Agricultural Economics Research Review
Vol. 22 January-June 2009 pp 21-45

First Prof. Dayanatha Jha Memorial Lecture

Challenges for Revival of Indian Agriculture

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Professor Dayanatha Jha.....

Prof. Dayanatha Jha was a renowned agricultural economist who made seminal contributions to the area of agricultural economics. His contributions in the area of agricultural policy research and technological change are recognised internationally. His work on research investment and its impact on agricultural productivity and growth and resource allocation is widely acclaimed. His in-depth understanding of micro-dimension of technological change such as fertilizer response in dryland areas, pest and irrigation management, small farm considerations, and supply response led to significant contributions to the area of agricultural economics. Advancement of the agricultural economics profession and institutional development were very close to his heart. It was due to Prof. Jha's vision and leadership that National Centre for Agricultural Economics and Policy Research (NCAP) could become a centre of excellence and institution of international repute. It is a befitting tribute to this great scientist, teacher, researcher philosopher, and humanbeing par excellence that NCAP has started Professor Dayanatha Jha Memorial Lecture from the year 2008.

The first Professor Dayanatha Jha Memorial Lecture was delivered by Dr S. Mahendra Dev, Director, Centre for Economic and Social Studies, Hyderabad on the Annual Day of NCAP in New Delhi.

Chief Editor

In India, economic growth has improved significantly during the past two and a half decades, particularly in the post-reform period. India is considered as one of the fastest growing economies in the world. However, the exclusion problems have not been addressed seriously by the government programmes and strategies. The experience of the economic reforms during the past 15 years indicates that while there have been improvements in the economic growth, foreign exchange, IT revolution, export growth, etc., the income distribution has been unequal and only some sections of the population have been benefited more from this higher growth and prosperity. 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 credit, health care and education and poor performance of the agriculture sector.

One of the excluded sectors during the reform period was agriculture which showed low growth and experienced more farmers' suicides. There are serious concerns about the performance of agriculture sector in the country. The post-reform period growth has been led by the services. The commodity sector growth (agriculture + industry) has not been higher in the post-reform period as compared to that during the 1980s. The particular worry is the agriculture sector which has shown less than 2 per cent per annum growth during the past decade. Also, there is a disconnect between employment growth and GDP growth. In other words, employment is not being generated in the industry and services sector, where growth is high. On the other hand, GDP growth is low in the agriculture wherein a majority of people are employed.

Thus, there has been a lop-sided approach to agricultural development in India during the past few

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decades. Growth may be higher during the past two decades, but the inclusive growth in terms of focus on agriculture has been missing[1]. It is like running a train with engine only without connecting a majority of the bogies and people to the engine. The role of agriculture in economic development is well known. Agriculture not only contributes to overall growth of the economy but also provides employment and food security to the majority population, which in turn reduces poverty in a developing country. Thus, if we want pro-poor growth and real development, high agricultural growth and rising incomes for farmers are essential.

In recent decades, the context within which agriculture policy has to be developed and implemented, has undergone fundamental changes. The relationships operated for much of the 1960s and 1970s have changed. Globalization policies during the 1980s and particularly during 1990s and beyond have created many challenges for agriculture in developing countries. Some of the consequences and impacts of globalization in developing countries are: exposure of domestic agriculture to international competition, growth of non-agricultural sector and its impact on demand for agricultural products, urban middle class life-style changes, including diets, rising food imports, competitiveness and diversification of domestic production systems, vertical integration of the food supply chain, etc. (Prabhu, 2006).

Because of demographic pressures, there has been a significant increase in small and marginal farm holdings. These farmers have to face the challenges of globalization. Risk and uncertainty have also increased as cultivation has spread to marginal lands. The diversification of agriculture has also raised concerns on food security.

In recent years, there has been a concern regarding increase in the global food prices. Rise in crude oil prices has increased agricultural costs also. Increased use of food crops for biofuels has also pushed up their demand. The USA uses 20 per cent of its maize production for biofuels; Brazil uses 50 per cent of sugarcane for biofuels; and the European Union uses 68 per cent of its vegetable oil production for biofuels. Such large usages, by reducing the availability of these products for food and feed, have exerted pressure on their prices. Food prices have also increased due to low output stocks. International prices of wheat, rice and maize have increased significantly in the past two years. This is another challenge for India in maintaining its food security.

This lecture is divided into three sections. Section 1 deals with the performance and problems of agriculture, while Section 2 discusses policy challenges for the revival of Indian agriculture. The last Section provides concluding observations.

1. Performance and Problems of Indian Agriculture

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 GDP. The share of agriculture and allied activities in GDP declined from 57.7 per cent in 1950-51 to 25 per cent in 1999-00 and further to 20 per cent in 2004-05. The share of agriculturial workers in total workers has declined slowly, from 75.9 per cent in 1961 to 59.9 per cent in 1999-00 and further to 56.7 per cent in 2004-05. Between 1961 and 2004-05, there has been a decline of 34-percentage points in the share of agriculture in GDP, while the decline in share of agriculture in employment has been of 19 percentage points only. As a result, the labour productivity in agriculture has increased only marginally, while that of non-agricultural workers has increased rapidly. There were about 259 million agricultural workers in the year 2004-05; about 42 per cent of them were females.

A structural transformation has happened in four Indian states, viz. Kerala, Tamil Nadu, West Bengal and Punjab – the share of agriculture in employment being less than 50 per cent in these states (Table 1)[2]. On the other hand, the share of agriculture in employment in eight states was more than 60 per cent in 2004-05. It may take some more years for these states to achieve structural transformation.

In terms of growth, the performance of agriculture has been quite impressive during the post-

[1] For more on inclusive growth, see Dev (2008)

[2] Also see, Kannan (2007)

Table 1. Structural transformation across different states of India: Share of agriculture in employment and GSDP: 2004-05

States	Share of agriculture in total (Rural+Urban) employment (%)	Rank based on employment share	Share of agriculture in GSDP (%)	Ranks based on share in GSDP
Kerala	35.5	1	16.5	3
Tamil Nadu	41.3	2	12.5	2
West Bengal	45.7	3	23.5	7
Punjab	47.6	4	38.6	16
Haryana	50.3	5	29.3	12
Maharashtra	53.2	6	9.6	1
Gujarat	54.9	7	20.1	5
Andhra Pradesh	58.5	8	24.7	8
Karnataka	60.7	9	19.2	4
Uttar Pradesh	60.9	10	33.3	15
Rajasthan	61.7	11	27.6	9
Orissa	62.4	12	28.2	10
Himachal Pradesh	64.1	13	20.5	6
Assam	66.0	14	32.0	13
Bihar	68.8	15	32.7	14
Madhya Pradesh	69.2	16	28.3	11
All-India	56.7	-	21.7	

Source: 61st Round of NSS Employment and Unemployment Survey and CSO data for GSDP.

independence era than pre-independence period. The all-crop output growth of around 2.7 per cent per annum during the post-independence period (1949-50 to 1999-00) was much higher than the negligible growth rate of around 0.4 per cent per annum during the first half of the previous century. As a result, India could achieve self-sufficiency in food grains at the national level by the mid-1970s. The growth in GDP in agriculture was around 2.2-2.5 per cent per annum during 1950-51 to 1980-81. It recorded the highest growth rate of more than 3 per cent per annum during the 1980s. In the post-reform period, the growth rate declined to 2.76 per cent per annum. The growth in agriculture GDP, which was 4.7 per cent per annum during the Eighth Plan (1992-97), declined to 2.1 per cent during the Ninth Plan (1997-2002) and further to 1.8 per cent per annum during the Tenth Plan (2002-07). Thus, there has been a significant deterioration in the growth rate of agriculture since mid-1990s. However, there are signs of revival of agricultural growth to more than 3 per cent per annum during the past few years.

If we look at the value of output of various sub-sectors, the crop sector which showed a growth rate of 3.2 per cent during 1990-91 to 1996-97, decelerated to 0.8 per cent during 1996-97 to 2004-05 (Table 2). In the case of livestock and fruits and vegetables, there has been a deceleration in their

Table 2. Growth rate of output of various sub-sectors in agriculture: 1980-81 to 2004-05

Period	Crop sector	Livestock	Fruits and vegetables	Non-horticultural crops	Cereals
1980-81 to 1989-90	2.71	4.84	2.42	2.77	3.15
1990-91 to 1996-97	3.22	4.12	5.92	2.59	2.23
1996-97 to 2004-05	0.79	3.67	3.28	0.05	0.02

Source: Chand *et al*. (2007); Computed from National Accounts Statistics

Table 3. Average annual per capita production of cereals, pulses and foodgrains: 1971-2007

(in kg)

Year	Cereals	Pulses	Foodgrains
1971-75	164	19	183
1976-80	172	18	190
1981-85	179	17	196
1986-90	182	16	198
1991-95	192	15	207
1996-00	191	14	205
2001-05	17	12	189
2004-07	174	12	186

Source: Planning Commission (2007)

growth rates since the mid-1990s, but still these are above 3 per cent per annum.

However, our concern is more regarding food crops. There has been no growth in the output of cereal crops like rice, and wheat, and coarse cereals. Similarly, there has been stagnancy in pulses and oilseed crops. The foodgrains output was 174.8 million tonnes (Mt) in 2002-03, 213.2 Mt in 2003-04, 198.4 Mt in 2004-05 and 208.6 Mt in 2005-06. It is expected to be around 216 Mt in 2006-07. It is a matter of concern and it may threaten our food security. As shown in Table 3, the per capita production of cereals, pulses and foodgrains has declined significantly since the early-1990s. However, foodgrains production is expected to be 230 Mt in the year 2007-08. It is due to the record production of paddy and wheat, touching 96 Mt and 78 Mt, respectively.

The major concern during the post-reform period is the decline in yield growth for both foodgrain and non-foodgrain crops (Bhalla, 2006). During the period 2000-01 to 2003-04, all-crops output growth declined further to less than 1 per cent per annum. The reduction was much higher for foodgrains than non-foodgrains.

The recent data given in Table 4 also indicate the story of yield slackness in a fairly telling manner. During the past five years, the yield levels for most crops or crop-groups stood almost frozen as shown by the 0.5 per cent growth (lowest ever in recent times) per annum for foodgrains. However, the yield growth for rice has shown fluctuations. It was 1.63 per cent during 2001-02 to 2005-06, but declined to 0.24 per cent during 2003-04 to 2005-06. Wheat has recoded negative growth during the past five years. Only the yield growth of oilseeds has recovered during 2001-02 to 2005-06.

Input Growth in Agriculture

One of the reasons for the decline in output growth and farm business income was low yield growth in the post-reform period. The reduction in yield growth, in turn, was largely a result of reduction in input growth in agriculture. Sen and Bhatia (2004) have shown that the growth of per hectare input-use at constant prices decelerated from 3.66 per cent per annum during the 1980s to 0.94 per cent per annum during the 1990s. The same study has revealed that combination of input price increase and inadequate expansion of public infrastructure could be responsible for the deceleration in growth of input-use. Real input prices (deflated by CPIAL) declined at the rate of (-) 1.94 per cent per annum during the 1980s but have risen at 0.33 per cent per annum

Table 4. Growth rate of yields for foodgrains and oilseeds: 1980-81 to 2005-06

Years	Rice	Wheat	Coarse cereals	Total cereals	Total pulses	Total foodgrains	Oilseeds
1980-81 to 1985-86	1.67	2.10	0.27	1.69	1.49	1.63	1.08
1985-86 to 1990-91	1.75	1.38	3.75	2.52	0.96	2.12	3.13
1990-91 to 1995-96	0.73	0.92	0.90	1.11	0.29	1.08	1.57
1995-96 to 2000-01	0.65	0.85	0.59	0.86	0.08	0.95	-0.53
2001-02 to 2005-06	1.63(0.24*)	-0.71	1.71**	1.03	0.22	0.52	4.53

Notes: *Growth rate for the period 2003-04 to 2005-06; **Covers the period 2001-02 to 2004-05

Source: Economic Outlook for 2006-07, A Report prepared by the Economic Advisory Council to the Prime Minister (August, 2006)

during the 1990s. The growth in the wages of hired labour was also responsible for the cost increases in non-cereal crops and this depressed the farm business incomes. It was also mentioned that reduction in subsidies could be compensated by higher output prices, but to compensate for the decline in yields and farm income, much higher output prices are needed. Mid-term Appraisal of the Tenth Plan also attributes a part of the decline in agricultural growth to lower input-use, which in turn, was due to lower profitability in the post-reform period.

Terms of Trade in Agriculture

The reform strategy for agriculture relied on making terms of trade (TOT) favourable to the sector by reducing protection to industry and trade liberalization. These favourable relative prices are expected to attract investible resources into agriculture and lead to higher growth of agricultural production.

As shown in Table 5, TOT for agriculture during the 1980s increased significantly, from 88.7 in 1981-82 to 99.4 in 1989-90. Inspite of this increase, the terms of trade for agriculture were not favourable. With liberalization and reduction in protection to industry, terms of trade have become favourable to agriculture since 1990-91. In the years 1999-00 and 2000-01, there was a reduction in the index before recovering in the subsequent two years. The index based on implicit prices of GDP has also shown that during 1998-2004, there was a four-point decline in the agricultural TOT, although it was still favourable to agriculture as compared to non-agriculture sector (Sen, 2007). However, the private investment in agriculture improved due to increase in terms of trade. Although the private investment increased at a faster rate during the 1990s, it has started declining in recent years. It may be noted that terms of trade are one of the factors responsible for enhancing agricultural growth. There are many non-price factors which are important for higher growth in agricultural production.

Total Factor Productivity in Agriculture

In development literature, the assumption is that productivity is lower in agriculture than non-agriculture sector. Here, we look at the Indian evidence on total factor productivity (TFP) growth in agriculture and non-agriculture sectors. The evidence shows that TFP growth has been almost identical (1.13 per cent per annum) in both the sectors during the 50-year period, 1950-2000 (Krishna, 2006). The sub-period data has indicated that TFP growth in agriculture was the highest during the 1980s at 1.89 per cent per annum, but declined to 1.68 per cent in the post-reform period (Table 6). On the other hand, TFP growth was higher in the non-agriculture than agriculture sector during the 1980s and it increased marginally in the post-reform period. One interesting finding is that inspite of lower growth in GDP, the TFP contributed more than 50 per cent to GDP in agriculture, whereas in the non-agriculture, its contribution to GDP was less than 30 per cent during the 1980s and 1990s. It shows the importance of TFP for agriculture during the past two decades.

Table 5. Index of terms of trade between agricultural and non-agricultural sectors (Base 1988-91=100)

Year	Index	Year	Index	Year	Index	Year	Index
1981-82	88.7	1989-90	99.4	1997-98	105.6	2005-06	101.9
1982-83	91.4	1990-91	101.9	1998-99	105.2	2006-07*	102.0
1983-84	91.6	1991-92	105.6	1999-00	102.7		
1984-85	93.9	1992-93	103.9	2000-01	100.7		
1985-86	93.6	1993-94	103.6	2001-02	102.8		
1986-87	95.7	1994-95	106.6	2002-03	103.6		
1987-88	97.4	1995-96	105.3	2003-04	101.0		
1988-89	98.3	1996-97	103.1	2004-05	100.3		

*provisional

Source: Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, New Delhi

Table 6. Total factor productivity (TFP) in agriculture and non-agriculture sectors

Particulars	1950-51 to 1960-61	1960-61 to 1970-71	1970-71 to 1980-81	1980-81 to 1990-91	1990-91 to 1999-2000
Agriculture					
Growth rate in GDP (%)	3.03	2.31	1.50	3.43	2.97
Growth rate in TFP (%)	1.65	0.88	-0.35	1.89	1.68
Share of TFP in GDP growth (%)	54.5	38.1	-23.3	55.1	56.6
Non-agriculture					
Growth rate in GDP (%)	5.34	5.30	4.38	6.77	7.14
Growth rate in TFP (%)	0.88	0.89	0.01	1.98	2.04
Share of TFP in GDP growth (%)	16.5	16.8	0.22	29.3	28.6

Source: Sivasubramonian (2004)

Regional Disparities: There are wide regional disparities in output across regions in India. Certain regions such as Punjab, Haryana, western Uttar Pradesh, parts of Andhra Pradesh and Tamil Nadu had benefited more during the initial phase of the green revolution than others could. This had accentuated regional disparities in the immediate post-green revolution period. An important feature of the 1980s and the early-1990s, however, was a more equitable spread of agricultural growth. After performing poorly during the early years of green revolution, many of the states, where poverty is widespread – Assam, Bihar, Orissa, Madhya Pradesh and West Bengal, have shown significant growth during the 1980s. Oilseeds have also gained in the dry belts of Rajasthan, Madhya Pradesh, Karnataka and Maharashtra.

Table 7 shows that growth rate in agriculture SDP was high for many states during the period 1984-85 to 1995-96. However, growth rates decelerated in all the states, except Bihar, during the period 1995-96 to 2004-05. The deceleration was the highest in the states with greater proportion of rain-fed areas (Gujarat, Rajasthan, M.P., Karnataka and Maharashtra). Agricultural growth in these states was less than one per cent per annum in the past decade.

NSS Data on Status of Farmers: The National Sample Survey Organisation (NSSO) undertook a comprehensive survey to assess the status of farmers in the country in the year 2003 at the request of the Union Ministry of Agriculture. According to the NSSO Report (497) on Income and Expenditure of farmers' households, the average total monthly

Table 7. Growth rates of agriculture SDP in different states (ranked by percentage of rainfed area)

State	Growth rate in NSDP agriculture		Rainfed (%)	State	Growth rate in NSDP agriculture		Rainfed (%)
	1984-85 to 1995-96	1995-96 to 2004-05			1984-85 to 1995-96	1995-96 to 2004-05	
Punjab	4.00	2.16	3	Gujarat	5.09	0.48	64
Haryana	4.60	1.98	17	Rajasthan	5.52	0.30	70
Uttar Pradesh	2.82	1.87	32	Orissa	-1.18	0.11	73
Tamil Nadu	4.95	-1.36	49	Madhya Pradesh	3.63	-0.23	74
West Bengal	4.63	2.67	49	Karnataka	3.92	0.03	75
Bihar	-1.71	3.51	52	Maharashtra	6.66	0.10	83
Andhra Pradesh	3.18	2.69	59	Kerala	3.60	-3.54	85
All India	3.62	1.85	60	Assam	1.65	0.95	86

Source: Planning Commission (2007)

income of a farmer household was Rs 2115 (annual income of Rs 25,380). The average monthly income per farmer household constituted Rs 969 from cultivation, Rs 819 from wages, Rs 236 from non-farm business, and Rs 91 from farming of animals. However, there were large differences in the total income across farm-size classes.

The question is whether the income from cultivation is sufficient to meet all the basic necessities of a farm household. Is the net income of Rs 969 from cultivation (annual income of Rs 11,628) sufficient? One household needs more than Rs 20,000/annum to cross poverty line. Here, even an average farmer household is not able to earn from cultivation half of the income needed to cross the poverty line. Incomes of small and marginal farmers are much lower than of the average farmer household. Many of the households depend on wages and non-farm businesses to augment their incomes. Even these incomes may not be sufficient to meet the basic necessities, including healthcare and education.

A study by Sen and Bhatia (2004) based on the cost of cultivation data has indicated a decline in the growth of farm business income (FBI) over time. This study has shown that the all-India rate of growth in real (deflated by Consumer Price Index Number for Agricultural Labourers) FBI per hectare declined sharply from 3.21 per cent per annum during the 1980s to only 1.02 per cent per annum during the 1990s. However, a farmer is interested in farm income per cultivator rather than price-cost ratio or FBI per hectare. Estimates of FBI per cultivator using growth of cultivators and cropped area have revealed that the growth rate was 1.78 per cent per annum during the 1980s, but it decelerated to 0.03 per cent per annum during the 1990s, indicating almost stagnant FBI per cultivator in the later period.

Farmers' Suicides: In recent years, the farmers' suicides have increased in some states. There were 167,000 farmers' suicides in the previous decade. It is one of the darker sides of Indian agriculture. Indebtedness of farmers and increasing risks in agriculture are the main factors responsible for these suicides[3]. The sharper decline in absolute productivity, price uncertainties due to trade liberalization and rise in costs due to domestic liberalization, decline in credit and non-farm work have intensified this crisis. Most of these studies have, rightly, identified household indebtedness to be the main reason for the suicides. However, indebtedness is due to increase in input intensity of agriculture. Long-term factors like decline in farm size, groundwater depletion, deterioration in soil quality, etc. have also been responsible for the agrarian crisis and farmers' suicides.

Many farmers are shifting to commercial crops, where input intensity is higher than subsistence crops. There is no breakthrough in dryland technology. Cultivation is also being done in marginal lands. Risk is high in commercial crops and marginal lands. The government has identified 32 districts in the four states of Andhra Pradesh, Karnataka, Maharashtra and Kerala and announced a package in September, 2006. Half (16) of these districts are from Andhra Pradesh. Due to this package, these four states would benefit in terms of irrigation projects, bank debt reschedule, writing off loan interest, moratorium on loans, support to co-operative banks, increase in new agricultural credit, support to dairy, poultry, fisheries, horticulture, insurance for crops and sheep, etc. The government package on farmer's suicides and agrarian crisis is a welcome step. However, the government has to take both short- and long-term measures to reduce the crisis. The Prime Minister's package for Vidarbha is comprehensive in coverage. However, it has to be improved from some deficiencies, as pointed by the Committee chaired by Radhakrishna (GoI, 2007). First, the design of some of the schemes is not based on the felt-needs of households. Second, there is a lack of region- and household-specific flexibility built into these measures. Third, there are problems of implementation and monitoring due to lack of proper institutional arrangements.

Problems and Reasons for Deceleration in Agriculture

To recapitulate, the agriculture sector has many problems. Its growth rate has been around 2 per cent since the mid-1990s, although there are signs of improvement in recent years. The yield growth has

[3] More on agrarian crisis, *see* Vyas (2004) and Reddy (2006)

also declined. Farmers' suicides have continued/ increased in some states. Farming is becoming a non-viable activity. Further scope for increase in net sown area is limited. Land degradation in the form of depletion of soil fertility, erosion and, waterlogging has increased. There has been a decline in the surface irrigation expansion rate and reduction in groundwater table. Risk and vulnerability have increased. Disparities in productivity across regions and crops still persist. Long-term factors like steeper decline in per capita land availability and shrinking of farm-sizes are also responsible for the agrarian crisis.

The Steering Committee Report on agriculture for the 11th Plan (GoI, 2007a) has identified the possible reasons for deceleration in agriculture since mid-1990s. According to the report, the major sources of agricultural growth are: public and private investments in agriculture and rural infrastructure, including irrigation, technological change, diversification of agriculture and fertilizers. It looks like that the progress in all these sources slowed down during the 1990s, particularly since mid-1990s (Table 8).

According to the report, the causes of slow down are: increase in subsidies crowding out investment in infrastructure, degradation of natural resources, failure in conservation, and improvement of rain-fed land, knowledge gap with existing technology, low market infrastructure and too much regulation, institutions not geared to help women farmers, imperfections in land market and plight of small farmers.

3. Policies Needed for Revival of Indian Agriculture

The agricultural growth declined during the post-reform period, particularly since the mid-1990s as noted in the previous section. Appropriate policies are needed for achieving growth rate of 4 per cent in agriculture and increase in income of farmers. To frame these policies, it is important to identify the policy issues and the needed reforms in agriculture. In this section, we discuss the policies needed for revival of Indian agriculture.

The supply and demand side constraints have to be removed to raise the overall growth in agriculture. It may be noted that more than 80 per cent of India's farmers belong to the categories of small and marginal farmers with an area share of more than 40 per cent. The support systems and policy changes

Table 8. Trend growth rate in area, input-use, credit and capital stock in agriculture during 1980-81 to 2003-04

(per cent/year)

Particulars	1980-81 to 1990-91	1990-91 to 1996-97	1996-97 to 2005-06
Technology[a]	3.3	2.8	0.0
Public sector net fixed capital stock	3.9	1.9	1.4[b]
Gross irrigated area	2.3	2.6	0.5[b]
Electricity consumption in agriculture	14.1	9.4	-0.5[c]
Area under fruits and vegetables	5.6	5.6	2.7[c]
Private sector net fixed capital stock	0.6	2.2	1.2[b]
Terms of trade	0.2	1.0	-1.7[b]
Total net fixed capital stock	2.0	2.1	1.3[b]
NPK use	8.2	2.5	2.3
Credit supply	3.7	7.5	14.4[b]
Total cropped area	0.4	0.4	-0.1
Net sown area	-0.1	0.0	-0.2
Cropping intensity	0.5	0.4	0.1

Notes: a – Yield potential of new varieties of paddy, rapeseed/mustard, groundnut, wheat and maize;
b – up to 2003-04; c – up to 2004-05.

Source: GoI (2008)

have to be tuned in such a way that they improve the productivity and income of the small and marginal farmers. However, the Approach Paper for the 11th Five-Year Plan indicates that the entire agriculture sector is in crisis and is not limited to small and marginal farmers. *Also, second 'green revolution' should focus more on dryland areas*. Simultaneously, the domestic reforms have to be undertaken in certain areas to improve growth and compete in globalized world.

The policies needed for revival of Indian agriculture are discussed below.

Price Policy

The major underlying objective of the Indian government's price policy is to protect the interests of both producers and consumers. Currently, food-security system and price policy basically consist of three instruments: procurement prices/minimum support prices, buffer stocks, and public distribution system (PDS). The Government of India (GoI) follows a Minimum Support Price (MSP) Policy for 24 major crops, including paddy, wheat, jowar, bajra, maize, ragi, pulses, oilseeds, copra, cotton, jute, sugarcane and tobacco. The Commission for Agricultural Costs and Prices (CACP) recommends levels at which MSP should be fixed based on several considerations, such as : (i) Cost of production; (ii) Changes in input prices; (iii) Input-output price parity; (iv) Trends in market prices; (v) Demand and supply; (vi) Inter-crop price parity; (vii) Effect on industrial cost structure; (viii) Effect on cost of living; (ix) Effect on general price level, etc. Among these factors, the cost of production is the important factor in determining minimum support price.

There is a need to provide remunerative prices to farmers to maintain food security and increase income of farmers. There has been a debate on price vs non-price factors in the literature. In our view, both price and non-price factors are important in raising agricultural production. It is true that studies have shown that aggregate supply response is higher for non-price factors as compared to price factors. However, prices play an important role in the cropping-pattern shifts and increase in private investments in agriculture. There are some concerns that inflation would increase if minimum support prices are raised. It may be noted that consumer interests can be protected with open market operations and public distribution system.

In the post-reform period, terms of trade increased initially, declined during the late-1990s and increased again recently (growth also fluctuated similarly). Another problem is volatility in the international agricultural prices.

In the context of globalization, the tariff policy becomes important for agricultural commodities. In other words, it is important to monitor exports, imports, global supply and demand and fix tariffs accordingly. There is a need to strike a balance between producer prices and consumer prices by a careful calibration of minimum support prices and tariff policy (import duties).

Macro Policies and Agriculture

There is a need to have pro-agriculture macro policies. The experience in several countries during the reform period shows that public expenditure as percentage of GDP is low and declining. As a result, public investment in the rural development has declined sharply in most of the Asian countries. Consequently, agricultural growth slowed down in most countries during the 1990s. The average annual rate of growth of gross capital formation also slowed down in many countries. Trade liberalization has been associated with increased ratio of trade to GDP, improved export performance, and diversification towards manufactured exports. However, linkages to employment are not so well established. Financial sector has historically had an urban bias. On balance, the macro policies have not been pro-employment and pro-poor in the post-reform period in many developing countries, including India. Therefore, there is a need to have pro-poor macro policies.

In terms of fiscal policy, pro-poor approach involves increasing tax/GDP ratio, improving expenditures on agriculture and rural development, infrastructure and other capital expenditures. Pro-poor monetary and financial liberalization policies should improve access to agricultural credit of small and marginal farmers and also to the informal sector. Monetary policy should contain inflation, particularly food prices and also reduce spread

between lending and deposit interest rates. Pro-poor trade liberalization and exchange rate policies are needed to promote employment through labour-intensive exports and also measures to reduce volatility in prices due to globalization.

Thus, priority should be given to the policies that improve quality and quantity of employment growth. Priority to public investment in physical (irrigation, roads, communications, transport, electricity, etc.) and human infrastructure (healthcare, education, etc.) is considered as one of the important factors responsible for inclusive growth. Also, priority to rapid growth in agriculture and rural non-farm sector is important for poverty reduction.

Land Issues

In India, land relations are extremely complicated and this complexity has contributed significantly to the problems being faced by the 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 should be 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 should be guaranteed. This will ensure availability of land for cultivation on marginal and small farms. The land rights of tribals in the agency areas must be protected. There is a considerable scope for further land redistribution, particularly when wastelands 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 has recommended as follows: "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 landowner 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.

Small and uneconomic holdings are at the root of many difficulties in the way of agricultural development and farmers' incomes. In order to improve the incomes of marginal and small farmers, there is a talk that we should promote cooperative farming. Andhra Pradesh has some experiences in cooperative farming, particularly in the case of women. One of the most interesting examples of this is the 'Deccan Devlopment Society' (DDS), an NGO working with poor women's collectives in some 75 villages in Medak district – a drought-prone tract of A.P. The DDS has helped the women from landless families to establish claims on land, through purchase and lease, using various government schemes. One such scheme of the Scheduled Caste Development Corporation in A.P. provides subsidized loans to landless scheduled caste women for buying agricultural land. Catalyzed by DDS, women form a group, apply for the loan after identifying the land they want to buy, and divide the purchased land among themselves, each women being registered as the owner of about an acre. Cultivation, however, is done jointly by each group.

The cooperative farming may not be possible on a large scale. The cooperative faming in terms of pooling of individual lands and cultivating as one unit may not be practicable now. To start with, there can be cooperation in input purchases and marketing the commodities. Similar to the DDS experiment, poor women's cooperative farming can be encouraged in some parts of the state. Because of the increased pressure from small and marginal farmers on the limited land for their livelihood, there is no justification, at this stage, for encouraging corporate farming by relaxing the existing ceiling on land ownership. Basically, marginal and small farmers need assistance in input purchases, technology adoption, crop insurance, credit, output

marketing and improvement in rural infrastructure in a big way.

The share of women is increasing in agriculture. However, the public services do not support women in agriculture. We have to ensure women's rights to land (Agarwal, 1994), infrastructural support to women farmers, and their access to technical knowledge, credit, inputs and marketing.

Special Economic Zones (SEZs)

In the year 2000, the Government of India had replaced the old Export Processing Zones (EPZ) policy by a new a scheme called, 'Special Economic Zones' (SEZs) with some more incentives. In 2005, a Bill was passed by the Parliament in the form of SEZ Act and SEZ rules were notified in February, 2006. The SEZ policy is expected to give a big push to rural employment, exports and investment. Since the notification of SEZ Act, 133 SEZs have been notified (Table 9). Out of these, 75 Zones are in operation. These have generated 35,000 jobs. By March 2008, SEZs are expected to increase investment to Rs 1,00,000 crore and create 1 lakh jobs.

However, there are several apprehensions against the SEZs. Some of these are : (a) generation of little new activity as there may be relocation of industries to take advantage of tax concessions, (b) revenue loss, (c) large-scale land acquisition by the developers which may lead to displacement of farmers with meager compensation, (d) acquisition of prime agricultural land having serious implications for food security, (e) misuse of land by the developers for real state, and (f) uneven growth aggravating regional inequities (GoI, 2007a). These are valid apprehensions. The social costs of creating large zones and the revenue loss (Rs 1,75,000 crore according to one estimate) have to be weighed against alternatives of employment generation. The government has made some changes in the SEZ policy recently. According to the new policy, the government cannot compel any landowner to sell land for SEZs. On the other hand, the central government cannot take away the right of the state governments to acquire land. If the state government acquires a land by force, the central government will not notify it under SEZ. But, in practice, it is difficult to say whether a state government has acquired the land voluntarily or by force. In the original policy, corporate responsibility will be confined to utilizing only 30 per cent of the land allotted, leaving the rest for development and real estate business. The new policy mandates that at least 50 per cent of the land should be for processing (of goods and services).

Often, the Chinese experience is quoted regarding SEZs. It may be noted that China has only six SEZs. And, there are many problems in these zones of China also. One criticism relating to SEZs in India is that it would create distortions. For example, the IT units in SEZs would have tax advantage beyond 2009, while these outside SEZs will not have this tax advantage beyond 2009. Another question is whether SEZ policy is for the long-term industrial development in the country. SEZs can only be a transitory phenomenon. Factors like technology, institutional and infrastructural improvements are necessary than cost minimization approach of SEZs.

Table 9. Status report of SEZs: Progress since notification of SEZ Act

Granted formal approval	362
Notified	133
Yet to be notified	229
Operational SEZs	75
Investment in these SEZs	Rs 43,125 crore
Employment generation	35,053
Estimated investment by March 2008	Rs 1,00,000 crore
Estimated direct employment by March 2008	1,00,000

Source: Businessline, 24 July, 2007

Subsidies and Investments

The question of subsidies in agriculture has emerged as an important issue in recent policy debates. Undoubtedly, subsidies are effective in pushing agricultural growth to a certain extent, but it is important to make sure that they do not become a permanent feature of the Indian economy.

Input subsidies in agriculture are having adverse effect on environment. These policies are leading to degradation of land and water. The subsidies are causing severe deterioration of the systems due to neglect of their maintenance, in addition to becoming fiscally unsustainable. Further, they have led to the highly wasteful use of canal water, ecological degradation from waterlogging, salinity, pollution, excessive consumption of electricity, and over-drawl of groundwater, resulting in the shortage of drinking water in several parts of the country. Similarly, the prevailing heavy subsidy on nitrogenous fertilizers perpetuates inefficiencies in the domestic fertilizer industry. Irrigation and use of power seems to be much higher under small than large farms. Moreover, the subsidies are cornered by the farmers in irrigated areas and those in unirrigated areas do not get these subsidies. Most of the fertilizer subsidy also goes to the farmers under irrigated areas. The benefit flowing to the farmers and consumers of food is illusory, as it is leading to the degradation of soil due to excessive chemicalization and adverse NPK ratio. A fixed quantity of fertilizers sufficient for one or two hectares may be subsidized for all the farmers, if necessary through a system of input coupons, requiring them to purchase the remaining quantities in the market at the on-going rates.

Who gets these subsidies? During the initial stages of adoption of new technology in agriculture some of these subsidies may be justified as 'front-up costs'. Over time it has been found, that the richer states and well-irrigated areas, certain crops, and sometimes rich farmers capture a disproportionately high share of the major input subsidy programmes of fertilizer, power, irrigation and credit.

Another issue regarding subsidies is that whether these should be withdrawn without improving the efficiency in supplying of inputs. While withdrawing subsidies, care should be taken to remove inefficiencies in production and distribution of inputs and services. For example, a farmer may not pay the full cost of power if reliable and continuous electricity is not supplied. The distribution system is characterized by inefficient transmission and widespread pilferage. Irrigation system is characetrized by inflated costs due to bad designing, inferior quality of services, inefficiencies in management, and delays and leakages in construction. Due to these inefficiencies, the actual subsidy going to the farmers using these inputs is far less than what is projected. A case for reduction in subsidies will be strengthened if the input-use efficiency is improved.

There has been a secular decline in public investment in agriculture and it has been a matter of concern as it is important for improving infrastructure. As compared to the target of 3.4 Mha per annum, the irrigation potential harnessed during the Ninth Plan was only 1.8 Mha per annum. It is true that private investment has increased during the 1990s, but the public and private investments cannot be treated as substitutes, as their compositions are different. Public investment is mainly in the medium and major irrigation works while private investment is mainly in minor irrigation, mechanization and land levelling (Sawant *et al.*, 2002). More public investment is needed in the rain-fed and backward areas. Many of the ills of the agriculture sector, namely, low productivity, low employment opportunities and inadequate infrastructure are attributed to inadequate and progressive decline in the public investment in agriculture.

The public investment in real terms in the agriculture sector has declined during the past two decades. It may be noted that inadequacy of investments has slowed the pace of technological changes in agriculture with adverse effects on productivity. Investment in agriculture has declined from 2.2 per cent of GDP in 1999-00 to 1.7 per cent in 2004-05 (Table 10). This decline in share was mainly due to stagnation or fall in the public investment in irrigation, particularly since the mid-1990s. However, there is an indication of a reversal of the declining trend with public sector investment reaching its highest level of Rs 12,591 crore since the early-1990s (Table 10). As a result, the share of

Table 10. Gross capital formation in agriculture

Year	Investment in agriculture (Rs crore)			Share in agricultural gross investment (%)		Investment in agriculture as percentage of GDP
	Total	Public	Private	Public	Private	
			In 1993-94 prices			
1990-91	14836	4395	10441	29.60	70.40	1.92
1995-96	15690	4849	10841	30.90	69.10	1.57
1996-97	16176	4668	11508	28.90	71.10	1.51
1997-98	15942	3979	11963	25.00	75.00	1.43
1998-99	14895	3870	11025	26.00	74.00	1.26
1999-00	17304	421	13083	24.40	75.60	1.37
			In 1999-00 prices			
1999-00	43473	7716	35757	17.7	82.3	2.2
2000-01	38735	7155	31580	18.5	81.5	1.9
2001-02	47043	8746	38297	18.6	81.4	2.2
2002-03	46823	7962	38861	17.0	83.0	2.1
2003-04	45132	9376	35756	20.8	79.2	1.9
2004-05	48576	10267	38309	21.1	78.9	1.9
2005-06	54539	13219	41320	24.2	75.8	1.9

Source: GoI (2007)

public sector in the total investment has increased from 18 per cent in the early years of this decade to 29 per cent in 2004-05. Private investment in agriculture, on the other hand, has continued to decline. It is a matter of concern that the overall investment, which was Rs 38,215 crore in 2001-02, declined to Rs 30,532 crore in 2004-05. It is true that the overall investment in agriculture has increased from 10 per cent to 12 per cent of agricultural GDP during the past few years. Given the low base, a dramatic improvement is needed to enhance income-generating capacities. According to some estimates, 16 per cent of investment is needed to attain 4 per cent growth in agriculture.

There seems to be some trade-offs between input subsidies and public investment in agriculture. The problem of mounting subsidies and its effect in terms of crowding out public agricultural investment has been highlighted in the 10th Plan document[4].

The estimates of CSO's public sector investment comprise mainly investment in irrigation projects. Some researchers feel that it is an underestimate and there is a need to widen the definition of public investment by including investment in the infrastructure, like rural roads and electrification. The government allocates large funds to anti-poverty programmes. Some of these programmes also may be contributing to capital formation in agriculture.

Rural Infrastructure and *Bharat Nirman Programme*

Investment in rural infrastructure is more important for agricultural growth than trade liberalization *per se*. The role of public and private investments in infrastructure becomes crucial in this context. The rural infrastructure plays an important role in both input and output sides. It helps to ensure timely and adequate delivery of inputs to the farmers and on the output front integrates local markets with national and international markets. In this context, the announcement of *Bharat Nirman* programme in 2005 by the Government of India in order to improve agricultural and rural infrastructure is in the right direction. It covers six components of infrastructural development: (i) accelerated irrigation benefit programme, (ii) accelerated rural water supply project, (iii) construction of rural roads, (iv) rural

[4] For more on subsidies vs investments, *see* Gulati and Narain (2003)

Box 1

Bharat Nirman Programme

Bharat Nirman is a time-bound business plan for action in rural infrastructure over the four-year period (2005-2009). Under *Bharat Nirman* Programme, action is proposed in the areas of irrigation, rural roads, rural housing, rural water supply, rural electrification and rural telecommunication connectivity. Specific targets have been set under each of these goals as under:

Irrigation	-	To create 10 million hectares of additional irrigation capacity
Rural roads	-	To connect all habitations (66802) with population above 1000 (500 in hilly/tribal areas) with all-weather roads
Rural housing	-	To construct 60 lakh houses for rural poor
Rural water supply	-	To provide potable water to all uncovered habitations (55067) and also address slipped back and water quality affected habitations
Rural electrification	-	To provide electricity to all un-electrified villages (1,25,000) and to connect 23 million households below the poverty line
Rural telephony	-	To connect all remaining villages (66822) with a public telephone

While the agenda is not new, the effort is to impart a sense of urgency to these goals, and make the programme time bound, transparent and accountable. The funding for the programme will be met through an appropriate mix of budgetary support by the Centre and states, external aid, market borrowing and a separate window under RIDF for rural roads.

To ensure accountability, the names of villages electrified, villages connected by all-weather roads, villages provided drinking water and villages provided telephone connectivity will be put on the internet.

housing, (v) providing rural electrification, and (vi) telephone connectivity in the villages (*see* Box 1). The Union Budget 2007-08 had provided an enhanced outlay of Rs 24,603 crore as against Rs 18,696 crore for *Bharat Nirman*. The programme for repair, renovation and restoration of water bodies is being implemented through pilot projects in 23 districts of 13 states. The design of the programme has been finalized in consultation with the states. Restoration of water bodies is expected to give an element of stability to agricultural production and thereby may give a boost to yields.

Irrigation and Water Management

Water is the leading input in agriculture. Development of irrigation and water management are crucial for raising the levels of living in rural areas. Around 40 per cent of country's cultivated area is irrigated. The ultimate irrigation potential of the country has been assessed at around 140 Mha — 58.46 Mha from major and medium irrigations and 81.42 Mha from minor irrigation, of which 64.09 Mha is from groundwater sources. Nearly 37 per cent of the available irrigation potential from the major and medium irrigation projects in the country still remains to be exploited. Over 400 such projects were in the pipeline at various stages during the Ninth Plan period. When these on-going projects are completed, bulk of the remaining irrigation potential would be exploited. Decline in public investment and the thin spread of resources over a large number of projects are responsible for the delay in completion of these projects.

Around 70 per cent of the available potential from minor irrigation sources (81.4 Mha), consisting predominantly of groundwater sources has been utilized. Further progress towards the exploitation of the remaining potential depends on the availability of electric power for pumping water in the eastern and north-eastern states where as much as 75 per cent of the groundwater potential still remains to be exploited. Apart from electricity, there is also a need to devise affordable schemes for financing groundwater tapping in these states, since most of the farmers in the region are resource-poor. Tapping groundwater in the Gangetic Plains and Assam is important for raising agricultural productivity in these regions.

The *Bharat Nirman* Programme *inter alia* indicates creation of 10 Mha additional assured irrigation during the four-year period (2005-09). To achieve this, the pace of potential creation will have to be increased. Investment under Accelerated Irrigation Benefits Programme (AIBP) has to be raised significantly.

Conservation of surface and groundwater has become imperative. This is best achieved when water and power are priced according to the volume of their consumption. Some state governments are providing free power to farmers. This is not sustainable. Involvement of rural communities is essential in setting the user charges as well as for assessing the individual consumption.

The rain-fed areas constitute about 60 per cent of the 142 Mha net sown area in the country. The rain-fed agriculture is characterized by low levels of productivity and low input-usage. The bulk of rural poor lives in the rain-fed regions. Therefore, it is important to accord high priority to sustainable development of these areas through watershed development approach. In fact, watershed development has been given high priority, at least on paper, for several years, but it does not appear to be making much headway, except in isolated cases, primarily under the initiatives and close supervision of a few NGOs. Watershed development can be sustained in the long-run only through social mobilization and capacity building. Land use should be made more remunerative through the new dryland technologies and the development of infrastructure. Watershed programme addresses two different concerns in the matter of land management. One is to conserve water in drought-prone areas. However, the programme is equally effective in areas with a surplus of water where drainage and waterlogging might be the major problems. Another area of concern is fodder, fuel and secondary timber availability. Because wastelands are treated under this programme, the availability of such forest produce has shown a significant increase. The proposed National Rainfed Area Authority is supposed to provide a vehicle for developing concerted action plans for the rainfed areas in close consultation with state governments.

Traditional water harvesting structures like tanks have become virtually defunct. The Finance Minister in his 2004-05 budget speech had announced a scheme to repair, renovate and restore all the water bodies that are directly linked to agriculture. Their restoration involves not only the physical aspects of the task but a clear demarcation of water rights. As many as 20,000 water bodies and a command area of 1.47 Mha have been identified in the first phase of this programme for repair, renovation and restoration of water bodies. It is important as many small and marginal farmers may benefit from the programme. It is also equally important to assign water rights to the community at large as a part of watershed approach that may be adopted for the afore-mentioned special programme for dryland farming in the arid and semi-arid regions in the country.

Agricultural Credit

The nationalization of banks in 1969 and subsequent developments led to the expansion of the geographical and functional reach of commercial banks, regional rural banks (RRBs) and cooperative credit institutions. Public policy is aimed at 'social' and 'development banking' in the form of meeting rural credit needs and reducing the role of informal sector credit. A large number of small and marginal farmers and other vulnerable groups remain excluded from the opportunities and services provided by the financial sector.

Supply and Demand Side Issues

It is being increasingly recognized that addressal of credit expansion requires a holistic approach, addressing both supply and demand side aspects. Although there has been a significant expansion in the banking sector during the past few decades, there are many supply-side problems for commercial banks, RRBs and co-operative banks. Some of the criticisms on the trends in rural credit in the 1990s were: (a) narrowing of the branch network in rural areas, (b) fall in credit-deposit ratios in rural areas, (c) disproportionate decline in agricultural credit to small and marginal farmers, (d) worsening of regional inequalities in rural banking – steepest decline in credit-deposit ratio in the eastern and

north-eastern states, and (e) crippling RRBs[5]. Political interference including loan waivers and write-offs also resulted in unviability and sickness in some of the formal rural credit institutions.

The credit-deposit ratios increased from 55.1 per cent in 1980 to 97.1 per cent in 1990, but declined significantly to 49.3 per cent by 2000. The incremental CD-deposit ratios also declined from 106.1 per cent during the 1980s to 36 per cent during 1990s. Against the target of 18 per cent for 'priority sector', the direct agricultural advances by the commercial banks are only around 11 per cent. The position is much worse in the eastern and northern states. The Rural Infrastructure Development Fund (RIDF), started a decade ago as a measure to provide infrastructural support to agriculture in lieu of its falling share in commercial bank credit, has remained grossly underutilized, basically for want of matching contributions from the state governments. In the process, individual needs of the farmers for investment and production credit are not being adequately met.

Kisan Credit Card Scheme, aimed at providing adequate and timely support to the farmers from the banking system in a flexible and cost-effective manner, does not seem to be working well because of various stipulations and restrictions. A more farmer-friendly credit card system needs to be operated so as to realize the objectives of the scheme.

There has been some improvement in institutional credit to agriculture during the past few years. With rising income, there will be diversification of crops. Investment needs for the production of high income-elastic agricultural products, such as dairying and livestock, horticulture, agro-forests, etc. would rise much faster. But, the main problem is that the focus is on meeting the quantitative targets. The government has to be more sensitive to the distributional aspects of farm credit. It has been silent on these distributional issues such as regional disparities and access to credit by small and marginal farmers. There is a suggestion that government should have sub-targeting to improve the credit flow to small and marginal farmers[6].

One issue is whether we need separate institutions for promoting credit expansion. Are the existing formal institutions sufficient for this purpose? It is true that commercial banks have their own problems, like manpower shortage, unfavorable attitude towards rural services, infrastructural and technological problems in the rural areas, etc. Rural banking has to be friendly to small and marginal farmers and other vulnerable groups. It requires a specific type of organizational ethos, culture and attitude (Rangarajan, 2005). There is a need to remove the supply-side problems of commercial banks, RRBs and co-operative banks. As the Union Budget 2005-06 admits, 'the cooperative banks, with few exceptions, are in shambles'. This institution has to be revived as many farmers are dependent on the credit from these banks. Vaidyanathan Committee's recommendations may be helpful to revive the cooperative sector.

On the demand side, some of the constraining factors for credit in rural and urban areas are: low productivity and high risk and vulnerability of small and marginal farmers, low skill and poor market linkages for rural non-farm and urban workers, vulnerability to risk for rural landless and urban poor, inadequate awareness and low financial literacy.

NABARD has also taken several initiatives that have significantly contributed to credit expansion. Self-help group (SHG)-bank linkage programme of NABARD is an innovative programme. It was started as a pilot program in 1992. Today, there are 22 lakh SHGs under this programme comprising more than 3 crore poor households who are accessing credit through commercial and cooperative banks. Every year 6 lakh SHGs are added. The programme is no longer confined to the southern states. The non-southern states have 46 per cent of the groups. Thus, the SHG movement is now a national movement. MFIs have been playing an important role in substituting moneylenders and reducing the burden on the formal financial institutions[7].

One can also learn lessons from the successful experiences in and outside India. Within India, we

[5] For more on this, *see* Shetty (2003) and articles in Ramachandran and Swaminathan (2005).

[6] *See* Reddy (2007)

[7] On the approach of RBI on micro finance, *see* Reddy (2005); on the initiatives of RBI on financial inclusion, *see* Thorat (2006).

have good and successful practices for credit like *Kudumbasree* programme in Kerala, *Velugu* (*Indira Kranti Padhakam)* SHG program in Andhra Pradesh. We have good practices in SEWA (health), BASIX (livelihoods) for insurance, while Pondicherry pilot project offers lessons for bank accounts. We can also learn from the successful practices in countries like Bangladesh, Thailand, Indonesia, Mexico and Brazil.

Ultimately, the credit expansion programme will be successful only if the productivity of the small and marginal farmers improves. We have to recognize that credit expansion for farmers cannot be sustained by the banking system alone, as there is a need for other measures like public investment in irrigation, research and extension, infrastructure, proper seeds and fertilizers, good marketing system for better price, etc. Small and marginal farmers face many risks in cultivation. Credit expansion should take into account the risk element of farmers while framing policies. The agricultural officers must provide 'farm advisory' services that will help in making agriculture an integrated activity with appropriate backward and forward linkages (Rangarajan, 2005).

Risks in Agriculture

One of the differences between 'green revolution' benefits during the 1960s and 1970s and the present 'second green revolution' plan is that the risk is higher in the latter approach as it has to concentrate more on dryland areas apart from the problems in irrigated areas. Crop failures and distress sales are also increasing.

Agriculture has two types of risks: Yield risk and Price risk. Crop insurance is important for taking care of yield risk. Since a major cultivated area is dependent on rainfall, crop insurance is important for farmers. In place of the Comprehensive Crop Insurance Scheme (CCIS), the government introduced a new scheme entitled, 'National Agricultural Insurance Scheme' (NAIS) from *rabi* 1999-2000 season. The premium paid during 1999 to 2006 was around Rs 2,566 crore, while total claims during that period were of Rs 7,506 crore. In the implementation of NAIS, certain limitations/ shortcomings relating to unit area of insurance, calculation of generated income, low indemnity level, and delay in settlement of insurance claims were observed. The government plans to introduce an alternative mechanism for crop insurance.

Field surveys have also shown that the insurance schemes are largely ineffective although some farmers did get the benefits (Vyas and Singh, 2005). Many farmers have criticized the compulsory insurance for taking loans from the banks and they never got compensation inspite of low yields. Another problem is that we do not have data on yields at the village level.

There are some proposals that insurance based on rainfall should be evolved instead of yields. Area-based rainfall index insurance has some attractive features such as lower adverse selection, less administrative costs, potential for a secondary market, can be sold to non-farmers, can be linked to microfinance and can clear the way for innovation in mutual insurance (Hazell and Skees, 2006). Some developments have emerged in India in recent years to offer rainfall insurance contracts. ICICI Lombard General Insurance Company began a pilot insurance programme that will pay farmers when there are rain shortfalls in one area, and pay others in the case of excess rains. BASIX used ICICI Lombard and technical assistance from the Commodity Risk Management Group of the World Bank to develop and launch the new rainfall insurance product. BASIX began operations in March 2001, in the districts of Mahbubnagar in Andhra Pradesh and Raichur and Gulbarga in Karnataka. In 2003, the new rainfall insurance was targeted at individual farmers of groundnut and castor. Given the apparent attractiveness of area-based index insurance, private sector should have entered into this field quickly. But, this has not happened on any widespread scale because of several set-up problems. Government may have to help in setting up basic infrastructure. In the 2007-08 Budget, the Finance Minister had announced that he would ask Agricultural Insurance Corporation (AIC) to start a weather-based crop insurance scheme on a pilot basis in two or three states as an alternative to NIAS.

It may be noted that crop insurance is not the long-term solution for yield variability. Risk

prevention or de-risking of agriculture is important. In order to de-risk agriculture, we have to focus more on management land and water, including irrigation development, soil conservation, watershed development, water conservation and improvement in public delivery systems.

For taking care of price risks, futures markets are advocated. It is, however, not clear whether farmers are benefiting from futures markets. It looks like that there is a disconnect between futures markets and farmers. The argument in favour of futures markets is that farmers in all other countries are benefiting from these markets. Indian farmers should not be denied this facility of futures markets.

Research and Extension

The yield growth for many crops had declined during the 1990s. The National Commission on Farmers has also indicated that there is a large yield gap between the yields in research stations and farmers' fields. There seems to be a technology fatigue in the 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 per cent (Punjab) to 84 per cent (MP)
- Rice: Over 100 per cent in Assam, Bihar, Chattisgarh and UP
- Maize: 7 per cent (Gujarat) to 300 per cent (Assam)
- Jowar: 13 per cent (MP) to 200 per cent (Karnataka)
- Mustard: 5 per cent (Haryana) to 150 per cent (Chattisgarh)
- Soybean: 7 per cent (Rajasthan) to 185 per cent (Karnataka)
- Sugarcane: 16 per cent (AP) to 167 per cent (MP)

A fresh look at the priorities of Indian agricultural research system is necessary in the 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 agricultural 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 a considerable potential for raising the effectiveness of these financial outlays by reordering the priorities in agricultural research and redefining the relative roles of public and private sectors in research and extension.

A review of the research and development activities of the Indian Council of Agricultural Resarch (ICAR) system during the first two years of the 10th Plan has revealed several weaknesses. Some of these are: (a) inadequate emphasis on the needs of rainfed areas, which account for over 60 per cent 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 the emerging challenges, particularly post-harvest, marketing and environmental conservation, (e) multiplicity of institutes with overlapping mandates leading to duplication of research work, and (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 the individual crop-oriented research focused essentially on irrigated areas, towards research on crops and cropping systems in the drylands, hills, tribal and other marginal areas[8]. Dryland 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. Horticultural crops that are land-saving and water-saving should be encouraged in the dryland areas. Research has to be improved on horticultural 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

[8] *See* Swaminathan (2007) on research and technology

becoming increasingly important, especially with the advent of biotechnology and protection being given to intellectual property. However, private sector participation tends to be limited to profitable crops and enterprises undertaken by the 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 being faced by the resource-poor farmers in the less-endowed regions. The new agricultural technologies in the horizon are largely biotechnologies. Effective research is needed to develop 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 moneylenders interested in selling inputs such as seeds, fertilizers and pesticides. Therefore, there is an immediate need for reforming and revitalizing the existing agricultural extension system in the country. The main ingredients of reforms should be: (a) active involvement of farmers through user groups/ associations, (b) participation by the private sector and NGOs, (c) increasing use of media and information technology, including cyber kiosks to disseminate knowledge on new agricultural practices and information on output and input prices, and (d) building gender concerns into the system, for example, by manning the extension services predominantly by women[9]. The returns to investment on research and extension will be much higher on agricultural growth as compared to other investments.

Diversification by Maintaining Food Security

There has been diversification of Indian diets, away from foodgrains to high-value commodities 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. There is a 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 the urban areas. The growth in per capita consumption has been shown highest by fruits and vegetables, 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 in diversification, necessary support to infrastructure and marketing is needed. Price policy should also encourage diversification of agriculture. However, diversification should not be at the cost of food grains and other food crops. Efforts should be continued to improve the yields of food crops.

The government plans to have the second 'green revolution' by diversifying agriculture in the crop sector and allied activities. Diversification is unlikely to be a feasible strategy all over the country if it is restricted only to agriculture-related activities like shift from cereals to horticultural crops. The true benefit of diversification will come if more emphasis is given on allied activities like animal husbandry and fisheries. The livestock sector contributes 5.4 per cent to GDP and 22.7 per cent to the total output from agriculture sector. The value of milk group commodities (Rs 103804 crore) is more than of paddy (Rs 73965 crore) or wheat (Rs 43816 crore). The rural women play a significant role in animal husbandry and are directly involved in major operations like feeding, breeding, management and healthcare. As the ownership of livestock is more evenly distributed with landless labourers, 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 ratio.

Marketing

For small and marginal farmers, marketing of their products is the main problem, apart from credit

[9] *See* Rao (2005)

and extension. The contract farming arrangements are particularly useful in the developing countries where small-scale agriculture is widespread. The small and marginal farmers have problems in getting inputs, credit, extension services and marketing. The services provided by the contract farming companies would be useful for small-scale agriculture. 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. Such contract farming arrangements have to be strengthened to help the small farmers. 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).

The contract farming is spreading for several crops in states like Andhra Pradesh (Dev and Rao, 2005), Tamil Nadu, Karnataka, Punjab and Maharashtra. From the farmers' perspective, there are risks of market failure and production problems while growing new crops. The sponsoring companies may be unreliable, may exploit the 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 the widespread use of contract farming in India. The legal system can be improved with legislative measures like development of model contract and code of practice, registration of contracts with marketing committees and tribunals for dispute resolutions.

Both the 11th Plan and NDC Working Groups on Marketing have supported the on-going marketing reforms. They want to take the APMC amendments to their logical conclusions. However, many states are yet to frame the necessary rules. Both Working Groups have endorsed 'Contract Farming'. Since several models are coming up, there is a need for mechanisms for dispute resolution and contract registration (Planning Commission, 2007).

The most important problem for the farmers is output price fluctuations. There is a big gap between the prices of producer and consumer. For example, farmers sometimes get 50 paise per kg of tomatoes while the consumers pay Rs 15/kg in the urban areas. In order to protect farmers from national and international price volatilities, price stabilization fund is needed. 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 Andhra Pradesh, and 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.

Globalization and Agriculture

There has been adverse impact of trade liberalization on the agricultural economy of the regions growing crops such as plantation, cotton and oilseeds, 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 recent years, domestic prices of several agricultural commodities have turned higher than their international prices. India is not able to check import of a large number of commodities even at high tariffs. It 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). Cost reduction is, therefore, important for increasing producers' profit margins. The policies have to induce larger investments in yield-augmenting technological improvements and contain the adverse environmental impact of misuse of water and agro-chemicals for sustainability of growth. 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. The effect of volatility in international prices on domestic agriculture should be checked by aligning tariffs with the changing price situation.

Implementation of the WTO Agreement on Agriculture (AoA) since 1995 has brought out the inadequacies inherent in the agreement. The ongoing negotiations in the WTO on the AoA provide an opportunity for India to rectify these inadequacies and inequalities. India should stress on the implementation of Uruguay round agreements to reduce subsidies and other distortions caused by policies pursued by developed countries.

Impact of Hongkong Ministerial Conference on India

India is likely to benefit if developed countries reduce agricultural subsidies. The phasing out of export subsidies is clearly a long overdue small step in removing distortions in the area of agriculture. But, since the total magnitude of export subsidies is only of the order of US $5 billion, it would not make much difference to markets for agricultural products until domestic support (more than US $300 billion) is reduced substantially. Unless domestic subsidies are cut, export subsidization will continue even after the 'elimination of export subsidies' in 2013 or their phasing out before that. The Hong Kong Conference would have been more meaningful if there had been a decision leading to substantial cuts in total-trade distorting domestic subsidies to levels below the current or planned applied levels, and serious disciplines on the Green Box subsidies and their reductions, so that overall domestic support is really decreased.

Institutional Reforms and Sustainable Agriculture

Institutional reforms are important, particularly in the domain of public systems, for a sustained technical progress and output growth in agriculture. "There is a limited scope for privatizing irrigation, research and extension and other infrastructural facilities. All of these will continue to be mainly the responsibility of public sector. Unless the public sector's efficiency in mobilizing resources and managing these facilities is vastly improved, *trade and price policy reforms will not make a significant difference to the pace of agricultural growth*" (Vaidyanathan, 1996, emphasis added).

Institutions for Sustainable 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 has shown 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 these reforms. However, much of the reported increase could be statistical because of underreporting of irrigated areas before reform , as this meant lesser payment of water tax to revenue department. Paddy yields are reported to have increased by about 40 per cent. 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.

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. The 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 the 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. The government has launched 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 (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 the 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, and planting materials globally.

The Integrated Nutrient Management (INM) advocates the integrated use of all sources of plant nutrients like chemical fertilizer, bio-fertilizer and locally organic manures like farmyard manure, compost, vermi-compost, green manures, edible and non-edible oilcakes to maintain soil health and its productivity. Focusing on improving the soil quality should be one of the priority areas in raising agricultural growth. Organic farming is also being encouraged in the country due to demand for these products all over the world.

District Planning

Agriculture is a state subject and most of the strategies are planned at the state level. The agricultural planning at state level has become weaker as often the State Plan is consisted of only Centrally-sponsored Schemes. The NDC resolution and the 11th Plan strategy of the Planning Commission advocate state-specific planning for improvement in agricultural performance. In fact, 'District Planning' is advocated for fully utilizing the resources available from all the existing schemes. The district agricultural plan will include crop, livestock and fishing sectors and be integrated with minor irrigation projects, rural development and with other schemes for water harvesting and conservation. The state governments are supposed to set up appropriate units at the district level for this purpose. Each state has to prepare a State Agricultural Plan based on district plans, subject to reasonable resources from its own Plan and adding those available from the Centre. The plans should aim at achieving the state's agricultural growth objective, keeping in view the sustainable management of natural resources and technological possibilities in each agro-climatic region (Planning Commission, 2007). They also should include seed production, extension, credit, and natural resource management. They should fix the annual targets and funds at the start of the fiscal year and review the implementation every quarter at both district and state levels.

Rural Non-farm Sector

The ultimate solution for reduction of land is to improve rural non-farm sector and planned urbanization. Rural diversification is important for several reasons. At the economy level, the demographic pressures on land have been increasing significantly in India. Urban areas have their own problems of demographic pressures. As a result, rural non-farm sector becomes an escape route for agricultural workers. In order to increase wages in agriculture and to shift the workers to more productive areas, rural diversification is required.

Chinese experience on rural transformation offers several lessons for India. Chinese government has recognised that agricultural growth is a necessary but not a sufficient condition for alleviating poverty.

It has followed several approaches including migration from urban to rural areas, and employment generation in the rural areas to deal with surplus agricultural labour. Chinese rural industrialization strategy is the most successful example for other countries to emulate. The rural township and village enterprises (TVEs) grew rapidly following the rural reforms of 1979 and now play a significant role in Chinese rural income growth.

Chinese experience shows that globalization with better initial conditions has increased employment and incomes for workers which in turn was due to rural diversification. Developing countries should learn from China on agricultural growth, rural non-farm employment, public investment and human resource development. The impact of growth on poverty reduction is quite significant. Elements of Chinese experience such as high and labour-releasing agricultural growth, favourable income distribution through broad-based agricultural growth, availability of infrastructure, higher levels of literacy and skills, inducements for the location of enterprises in rural areas, and easy access to credit and inputs are extremely relevant for the developing countries. Those who support liberalization say that China's high economic growth and impact on poverty is due to economic reforms since 1978. However, initial conditions before introduction of reforms are important. China's success is due to these better initial conditions. China introduced land reforms and invested in infrastructure, healthcare and education before reforms. This led to high agricultural growth, and better human development. In other words, reforms work better in a more egalitarian (equality) society. Infrastructural investment was 19 per cent of GDP in China as compared to 2 per cent in India in the 1990s. The foreign direct investment also plays an important role in improving investment in China. One important debate in India relates to the impact of FDIs, particularly on retail chains on employment.

Although there has been a reduction in the growth of TVEs, they are likely to remain important in Chinese rural economy. The effective functioning of a well-knit decentralized mechanism of resources and control system along with massive investment in local infrastructure and newer ventures helped the Chinese TVEs enormously.

Turning to India, it is recognized that rural non-farm sector is important in both generating productive employment and alleviating poverty in the rural areas, as agriculture and urban areas cannot absorb the increasing workforce. Within agriculture and allied activities, there seems to be some diversification towards non-cereal crops. However, risks and uncertainty are associated with diversification. Technology, infrastructure and market have to be improved in order to shift the farmers to non-foodgrain crops. By any standards, the unutilized potential of food processing in India is enormous. An expansion of this sector is an ideal way of bringing industry to rural areas, expanding the value chain of agricultural production, providing assured markets for farmers, enabling them to diversify into higher-value horticultural crops and expanding employment by creating high-quality non-agricultural work opportunities in the rural areas. There can not be one policy package for the entire rural non-farm sector. Sub-sectoral policies in different regions are needed.

In general, development of the manufacturing sector is important for absorbing labour force productively. Right now many workers are absorbed in low productive services sector. Encouragement to women and training and improvement in skills would enhance employment opportunities. Leading factor for diversification is improvement in education and skills of workers. Migration is considered another form of diversification. But, it has to be based on pull factors rather than distress migration.

A two-pronged strategy is needed for enhancement in the livelihoods of the poor. On the one hand, government should have policies to improve education and skills of the workers, and on the other hand, there should be several policies to increase employment for the unskilled workers. For these two strategies, pro-poor growth engines have to be identified. Simultaneously backward areas and social groups have to be helped for development. Livestock and forest sectors are more pro-poor in the rural areas as compared to other areas. The poor suffer from inadequate access to important capitals. These are physical (roads, buildings, plant and machinery, infrastructure), natural (land, water, forests, livestock, weather), human (nutrition,

healthcare, education, skills, competencies), social and financial. There is a need to improve these capitals for the poor in order to reduce demand-side problems.

4. Concluding Observations

There are many policy challenges for the Indian agriculture. Both price and non-price factors are important for higher agricultural growth. The challenges for the 'second green revolution' as compared to green revolution of 1960s and 1970s are : (a) globalization challenges, high volitility in prices, (b) more shrinking farm-size, (c) dryland farming challenges, and (d) environmental stress. Small farmers are certainly going to remain in India in the next decade or even after. The main challenges are improving productivity and moving towards high-value agriculture and promoting rural non-farm sector by maintaining food security for reducing poverty and hunger.

There are six deficits in Indian agriculture. These are: (a) investment, credit and infrastructure deficit; (b) research and extension (technology) deficit; (c) market deficit, (d) diversification deficit, (e) institutions deficit, and (f) education/skill deficit.

De-risking or risk prevention in agriculture through land and water management is better than insurance, etc. There are many domestic and external trade liberalization challenges and small farmers can respond to and benefit from these challenges. Apart from high growth, efficiency (cost reduction) is also needed in the globalized world.

Ultimately, it depends on the political will at both central and state levels. Deficiency in agricultural and rural infrastructure is the biggest problem for agricultural development. There is a need for massive increase in outlays for agricultural and rural infrastructure by simultaneously improving the delivery systems. Trilemma of keeping input prices low, farm level prices high and consumer prices low has always been a challenge for policymakers. 'Business as usual approach' may not help revival of agriculture. Declining profitability in Indian agriculture has to be reversed. The government is thinking of big push to education in the 11th Five-Year Plan. Such a big push is needed for agriculture also. Given the short-run and structural long-term problems in agriculture, the government should give large push to core issues like public investment in infrastructure, land and water management including rainwater conservation and watershed development, research and extension, price stabilization, etc. to make cultivation viable and profitable. There is a need to concentrate on delivery systems also. India's large numbers of farmers and poor can benefit if there are right policies and effective implementation.

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