn, rose, onions, cotton, wheat, basmati rice, groundnut, flowers, and medicinal plants and is spreading throughout India in states like Andhra Pradesh (Dev and Rao, 2005), Tamil Nadu, Karnataka, Punjab and Maharashtra.

While the pros of contract farming are potentially many, the sponsoring companies may be unreliable, may exploit a monopoly position, and/or have inefficient management and marketing problems that could result in manipulation of quota and non-fulfillment of commitments. Contract farming in India is neither backed up by law nor by an efficient legal system. This is the single most constraint to widespread use of contract farming in India. The legal system can be improved with legislative measures like the model contract and code of practice, registration of contracts with marketing committees and tribunals for efficient, speedy and corrupt-free dispute resolutions.

There is a need to revamp some of the legal hurdles for agro processing and APMC Act⁷. Several State Governments have already amended their APMC Acts allowing varying degrees of flexibility. However several States are yet to notify the relevant rules that would make the amendment fully operational. These steps should be speedily completed to provide a boost to promotion of direct marketing, contract farming, and setting up of markets in private and co-operative sectors.

Most important problem for the small farmers is output price fluctuations. There is a big gap between producer prices and consumer prices. There are different models for marketing collectively by the small and marginal farmers. These are: self help group model, co-operative model, small producer co-operatives and contract farming. *Apni Mandi* in Punjab, *Rytu Bazars* in

⁷ See Chadha (2009) on agro processing and rural industrialization

Andhra Pradesh, dairy co-operatives are some of the successful cases in marketing. The real challenge lies in organising the small and marginal farmers for marketing and linking them to high value agriculture. Thus, group approach is needed for getting benefits from marketing.

Super markets and supply chains: Small farmers can benefit from the emerging super markets and value chains. The presence of super markets as retail trade is rapidly expanding in the emerging economies. According to Reardon and Gulati (2008), this process has developed in an astonishing speed: Supermarkets now enjoy a retail share of 50-60% in South America, East Asia (China excluded) and South Africa; and a 30-50% in Mexico, Central America and much of South East Asia. While in China, India and Vietnam their market is still low and variable (2-20%), it is experiencing an annual growth between 30% and 50%.

Reardon and Minten (2011a) examine the patterns and dynamics of diffusion of modern food retail in India. They emphasized three surprises in the rise of modern food retail in India. They are: “(1) that has occurred since the 1960s with waves of government, coop, and then private retail; (2) that the private retail wave has been extremely fast in particular in its second phase, in the past 6 years, when it grew at 49% per year on average, some 5 times faster than the fast growth being experienced in the GDP; (3) that the rise of private retail chains has been unique or rare in its drivers (in its great majority by domestic capital, not foreign investment), and “early” (compared with the prior experience in other developing countries) in its penetration of the food markets of the poor, of small cities and even rural areas, of fresh product markets, and its use of diverse formats to help toward the above ends” (p.20, Reardon and Minten, 2011a).

In a study on food supply chains in India, Reardon and Minten (2011) indicate the following changes in the past two decades.

- (1) A modern sector is emerging in the whole sale sector with the growth of modern logistics firms and specialized modern wholesalers.
- (2) Tradition segment of the whole sale sector is also transforming. Based on earlier studies, this study presents the findings on transformation of traditional whole sale sector as follows.
 - (a) Rural traditional market transformation is much more advanced in certain regions For example, West and Central regions of Madhya Pradesh and West and Central Uttar Pradesh are different from Eastern regions of these states.
 - (b) The marginal farms (0-1 hectare) look more like traditional rural India with low market surplus, chemical use, credit use, lower use of cold stores etc. On the other hand, small and medium farmers are more dynamic.
 - (c) The conventional view is that food supply chains are dominated by long chain of many hands. The recent findings show that supply chains can be short.
 - (d) Conventional view is that farmers are at the mercy of money lender or because of tied credit. But, the surveys show that less than 5 per cent take advance or credit in any form from brokers or wholesalers.
 - (e) The surveys show rapid development of cold stores for potato in Uttar Pradesh and Bihar in 2000s.

In India, the expansion of modern retailing has the potential to spark investment in marketing efficiency and processing that yields benefits to both producers and consumers. In those cases

where small producers have been able to integrate into the supplying chains, supermarkets have offered enhanced security and considerably higher margins than the traditional clients, such as wholesales and groceries. However, there is scope for exploitation in contract farming and super markets if rules are not framed properly.

3.5. Policies to Support to Small Holders

In the case of small holding agriculture, Government has to play an important role in improving productivity and incomes of small farmers. The 11th Five Year Plan says that “the agricultural strategy must focus on 85% of farmers who are small and marginal, increasingly female, and who find it difficult to access inputs, credit and extension or to market their output. While some of these farmers may ultimately exit from farming, the overwhelming majority will continue to remain in the sector and the objective of inclusiveness requires that their needs are attended to” (p.8, Vol.3).

The National Commission for Enterprises in the Unorganized Sector (NCEUS) has recommended a special programme for marginal and small farmers. The report of NCEUS analyses the status and constraints faced by marginal and small farmers and focuses on the need for a special programme which aimed at capacity building of these farmers, both the farm and non-farm activities. As the marginal and small farmers suffer from market failures in agriculture in terms of credit, input supplies and marketing of output, access to new technologies etc. NCEUS recommended the four measures. These are: (a) Special programmes for marginal and small farmers; (b) Emphasis on accelerated land and water management; (c) credit for marginal and small farmers; (d) Farmers’ debt relief commission.

The Commission strongly advocates that a strategy for marginal and small farmers must focus on group approaches in order to benefit from the economies of scale. A focused approach can be used to incentivize the formation of farmer’s groups and apex organizations and government and other can facilitate in finding solutions to problems of irrigation, inputs, procurement, markets and risk. The Commission has considered four important models for group approach in the country. These are: Co-operatives, Producer’s Companies, Farmers’ groups such as those in Andhra Pradesh and SEWA (Self Employed Women’s Association) Farmers’ model.

Cooperatives and farmers’ groups on the lines of Self Help Groups (SHGs) seem to hold greater promise for expansion. It may be noted that formation of marginal and small farmers’ groups on the lines of SHGs has developed under agency structure such as ‘Velugu’ or Indira Kranti Pradham (IKP) or CMSA mentioned above in Andhra Pradesh, ‘Kudumbashree’ in Kerala and SEWA in Gujarat. Such initiatives are being developed in Tamil Nadu, West Bengal, Orissa and Madhya Pradesh as well. As the Commission mentions that the ‘main lesson of these experiences is the capacity building and group formation among the poor marginal and small farmers can not be simply seen as an extension of routine departmental activity and as one of the many activities that a programme seek to promote” (p.39). These groups under agency approach can be promoted where farmers’ cooperatives are not operating.

The elements of special programmes advocated by NCEUS (2008) are the following

- (a) Promotion of Marginal and Small Farmers’ Groups: In many states groups on lines of self help groups (SHGs) are few. Special efforts have to be made to facilitate formation of such groups. The special programme proposes setting up of Marginal and Small Farmers’

Development Society (MSFDS) for the promotion, capacity building and coordination of development of marginal and small farmer's groups.

- (b) Enabling greater access to institutional credit: Linking Marginal and small farmer's groups to banks is an essential step towards needed credit flow to these farmers.
- (c) Training and capacity building: The special programme aims at motivating and enabling marginal and small farmers to acquire skills by establishing Community Resource Centres, by promoting marginal and small farmer activists at the village, cluster and block levels.
- (d) Support for strengthening and creation of non-farm activities: This aims to bridge the farm activities and non-farm activities of small holding agriculture as income from small farming is hardly sufficient to meet the basic needs of the farm households.
- (e) Gender-focused activities: It is known that the share of women is increasing in agriculture. This programme aims that the farmers' groups should have adequate representation of women farmers.
- (f) Planning for development of Marginal and Small Farmers: The Marginal and Small Farmer's Development Society would develop a medium term development strategy for these farmers.

Rural non-farm sector

As mentioned above, the income from small and marginal farms is not enough to take care of daily consumption and they have to borrow to survive. Therefore, small holdings farmers have to get part of income from rural non-farm activities. Therefore, promotion of rural non-farm sector is essential for generating incomes for rural population. Poverty can not be removed with 55% of workers in agricultural sector. Ultimately, many of the small and marginal farmers have to be shifted to rural non-farm sector and urban areas.

India currently produces about 50 million tonnes of fruits and 90 million tonnes of vegetables. Only 2% of these fruits and vegetables are processed as against 23% in China, 78% in Philippines, 83% in Malaysia. Half of those engaged in agriculture are still illiterate and just 5% have completed higher secondary education. Even in 2004-05, around 60% of rural male workers and 85% of rural female workers are either illiterate or have been educated upto primary level. In other words, education and skills are constraints. India can learn from China on rural transformation. China experienced a structural transformation in the last three decades. The state's role has been decisive in building up the physical and social infrastructure (including land reforms). India should learn from China on reforms in agricultural growth, rural non-farm employment, public investment and human development. The impact of growth on poverty reduction is quite significant (Rao, 2007). China started with agricultural reforms. Agricultural growth was quite high. The economic and institutional reforms in the whole economy created space for rural non-farm sector (TVEs and others). Diversification towards rural non-farm sector in China is one of the important factors responsible for rural poverty reduction (poverty is only 3%). This was partly due to agricultural productivity.

Rural Infrastructure Development

Regarding protection of agriculture in OECD countries, some suggest that developing countries also should protect their agriculture. However, a better option is to provide more rural and agricultural goods that are undersupplied by the market (Lipton, 2006). It also includes rural

infrastructure development like roads, irrigation, communications etc. Returns are also high from investments in agricultural R&D, rural roads and other infrastructure and knowledge generation (Hazell, 2011). The rural infrastructure will enable small and marginal farmers to compete with other farmers in India as well as in other countries.

4. LESSONS FROM INDIAN EXPERIENCE

Indian experience on small holding agriculture provides some lessons for developing countries.

(a) *Green revolution and Small Farms*: India's green revolution which started in the mid-1960s heralded a new era in Indian agriculture. The cultivation of high yielding varieties of seeds at recommended dosages of fertilizers were encouraged in water assured areas. Initially, the medium and large farmers in irrigated areas benefited from the new technology. However, small holding agriculture also benefited from green revolution because of government support in accessing services.

(b) *Food grains management*: The food grains management policy of India consists of three instruments: (a) minimum support prices and procurement; (b) buffer stock and (c) public distribution system. During 2006-08, there were significant increase in global food prices of rice and wheat. In the case of India, food grain prices increased only around 10 per cent as compared to global food price increase of 80 to 90 per cent. Food grain management is partly responsible for insulation from the rise of global food grain prices. Small and marginal farmers also benefited from these policies.

(c) *Dairy cooperatives*: Other countries can learn from the dairy cooperatives in India. The country's dairy sector is dominated by smallholders, and contracting with a large number of them involves transaction costs for the processors. The processors do not have much choice but to take milk from smallholder producers. The problem of the higher cost of contracting with small producers is overcome by contracting with a single person in the village—often an agent—who acts as an intermediary between the processor and producers (Birtal et al, 2008).

National Dairy Development Board covers 1,40, 227 village level societies and 14 million farm families of which 4 million are women. It has a daily procurement of 22 million liters of milk⁸. *Amul* Pattern of dairy cooperatives have contributed immensely to the fact that India has progressed from a milk-deficit country to emerge as the largest milk-producing nation in the world. In the process, they have generated millions of days of employment for the rural poor and improved their socio-economic condition⁹.

(d) *Water management in Gujarat*: The government of Gujarat played an important role in the Gujarat miracle for agriculture in 2000s. Gujarat has recorded high and steady growth at 9.6% per year in agricultural state domestic product since 1999-2000. What are the factors responsible for this high growth? According to Shah et al (2009), "the Gujarat government has aggressively pursued an innovative agriculture development programme by liberalising markets, inviting private capital, reinventing agricultural extension, improving roads and other infrastructure". If it is only canal irrigation, high growth should have been mainly in South and Central Gujarat.

⁸ See www.nddb.org

⁹ Speech of Chairman, *Amul* Dairy, 2007

However, the evidence shows that dry Saurashtra and Kachchh, and North Gujarat that have been at the forefront. “These could not have performed so well but for the improved availability of groundwater for irrigation. Arguably, mass-based water harvesting and farm power reforms have helped energise Gujarat’s agriculture” (Shat et al, 2009). This is possible due to more than 100,000 check dams and major programme on Khet Talavadi (water ponds in the fields).¹⁰

(e) *Self Help groups and group approach:* The women’s self help group (SHG) movement particularly SHG-bank linkage programme has spread all over the country. As mentioned above, there are two successful models in the country. One is Andhra Pradesh model and the other is Kerala model. These programme’s interventions and processes have resulted in a sustained process of empowerment of its women members. The real power of the SHG-bank linkage model (SBL model) lies in the economies of scale created by Self Help Group (SHG) Federations (comprising 150–200 SHGs each). This is evident, for example, in bulk purchase of inputs (seeds, fertilisers etc.) and marketing of outputs (crops, vegetables, milk, NTFPs etc). Government of India has now started National Rural Livelihoods Mission (NRLM) in 2011. There is a clear understanding that the SBL programme can only be successful if it is tied up with livelihood programmes such as improved agriculture, dairying, marketing etc.

(f) *Institutional innovations:* As discussed above, there are many institutional innovations in input services, land water management and output marketing for marginal and small farmers. Other countries can learn from these experiences.

(g) *Rights based approach:* India has been rights approach for several development programmes and to maintain transparency. The country has Right to Information, 100 days of guaranteed unskilled employment under National Rural Employment Guarantee Act, Right to Education. It is also going for Right to Food by introducing National Food Security Act. These rights approach puts pressures on governments to deliver the services to citizens. Basically we have to go beyond supply side and focus on demand side. Social pressures are needed for public action. Better monitoring systems have to be developed at Central, state, district and village levels to realize rights. Justiciability is one aspect of rights. However, one (particularly the poor) can not go to court every time right is violated. It is the responsibility of citizens and NGOs to organize campaigns for better functioning of the programmes. Public accountability is crucial for the success of rights approach.

(h) *Learning from others:* India also can learn from countries like China and Brazil on agriculture and other policies on reducing poverty. India can learn from China on agricultural transformation, education, infrastructure, macro policies, doing business, equitable asset distribution and, rural non-farm sector development. Similarly, Latin American Countries like Brazil can offer lessons to India on agriculture research (e.g. Agriculture research corporation EMBRAPA) and Zero hunger programme.

¹⁰ See Gulati (2009)

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Tables

Table 1 Share of Agriculture in GDP and Employment: All India

Year	Share in GDP (%)		Share in Employment (%)
	Agriculture, forestry and fishing	Agriculture*	
1950-1	57.7	50.2	--
1960-1	53.0	47.3	75.9
1980-1	39.7	35.8	--
2004-5	18.9	15.9	56.4
2008-9	15.7	13.3	--

Source: 'National Accounts Statistics of India: 1950–51 to 2002–03', Economic and Political Weekly Research Foundation, December 2004, Mumbai; Brochure on the New Series of National Accounts, Base Year 2005; K. Sundaram, (2001, 2007)

Table 2 Growth Rates in Agriculture GDP: All India

Period	Growth Rate (per cent per annum)
1950-1 to 1964-5	2.51
1867-8 to 1980-1	2.20
1980-1 to 1990-1	3.07
1992-3 to 1996-7	3.85
1992-3 to 2001-2	2.76
1997-8 to 2004-5	1.60
2004-5 to 2010-1	3.47

Source: National Accounts Statistics. Various years. Central Statistical Organisation, Government of India.

Note: GDP is in 1980–1 constant prices from 1950–1 to 1980–1; in 1993–4 constant prices for the period 1980–1 to 2004–5; in 2004-5 constant prices for the period 2004-5 to 2010-1. Quick estimates for 2009-10 and advanced estimates for 2010-1.

Table 3. Changes in Percentage Distribution of Operate Holdings and Operated Area

Land Class	Percentage Distribution of farm holdings				Percentage Distribution of Operated Area			
	1960-61	1981-82	1991-92	2002-03	1960-61	1981-82	1991-92	2002-03
Marginal	39.1	45.8	56.0	62.8	6.9	11.5	15.6	22.6
Small	22.6	22.4	19.3	17.8	12.3	16.6	18.7	20.9
Small&Marginal	61.7	68.2	75.3	80.6	19.2	28.1	34.3	43.5
Semi-medium	19.8	17.7	14.2	12.0	20.7	23.6	24.1	22.5
Medium	14.0	11.1	8.6	6.1	31.2	30.1	26.4	22.2
Large	4.5	3.1	1.9	1.3	29.0	18.2	15.2	11.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Marginal 0.01 to 1.00 ha.; Small 1.01 to 2.00 ha; Semi-Medium 2.00 to 4.00 ha; Medium 4.01 to 10.00 ha; Large above 10 ha.

Source: NCEUS (2008) National Sample Survey Land Holdings 8th, 17th, 26th, 37th, 48th, 55th Rounds, Central Statistical Organization, Government of India

Table 4. Average Size of Land Holdings

State/UT	Marginal	Small	Semi-Medium	Medium	Large	All Holdings
1	2	3	4	5	6	7
Andhra Pradesh	0.44	1.42	2.67	5.70	16.34	1.25
Arunachal Pradesh	0.50	1.32	2.66	5.77	16.13	3.69
Assam	0.39	1.30	2.73	5.22	53.02	1.15
Bihar	0.30	1.21	2.62	5.24	15.50	0.58
Chhattisgarh	0.44	1.42	2.70	5.76	16.49	1.60

Goa	0.32	1.26	2.56	5.64	23.77	0.84
Gujarat	0.53	1.46	2.78	5.80	16.91	2.33
Haryana	0.45	1.43	2.81	5.99	16.48	2.32
Himachal Pradesh	0.41	1.40	2.71	5.69	15.91	1.07
Jammu & Kashmir	0.37	1.40	2.66	5.39	21.13	0.67
Karnataka	0.46	1.44	2.72	5.83	14.83	1.74
Kerala	0.14	1.32	2.52	5.29	40.93	0.24
Madhya Pradesh	0.49	1.45	2.77	5.94	15.50	2.22
Maharashtra	0.50	1.42	2.69	5.64	15.38	1.66
Manipur	0.53	1.29	2.47	4.86	11.38	1.15
Meghalaya	0.55	1.45	2.58	5.41	13.12	1.30
Mizoram	0.64	1.28	2.33	4.78	13.14	1.24
Nagaland	0.52	1.19	2.55	6.20	15.83	7.28
Orissa	0.50	1.39	2.69	5.63	16.48	1.25
Punjab	0.63	1.40	2.67	5.75	15.14	4.03
Rajasthan	0.48	1.44	2.85	6.19	18.21	3.65
Sikkim	0.42	1.40	2.74	5.79	20.67	1.57
Tamil Nadu	0.37	1.40	2.72	5.68	19.48	0.89
Tripura	0.31	1.37	2.55	5.16	78.77	0.56
Uttarakhand	0.39	1.39	2.71	5.47	25.07	0.95
Uttar Pradesh	0.40	1.41	2.74	5.57	15.07	0.83
West Bengal	0.51	1.59	2.77	5.12	27.89	0.82
A & N Islands	0.39	1.38	2.53	4.31	46.79	2.00
Chandigarh	0.39	1.42	2.79	5.92	12.00	1.44
Dadar & Nagar Haveli	0.52	1.32	2.75	5.78	15.95	1.48
Daman & Diu	0.29	1.37	2.63	5.86	20.25	0.59
Delhi	0.42	1.38	2.86	5.77	15.27	1.52
Lakshadweep	0.19	1.27	2.56	5.47	22.33	0.27
Pondicherry	0.29	1.42	2.74	5.68	19.50	0.70
All-India*	0.24	1.42	2.39	4.42	13.16	1.33

Note: Includes institutional holdings also.

* No data available for Jharkhand

Source : Department of Agriculture and Cooperation, Agricultural Census Division.

Table 5: Extent of Area Under Irrigation in different farm size categories

Year	Marginal	Small	Semi-medium	Medium	Large	All Categories
1980-81	40	33	29	24	16	27
1990-91	44	36	33	30	22	33
2000-01	51	39	37	36	31	39

Source: Chand et al (2011); From Agriculture Census

Table 6: Fertilizer Consumption per ha of net sown area according to farm size class

Year	Marginal	Small	Semi-medium	Medium	Large	All Categories
Total Area						
1981-82	55	48	42	36	27	40
1991-92	99	85	77	68	54	76
2001-02	175	129	112	95	68	119
Irrigated Area						
1981-82	100	98	99	97	101	99

1991-92	145	140	147	144	157	146
2001-02	252	206	190	174	171	203
Unirrigated Area						
1981-82	24	22	18	14	9	16
1991-92	58	48	39	32	19	38
2001-02	96	76	63	46	22	61

Source: Chand et al (2011): from Input Survey, Ministry of Agriculture

Table 7: Share of Area under HYV according to farm size class

Year	Marginal	Small	Semi-medium	Medium	Large	All Categories
Total Area						
1996-97	59	55	54	53	42	54
2001-02	72	68	65	61	47	64
Irrigated Area						
1996-97	80	76	76	76	75	77
2001-02	89	86	85	82	78	85
Unirrigated Area						
1996-97	37	37	38	36	25	35
2001-02	52	54	52	46	30	48

Source: Chand et al (2011): from Input Survey, Ministry of Agriculture

Table 8: Cropping Intensity according to farm size class

Year	Marginal	Small	Semi-medium	Medium	Large	All Categories
1981-82	134	128	125	120	116	124
1991-92	137	130	124	121	118	126
2001-02	139	128	126	125	121	128

Table 9: Cropping Patterns by Farm Size: 2003

Crop	Small	Medium	Large	All
Paddy	35.0	24.7	13.4	25.8
Wheat	19.0	15.6	12.8	16.3
Coarse Cereals	16.5	19.4	18.3	17.7
Pulses	8.0	11.0	14.6	10.8
Oilseeds	7.2	12.0	14.0	10.4
Fruits	1.2	1.4	0.9	1.2
Vegetables	3.5	2.0	1.0	2.4
Condiments and spices	1.0	1.2	1.0	1.1
Sugarcane	2.6	3.5	2.5	2.8
Cotton	2.1	4.8	15.4	6.9
Other crops	3.9	4.4	6.0	4.7
Total	100.0	100.0	100.0	100.0

Source: BIRTHAL et al (2011)

Table 10. Share of Small and Marginal farmers in land possessed and in crop output (%)

States	Share in Area (Land Possessed)	Share in Output
West Bengal	83.0	86.2
Uttaranchal	81.4	46.7
Kerala	79.8	78.1
Himachal Pradesh	73.7	73.9
Orissa	73.2	72.5
Jharkhand	73.1	78.1
Assam	72.4	70.7
Bihar	67.2	69.2
Jammu and Kshmir	66.4	77.3
Uttar Pradesh	59.4	65.1
Tamil Nadu	54.4	51.7
Chattisgarh	49.4	46.1
Andhra Pradesh	47.5	46.7
Haryana	42.2	29.9
Karnataka	37.4	38.5
Madhya Pradesh	34.3	27.9
Gujarat	34.3	35.3
Maharashtra	31.7	35.2
Punjab	29.9	19.3
Rajasthan	22.6	33.2
All India	46.1	51.2

Table 11: Value of Output per Hectare (Rs.)

State	Marginal	Small	Marginal & Small	Medium & Large	All
Punjab	29448	26120	27213	28983	28623
Kerala	26485	27576	26814	28655	27197
Jammu & Kashmir	26774	24768	26057	16914	23214
West Bengal	21065	20429	20874	19004	20594
Assam	18484	17370	17975	18296	18068
Haryana	17769	16872	17304	17541	17470
Uttaranchal	15405	12694	14859	69131	25536
Andhra Pradesh	14777	14849	14813	12886	13720
Uttar Pradesh	14442	14441	14442	15611	14826
Himachal Pradesh	12680	17650	14347	19198	15362
Tamil Nadu	15629	11353	13926	15799	14771
Bihar	14230	13184	13833	13847	13837
Jharkhand	14275	12457	13568	11420	13034
Maharashtra	13212	11350	12064	7140	8339
Karnataka	11727	12178	11962	10194	10809
Gujarat	12001	11656	11807	11504	11609
Chhattisgarh	8612	8128	8339	7953	8126
Madhya Pradesh	8543	7546	7927	8783	8526
Orissa	7207	6374	6870	6731	6831
Rajasthan	7177	5629	6330	4213	4739
All India	14754	13001	13944	11333	12535

Note: All India includes small states Goa, Delhi, Pondicherry, North Eastern States & UTs.

Source: Computed using NSS unit level data 59th Round on Situation Assessment Survey of Farmers 2003.

Table 12. Cost of Cultivation per hectare (Rs.)

	Marginal	Small	Marginal & small	Medium & large	All
Cost per ha (Rs.)	6975	6046	6530	5252	5841

Source: Assessment Survey of Farmers, 2003

Table 13: Net Farm Income per Hectare of Cropped Area from Cultivation

State	Marginal	Small	Marginal & Small	Medium & Large	All
Andhra Pradesh	4224	5043	4637	5359	5047
Assam	15765	14682	15269	15238	15260
Bihar	7997	7566	7834	8479	8032
Chhattisgarh	5317	5157	5227	4468	4809
Gujarat	5717	5875	5806	5536	5630
Haryana	9922	9151	9523	8155	8567
Himachal Pradesh	7887	11674	9157	11785	9707
Jammu & Kashmir	20330	20295	20317	13079	18067
Jharkhand	10655	9406	10169	8898	9854
Karnataka	5695	6333	6028	5672	5796
Kerala	16829	18109	17216	15799	16921
Madhya Pradesh	5294	4060	4531	5203	5001
Maharashtra	6547	5712	6032	3653	4232
Orissa	3448	3096	3306	2939	3204
Punjab	18582	15780	16701	16615	16632
Rajasthan	2651	1392	1962	1345	1499
Tamil Nadu	6088	3658	5120	7723	6295
Uttar Pradesh	6700	7399	6998	8281	7421
Uttaranchal	11286	8527	10730	64752	21358
West Bengal	9528	9444	9503	9512	9503
All India	7809	6955	7414	6080	6694

Note: All India includes small states Goa, Delhi, Pondicherry, North Eastern States & UTs.

Source: Computed using NSS unit level data 59th Round on Situation Assessment Survey of Farmers 2003.

Table 14: Income and Consumption per Farmer Household (Rs. Per month), by Size Category of Farmers

State	Marginal			Small			Semi-medium		
	Income	Consumption	Difference	Income	Consumption	Difference	Income	Consumption	Difference
Andhra Pradesh	1235	2159	-924	1837	2549	-712	2590	3045	-455
Bihar	1439	2254	-815	2667	3246	-579	4460	3599	861
Chhattisgarh	1187	1754	-567	1684	2204	-520	2858	2681	177
Gujarat	1931	2725	-794	2815	3386	-571	3757	3698	59
Haryana	2155	3820	-1665	2919	5233	-2314	4289	5122	-833
Jharkhand	1814	1835	-21	2713	2149	564	4901	2674	2227
Karnataka	1951	2262	-311	2474	2693	-219	3796	3262	534
Kerala	3602	4075	-473	6290	5262	1028	10639	7178	3461
Madhya Pradesh	1099	1973	-874	1193	2241	-1048	1439	2720	-1281
Maharashtra	1761	2467	-706	2183	2583	-400	3525	3026	499
Orissa	901	1578	-677	1425	2034	-609	2456	2688	-232
Punjab	2840	3900	-1060	4462	5452	-990	6605	5860	745
Rajasthan	1427	2809	-1382	1650	3668	-2018	1678	3875	-2197
Tamil Nadu	1739	2285	-546	2244	3187	-943	3658	3691	-33
Uttar Pradesh	1198	2526	-1328	2428	3728	-1300	3978	4948	-970
West Bengal	1862	2517	-655	3643	3877	-234	5993	4754	1239

All India	1659	2482	-823	2493	3148	-655	3589	3685	-96
State	Medium			Large			All		
	Incom e	Consump -tion	Differ- ence	Incom e	Consump -tion	Differ- ence	Income	Consump -tion	Differ- ence
Andhra Pradesh	5479	4133	1346	9418	5724	3694	1634	2386	-752
Bihar	9526	5678	3848	27766	8174	19592	1810	2459	-649
Chhattisgarh	3860	3716	144	10500	5161	5339	1618	2045	-427
Gujarat	6355	4687	1668	5084	4391	693	2684	3127	-443
Haryana	5353	6463	-1110	16110	8234	7876	2882	4414	-1532
Jharkhand	7990	2773	5217	23433	3251	20182	2069	1897	172
Karnataka	5178	3563	1615	16837	8844	7993	2616	2608	8
Kerala	15045	8820	6225	***	***	***	4004	4250	-246
Madhya Pradesh	3066	3667	-601	8000	6108	1892	1430	2339	-909
Maharashtra	6244	3877	2367	15653	7241	8412	2463	2689	-226
Orissa	3724	2771	953	11451	5314	6137	1062	1697	-635
Punjab	13770	7836	5934	34340	13078	21262	4960	4840	120
Rajasthan	1682	4368	-2686	706	4939	-4233	1498	3288	-1790
Tamil Nadu	9061	3793	5268	26984	9030	17954	2072	2506	-434
Uttar Pradesh	7974	6732	1242	7850	6776	1074	1633	2899	-1266
West Bengal	3864	5234	-1370	***	***	***	2079	2668	-589
All India	5681	4626	1055	9667	6418	3249	2115	2770	-655

Note: All India includes small states Goa, Delhi, Pondicherry, North Eastern States & UTs.

Source: Computed using NSS unit level data 59th Round on Situation Assessment Survey of Farmers 2003.

Table 15: Literacy and Mean Years of Education of Unorganized Agricultural Self-employed Workers, 2004-2005

Land Size/Class	Literacy Rate			Mean Years of Education		
	Male	Female	Total	Male	Female	Total
Landless	45.6	25.5	34.0	2.2	1.5	1.8
0.01 – 0.40 ha	59.2	31.1	43.7	3.7	1.7	2.6
0.41 – 1.00 ha	64.5	31.7	51.4	4.1	1.7	3.2
Marginal	62.5	31.2	48.1	3.9	1.7	2.9
Small	68.7	34.8	55.9	4.7	1.9	3.6
2.00 – 4.00 ha	70.2	37.1	57.6	4.9	2.1	3.8
> 4.00 ha	77.4	42.0	63.3	5.8	2.5	4.5
Medium & Large	72.9	39.0	59.7	5.3	2.2	4.1
All	67.4	34.1	53.4	4.5	1.9	3.4

Source: NCEUS (2008) Computed using NSS unit level data 61st Round in Employment and Unemployment Situation in India.

Table 16: Prevalence Rate of Indebtedness by Farm Size, All India (Percentage) 2003.

Land Size (ha)	Formal	Informal	Both	Total
<= 0.40	12.7	30.3	3.5	46.5
0.41 – 1.00	18.8	21.7	4.6	45.0
1.01 – 2.00	25.9	17.9	7.0	50.8
> 2.00	34.7	14.4	8.6	57.8
Total	20.4	23.0	5.3	48.6

Source: Computed using NSS unit level data 59th Round on Situation Assessment Survey of Farmers 2003.

Table 17: Percentage Distribution of Outstanding Loans by Farm Size & Sources (2003)

Source of Loan	Size Class of Land Possessed (hectares)			
	<=0.40	0.41 – 1.00	1.01 – 2.00	Above 2.00
Government	3.9	3.8	1.7	1.4
Co-operative society	14.1	17.0	2.5	22.8
Bank	24.4	32.0	35.4	42.6
Total: Institutional	42.4	52.8	57.6	66.8
Agricultural/ Professional money lender	32.4	30.8	25.9	20.0
Trader	4.9	4.6	4.2	6.0
Relatives & friends	15.2	9.1	8.8	5.2
Doctor, lawyer & other professionals	1.4	0.7	0.8	0.8
Others	3.6	2.0	2.6	1.2
Total: Non-Institutional	57.6	47.2	42.4	33.2

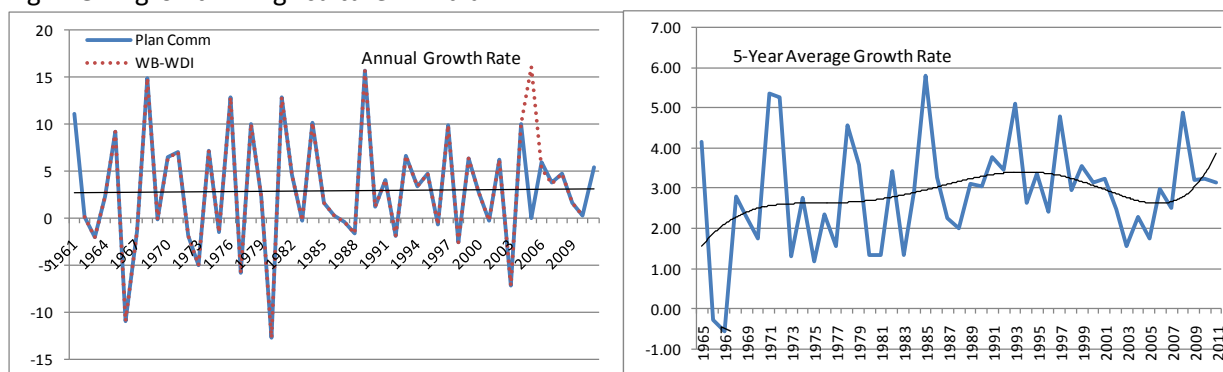
Source: Computed using NSS unit level data 59th Round on Situation Assessment Survey of Farmers 2003.

Table 18: Percentage Distribution of outstanding loans by formal and informal source across size classes of land in selected states: 2003

State	Size Class of Land owned							
	<0.01	0.0 I - 0.40	0.40 - 1.00	1.01 - 2.00	2.0 I - 4.00	4.01 - 10.00	10.00+	All sizes
	Formal Sources							
AP	16.9	19.3	25.1	26.6	41.5	48.6	49.5	31.4
Bihar	36.5	20.8	47.0	66.1	63.4	19.6	70.1	39.2
Maharashtra	58.3	83.2	80.2	78.8	83.8	88.7	91.1	83.8
Orissa	64.7	62.4	77.1	72.1	88.4	96.9	13.2	74.8
Punjab	24.8	29.2	65.6	49.1	61.2	47.5	30.1	47.9
Tamil Nadu	19.1	37.4	46.0	61.5	65.2	74.3	82.9	53.4
All India	22.6	43.3	52.8	57.6	65.1	68.8	67.6	57.7
	Informal Sources							
AP	83.2	80.9	75.0	73.4	58.4	51.4	50.5	68.5
Bihar	63.5	79.2	53.0	33.8	36.6	80.4	29.9	58.5
Maharashtra	41.6	16.8	19.8	21.1	16.2	11.3	8.9	16.2
Orissa	35.4	37.5	22.8	27.9	11.7	3.2	86.8	25.1
Punjab	75.2	71.0	34.5	50.9	38.8	52.4	70.0	52.1
Tamil Nadu	80.9	62.5	53.9	38.6	34.7	25.7	17.2	46.5
All India	77.4	56.7	47.2	42.4	34.0	31.2	32.8	42.3

Source: Calculated from NSSO (2005)

Fig 1. GDP growth in Agriculture in India



Source: Madhur (2011)

Fig 2

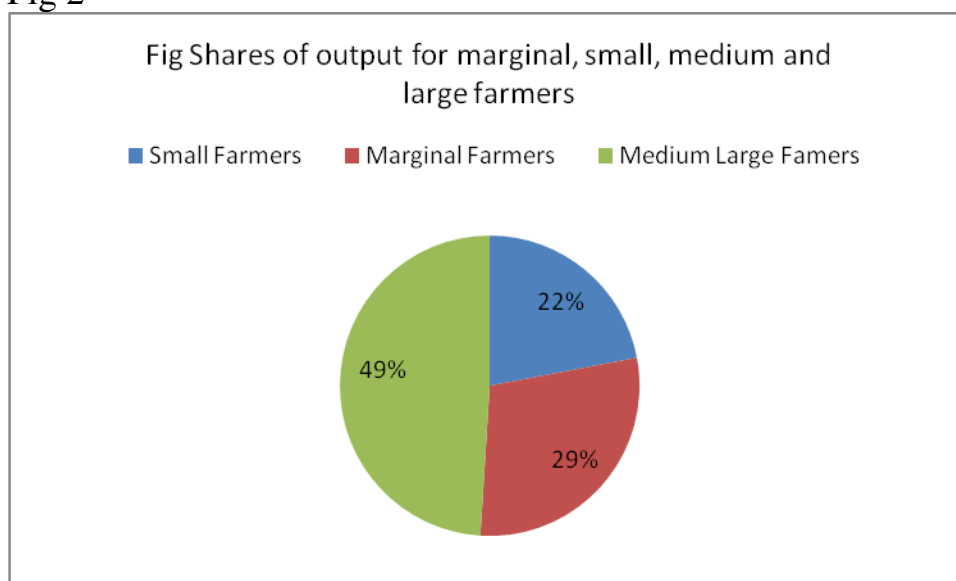


Fig. 3: Value of Output per Hectare (Rs.) 20

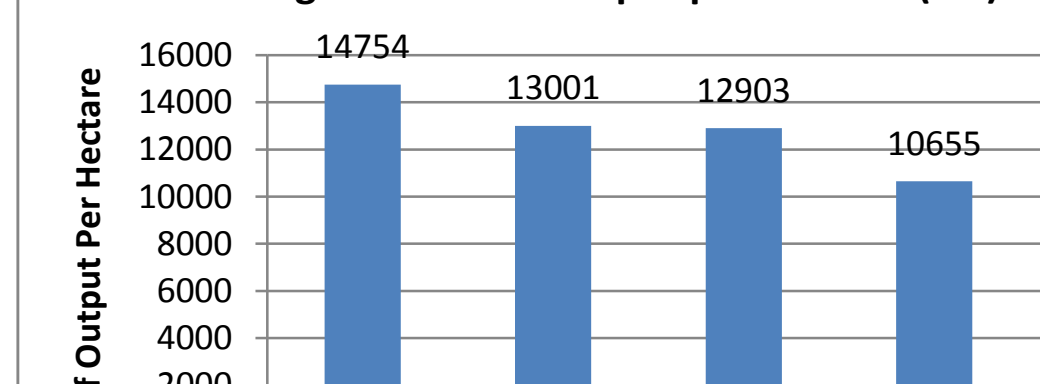


Fig 4.1



Fig 4.2.

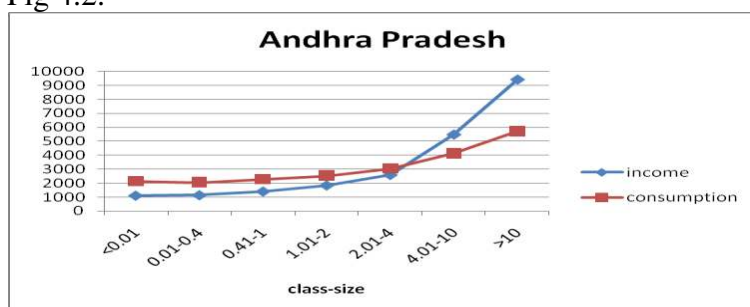


Fig 4.3

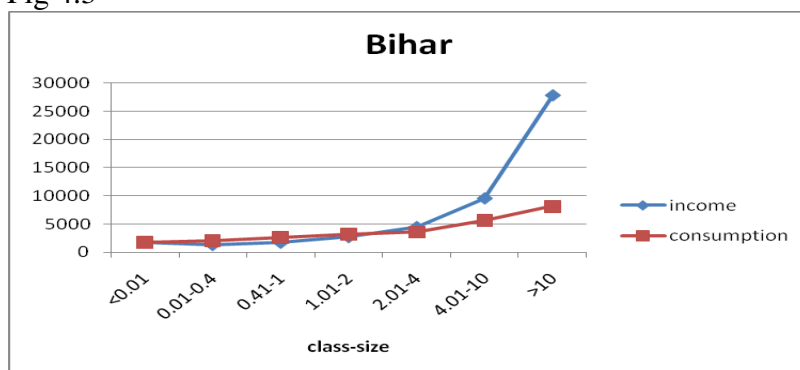


Fig 4.4

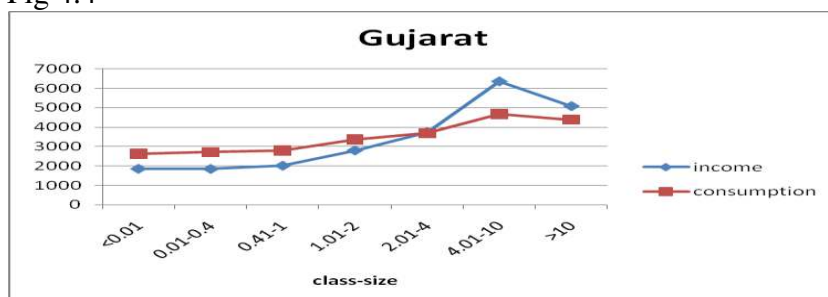


Fig 4.5

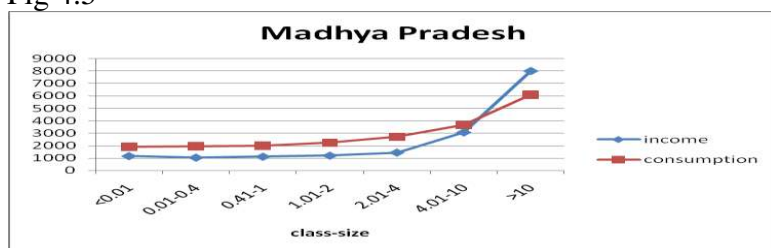


Fig 4.6

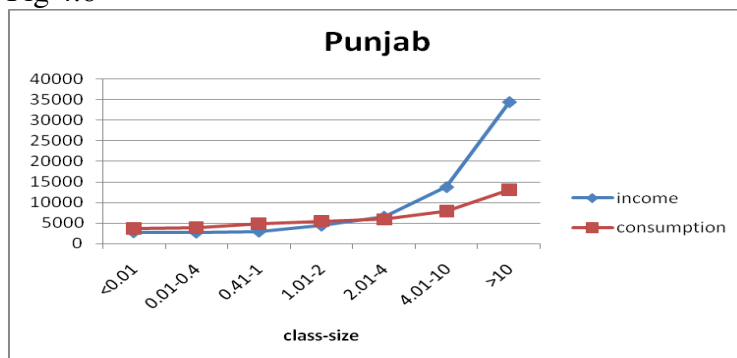


Fig 4.7

