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13 October 2010

Online at <https://mpra.ub.uni-muenchen.de/35865/>

MPRA Paper No. 35865, posted 10 Jan 2012 19:45 UTC

# Agricultural Growth Deceleration in India: A Review of Explanations <sup>1</sup>

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*Since the inception of economic reforms, Indian economy has achieved a remarkable rate of growth. This fantabulous performance, to a large extent, was driven by service sector and improvements in the secondary sector. However, this growth process bypassed the agricultural sector, which showed sharp deceleration in the growth rate (3.62 percent during 1984/85 - 1995/96 to 1.97 percent in 1995/96 - 2004/05). Given the relevance of the sector for employment and rural development the declining trend in agricultural growth has emerged as a major concern for researchers and policymakers. A large number of studies have enquired into the growth process of agricultural sector and has criticised the neo-liberal policy regime for a general neglect of the sector. The sector has recorded wide variations in yield and productivity and there was a shift towards cash crop cultivations. Moreover, agricultural indebtedness pushed several farming households into poverty and some of them resorted to extreme measures like suicides.*

*In this context, the present paper reviews the performance of the Indian agriculture since reforms and compares it with pre-reforms conditions. A systematic and critical review of literature is presented to comprehend the poor performance of Indian agriculture. The review focuses on the pattern and determinants (price and non-price) of agricultural growth and evaluates the influence of policy and environmental factors on its performance. This paper exclusively explains the following objectives. To explain the growth of agriculture in terms of area, yield and cropping pattern and findings that have taken place in the recent past. To understand the determinants that contributes to the changes in the sources of growth. To explore the influence of the policy factors and natural factors, which lead to changes in the growth of agriculture? The study identifies that, in the post reform period there has been an increase in prices of cash crops and the cropping pattern changes towards non-food grains have a significant effect on growth. The review also concludes that much of the slowdown in agriculture is caused due to other pertinent factors such as infrastructure, technology and environmental factors, lack of political commitment and poor implementation of policies.*

## **JEL Classification: Q10**

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<sup>1</sup> This paper is an outcome of authors' first term paper, which is being carried out at the Centre for Development Studies, as a part of MPhil course work. Thanks are due to insightful comments during presentation by the faculties and fellow students. However, usual disclaimers apply

## 1 Introduction

India's economic growth performance has started taking its pace since after economic reforms and emerged as one of the fastest growing economies in the world. Annual growth rate in total Gross Domestic Product (GDP) rose from below 6 per cent during reforms to over 8 per cent during last couple of years. In the post reform period, the growth was mainly driven by the exceptional growth in service sector which at present contributes 54 per cent of total GDP. Manufacturing output, seen as bellwether for the policy stance since 1991, has even registered double-digit growth in some recent years. On the other hand performance of agriculture in terms of its growth rates has been disappointing. The growth of agriculture started declining since the reforms and became worse in the post WTO period. The growth of agriculture has come down from 3.62 in 1990-91 to 1.97 by 2004-05 and the share of agriculture in the gross domestic product has registered a steady decline from 36.4 per cent in 1982-83 to 18.5 per cent in 2006-07(Chand et al 2007). Yet, this sector continues to support more than half a billion people providing employment to 52 per cent of the total workforce. Between 1950-51 and 2006-07, production of food grains increased at an average annual rate of 2.5 per cent compared to the growth of population which averaged 2.1 per cent during this period. As a result, India almost became self-sufficient in food grains and there were hardly any imports during 1976-77 to 2005-06, except occasionally the rate of growth of food grains production, however, decelerated to 1.2 per cent during 1990-2007, lower than annual rate of growth of population, averaging 1.9 per cent (Economic survey 2007-08). This is showing agrarian situation during last decade and half.

The government is yet to comprehend the real picture of the current agrarian situation in India. The agrarian crisis being experienced today is an unprecedented and all encompassing phenomenon. All sectors in agriculture and sections among the peasantry are affected by the deepening agrarian crisis. The poorer sections among the peasantry, especially the small and marginal farmers and the agricultural labourers, who constitute the vast majority of the Indian population, are the worst sufferers. Indian agriculture is

characterized by small farm holdings. The average farm size is only 1.57 hectares. Around 93 percent of farmers have land holdings smaller than 4 ha and they cultivate nearly 55 percent of the arable land. On the other hand, only 1.6 of the farmers has operational land holdings above 10 ha and they utilize 17.4 percent of the total cultivated land (Pillai 2007). Ministry of Finance, Planning Commission, and office of Prime Minister are emphasising on concerted measures to address poor growth rate in agriculture, partly because poor growth rate has serious implications for large percent of India's population that depends upon agriculture for livelihood, and partly because poor growth of agriculture affects growth of overall economy (Chand 2005). While there have been many arguments that reform process acted against agriculture sector. State intervention has been consciously reduced in order to make way for the 'market', a euphemism for the dominant role for the private players, especially big business, in all spheres of the economy. It was argued by the proponents of liberalisation that freeing agricultural markets and liberalising external trade in agricultural commodities would provide price incentives leading to enhanced investment and output in that sector, while broader trade liberalisation would shift inter-sectoral terms of trade in favour of agriculture. A decade and a half later, the hollowness of these claims stand exposed (Pillai 2007 and Patnaik 2005). But this policy option did not become viable rather it worsened further. The poor performance of agriculture has become a serious matter of concern and this has lead to initiation of debates about the causes of agrarian crisis among researchers and policy makers in the country. Recently UPA government came with 4 per cent target growth rate in agriculture during 11<sup>th</sup> plan.

This chapter is organized as follows. In the section two presents a brief review of literature, where in this we examine various arguments that have come up in the recent periods explaining growth crisis in agriculture. In the third section sources of agricultural growth are presented, it mainly investigates how sources of growth in agriculture have changed in the period by comparing it with pre reform period. Section four gives the information as to what factors have contributed for the changes in the sources of growth in the post reform period and it also tries to identify to what extent economic factors contributed and how much on other factors and final section concludes

## 2 Review of literature

As it is already mentioned, the recent trends in agricultural growth and development have shown a sharp deceleration in the agricultural sector despite an overall impressive growth of Indian economy is a major cause of concern today. Thus, it led to intense debate in the country, both in academic and policymaking circles. In the recent period, many arguments have come up analyzing the potential impact liberalisation on farming community. There are two groups of people explained the reasons for poor performance of agriculture in the post reform era. One group of people, Gulati, Kelly and Narayanan, S. claimed that the slow pace of agricultural liberalization (domestic and external) is responsible. Another group, Sen and Patnaik blames the withdrawal of state support to agriculture and the integration of agriculture into global markets, due to liberalization pressures. The two groups have advocated an increased role for either markets or the state as the solution. There are many other arguments came up arguing in this line showing multi dimensions of the crisis.

In the light of above discussion, we now try to look at the reasons addressed by different authors in explaining crisis. They are variety of reasons put forward in the literature, sum of them are discussed below. Vakulabharanam (2008, 2005) argues that the state had offered various input subsidies, especially in the provision of fertilizers, electricity and credit. It had provided infrastructural support (primarily in irrigation and electricity) and extension services to cultivators. It had also provided minimum support prices for agricultural output. The policies after 1990, unevenly withdraw this support to the farming community. The reduction of domestic support in terms of subsidy and credit on the one hand and drastic price fall of agricultural commodities in the international market on the other hand led to distress in the farming class. Chand et, al (2007) and Chand (2005, 2004) argues, the main factors which led to a slowdown in agriculture at national level after 1996-97 are: (a) decline in the area under cultivation, which seems to be a result of expanding urbanization and industrialisation, (b) deterioration in the terms of trade for agriculture, (c) stagnant crop intensity, (d) poor progress of irrigation and fertiliser, (e) Decline in supply of

electricity to agriculture, and (f) slowdown in diversification. Mishra Srijit (2007) and Reddy and Mishra(2008), Crisis in agriculture was well underway by the 1980s and economic reforms in the 1990s have only deepened it the major reasons brought out in the light of agricultural distress are vagaries of nature (primarily, inadequate or excessive water),lack of irrigation facilities, market related uncertainties such as increasing input costs and output price shocks mainly commercial and plantation crops due to agricultural trade liberalisation, unavailability of credit from institutional sources or excessive reliance on informal sources with a greater interest burden and new technology among other.

Narayanamoorthy (2007) argues that fall in wheat and rice production is not due to technology fatigue rather due to extensive mono crop cultivation and high use of fertilisers and faulty agricultural pricing. Lack of allocation of funds to irrigation development after liberalisation during this period net area irrigated remained constant. This poor growth in surface irrigation has compelled farmers to rely heavily on groundwater irrigation. The increased dependence on groundwater irrigation increases the cost of cultivation and depletion of ground water resources and in addition to this credit unavailability for investment on inputs put farmer in further crisis. Pillai (2007) in his, study he basically observed major aspects of the crisis and try to find out the reasons contributed for it. Study came up with the issues liberalisation, price volatility and weak domestic support in price policies and credit. The single most adverse effect of trade liberalisation has been the combination of low prices and output volatility for cash crops. While output volatility increased especially with new seeds and other inputs, the prices of most non-foodgrain crops weakened, and some prices, such as those of cotton and oilseeds, plummeted for prolonged periods. This reflected not only domestic demand conditions but also the growing role played by international prices consequent upon greater integration with world markets. In addition to that, high volatility of output and lack of proper domestic price support and credit facility to invest in agriculture worsened the agrarian situation in the last part of 20<sup>th</sup> century. Suri (2007) argue that that agrarian distress is the result of the policies pursued by the governments over the years. Other factors such as changed cropping pattern due to a shift away from light crops to cash crops; liberalisation policies

which prematurely pushed Indian agriculture into the global markets without a level-playing field; heavy dependence on high-cost paid out inputs; growing costs of cultivation; volatility of crop output; market vagaries; lack of remunerative prices; indebtedness; neglect of agriculture by the government; decline of public investment have contributed further to agrarian crisis. Galab and Reddy (2006), the authors precisely talked about the factors that caused crises in agriculture. They are technological factors, ecological, socio cultural and policy related factors. Extensive cultivation has led to decrease in fertility and productivity this is also because of intensive use of fertilisers, since the input intensity is increased in the marginal farms the productivity fell down coupled with increasing cost of inputs, these factors ultimately led to decrease in profit margins. Ecological factors include decreasing quality of land and water resources due to intensive chemical and fertiliser use. Socio and cultural factors include the effects of globalisation and urban culture on villages had shown impact on health and education consciousness in the rural agrarian families, in order to get the access of better facilities farmers have changed their cropping pattern. Policy related factors like decrease in public investment from 4 per cent of agricultural GDP during 1980's to 1.86 during early 2000.

Patnaik (2005), tried to identify changing agrarian situation after reforms. This study tries to explain how neo liberal policies introduced in the 1990's affected peasant community by examining the fund allocation to the rural development from the Net National Product. Fund allocation to the rural development will result in improving irrigation, irrigation and other heads of agriculture and this fund allocation has come down from 4 per cent of NNP to 1.9 of NNP by 2001-02. The study also explores the impact of liberalisation on food security and found out that shift in cropping pattern towards non food grains has led to food security problem. Since advanced country markets were in recession and global primary product prices went into a steep tailspin with 40-50 per cent decline in unit dollar prices of all crops –cereals, cotton, jute, sugar, tea, coffee – and up to 80 per cent decline in some oil crops between 1995 and 2001. With a brief spike in 2002 most prices have continued to fall and some prices are today lower than as far back as 1986. This resulted in distress of farmers which had led to farmers committing suicides. Gulati and Bathla (2001)

and Chand and Kumar P (2004) studied impact of capital formation on Indian agriculture and it is found that growth in capital formation is significantly related with growth of agriculture. But capital formation in Indian agriculture has been either stagnating or falling since the beginning of 1980s but macro economic reforms further squeezed public investment, though there is rise in private investment that was not rising to meet the requirements.

Rao C H (2001), tried to study the impact of WTO on viability of Indian agriculture in which, he explain the main rationality of introduction of WTO and whether Indian agriculture reaped the benefits in the post globalisation period. He argued that India could not exploit the trading opportunities with comparative cost advantage is due to high domestic support, export subsidies and denial of market access through various tariff and non-tariff barriers in the developed countries. The major challenge to the viability of agriculture of India is posed by the shortfalls in public investment and in the provision of agricultural services account for the failure of agricultural supplies to respond to the favourable incentive framework created by macroeconomic reforms, including trade liberalisation, in the 1990s. India was major exporter of food grain in the world but due to the unfavourable terms of trade exports have come down and finally, the price fall in the international market has significantly affected whole farming community. Vyas and Reddy (2001) they examined impact on economic reforms on agriculture. They claim that Indian farmers are mostly consists of small and marginal farmer who mainly depend on agricultural price policies such as Minimum Support Prices (MSP), subsidies on inputs and irrigation. But after pro market strategies developed after liberalisation has minimum role in providing them. Withdrawal of public investment due to structural adjustment is also another reason for poor performance of agriculture.

### **3 Sources of Agricultural Growth since Independence:**

As we know, agricultural growth is very vital in developing countries like India with population over one billion. The most importantly, it feeds whole nation with its supply of food on the one hand and on the other hand it provides employment to more than half of

work force in the country, which implies growth of agriculture plays very important role in the growth of economy. Therefore, it is important to know the growth performance of agricultural sector and what is the engine of its growth. Principally the main sources of growth are area, yield and cropping pattern which are affected by various factors. The contributions of these three sources have been changing over a period with respect to supply and demand factors including some other socio economic and environmental factors. First one half decade after independence, during so called pre Green revolution period, area growth land has played significant role in the growth of agricultural output. Partly because of land reforms though not successfully implemented everywhere, has shown area expansion due to distribution of surplus land. In the mid 60's with state intervention in agricultural development had led to introduction of HYV seeds, improved irrigation facilities. This was done by creating infrastructure through public investments and by policy changes affecting agricultural marketing, production, processing and trade (Vaidyanathan 1994). Bhalla and Alagh (1979) in their state level as well as in district level study found that total agricultural output grew at a compound rate of 1.95 per cent during 1962-65 and 1970-73, in overall situation. Area under 19 crops increased from 124 mn. hectares to 127 mn. hectares, that is, at a compound rate of 0.30 per cent. Productivity increased at a much faster rate of 1.66 per cent from Rs 853 per hectare to Rs 973 per hectare. Another study by Singh *et al.* (1997) examined temporal and spatial performance of important food grain and non-food grain crops in terms of area, production and yield. They also examined the factors responsible for determining yield and acreage of important food grain crops across the states and the country. The study revealed that in case of total food grains as well as for the individual grain crops, yield witnessed higher growth rates as compared to acreage in the last two decades. Area effect played a significant role in the pre green revolution while yield effect and changing cropping pattern played a crucial role in agricultural growth despite the reduction in the overall area cultivated due to the effective state intervention in creating favourable environment for agricultural development. Ray (1983) shows that sources of area expansion became less significant to agricultural growth,

at the same time cropping pattern shifts became progressively important contribution of yield was an important contributor growth during 60's and 70's.

### *Sources of agricultural growth during pre and post reform period*

It is well approved that, agricultural growth performance during 80's is impressive compare to the previous periods due to spread of Green revolution technologies to many places backed by huge investments made on irrigation and infrastructural development. The efforts of state resulted in the growth of productivity of products. During this period area expansion has shown a decline but massive increase in the yield compensated the reduction in area and kept agricultural growth in better place. When we see the trends in area expansion, it is showing decline in trend in the coarse cereals and increasing trend in the non food grains such as oilseeds and horticultural crops, spices and sugarcane. Area effect is mainly because of relative price changes among crops, this gave rise to importance of cropping pattern and crop diversification has become important particularly after economic reforms. It is found that area and yield accounted for 45 and 48 percent of growth while cropping pattern accounts for only 8 per cent. During 1980's growth in production was mainly contributed by growth in the yield while area expansion and cropping pattern was main source during 1990's due to technological slack and weak input delivery system and poor infrastructure (Joshi et al, 2004). Macro level study on agricultural growth after reforms gives very different look despite increase in cropping intensity and area expansion which are considered as major sources of growth. In the Post reform period, agricultural growth is recording a fall mainly is in food grains in the first phase of reform but growth during this period sustained due to rise growth rate of commercial crops such as horticulture and oilseeds, cotton and allied sectors like livestock. But after globalisation agriculture as a whole declined drastically while non agriculture sector is growing fast, this poor performance of agriculture particularly food grains has become a serious concern for the policy makers as there is a chance of facing the problem of food security. In this section we try to explore the causes of poor performance of agriculture by examining the sources of growth first and its changes over a period of time and finally find out the factors that have

caused deceleration in growth performance in agriculture. Now first let us have a look at the growth performance of agriculture since 1980's and how it performed during the post reform period and then explore the sources of growth and factors contributed for it.

**Table: 1 Growth Rate in GDP Agriculture and Non-Agriculture Before and After Reforms at 1993-94 constant prices**

Period	GDP Total	GDP Agriculture and allied	GDP Agriculture	GDP Fishery	GDP non Agriculture
1980-81 to 1989-90	5.52	3.12	3.29	5.93	6.88
1990-91 to 1996-97	6.01	3.64	3.69	7.41	7.04
1996-97 to 2004-05	5.72	1.66	1.65	4.3	7.06

Source: Chand et al 2007

Agricultural performance has shown slight 0.5 percentage points increase in its growth rate in the initial phase of liberalisation at 3.64 per cent during 1990-91 to 1996-97 against 3.12 during the pre reform decade, which is due to impressive growth rates witnessed in horticulture (5.92 per cent) and fishery (7.41 per cent) in the initial period of reforms but after 1996 growth in agriculture sector as a whole experienced a drastic reduction in the growth rates to 1.66 out of this fishery fallen from 7.41 to 4.3 and horticulture has fell down from 5.92 to 3.28. We conclude that agricultural growth in the initial years of reform was led by horticulture crops and fishery due to the favourable terms of trade during the period. Agricultural sector after WTO period has experienced growth deceleration due to various factors to which we will come shortly.

**Table: 2 Growth Rate in Output of Various Sub Sectors of Agriculture at 1993-94 constant prices**

Period	Crop sector	Live stock	Fruits and Vegetables	Non-Horticulture 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

In the post reform period, except for the horticulture which has shown significant growth in the first phase of reforms, all other sub sectors of agriculture have undergone a growth

deceleration (Table 2). Many scholars have attributed different reasons for the growth deceleration. Now, this paper will try to look at the sources of growth namely area, yield and cropping pattern and their changes in the post reform period. By doing so, we will come to know what are the changes that affected positively in the initial reform period and negatively in the in the post WTO period.

### *Changing sources of growth of agriculture in the pre and post reform period*

It is very important to understand the sources of growth and their changing contribution and impact on the overall growth of agriculture in order to judge the performance of agriculture as a whole. As it is discussed earlier, the main drivers of growth are area, yield and cropping pattern. We will discuss how these sources have changed from pre reform period to post reform period. Area expansion is mainly affected by the relative prices and other factors like urbanization and industrialisation, these two are not concerns of our study coming to the area change it can be seen from the table 3 that food grains constitute 70 per cent of total cultivated area and non food grains contribute around 30 per cent but it accounts for 51 per cent of value of output during the pre reform period. The high value of non food grains has attracted farmers to shift from food grains to non food grains, in the post reform period acreage area in food grains has come down to 65.44 per cent while area under non food grain increased to 34.56 in the post reform period. This shows that there is shift in cropping pattern to high value non food grains such as horticulture crops, oilseeds, cotton and sugarcane as the prices of these high value commodities are high compare to the food grains. But if we look at the expansion of area in the post reform period, it is seen that acreage area has come down for many crops in the post reform period (see Table 7). Net area sown has come down in the post reform period. Net sown area witnessed a decline at the rate of 0.55 per cent which was not compensated by an increase in cropping intensity. Similar trend has been observed in gross cropped area. Decline in the area under cultivation, which could be a result of expanding urbanisation and industrialisation (Chand et al 2007).

**Table: 3 Share of foodgrain and non-foodgrain crops in cropping pattern and value of output in India at constant prices (percent)**

Region	Share of foodgrain and non-foodgrain crops							
	TE 1981-82				TE 1998-99			
	Foodgrain crops		Non-foodgrain crops		Foodgrain crops		Non-foodgrain crops	
	Area	Value	Area	Value	Area	Value	Area	Value
Eastern	81.63	51.73	18.37	48.27	73.83	43.04	26.17	56.96
Northeastern	70.11	44.43	29.89	55.77	65.06	35.8	34.94	64.2
Northern	77.42	54.92	22.58	45.08	76.86	53.74	23.14	46.26
Southern	62.86	41.82	37.14	58.18	53.08	28.2	46.92	71.8
Western	71.92	44.44	28.08	55.56	61.85	36.1	38.15	63.9
All-India	70.34	48.05	29.66	51.95	65.44	39.85	34.56	60.15

Source: Joshi, 2005

The rate of growth of both gross cultivated area has started coming down from the beginning of 1980's but it was compensated by the impressive growth in the yield due to the wide spread of Green revolution technology and improved irrigation system and also changing cropping system towards more high value crops and yields of these crops helped to sustain agricultural growth around 3.16 per annum during the decade of eighties despite the reduction in the public investment. The contribution of growth of area to the total output growth is explained below.

The table 3 essentially to show the main contributors of growth in agriculture during pre and post reform period. A region wise analysis is made us to better understand the changes in sources of growth across country during the post reform period as Indian agricultural scenario is diverse due to different tropical regions so infrastructural and technological advancements vary across states and hence its sources of growth to total growth vary.

**Table: 4 Sources of agricultural growth in different regions of India during 1980s and 1990s (percent)**

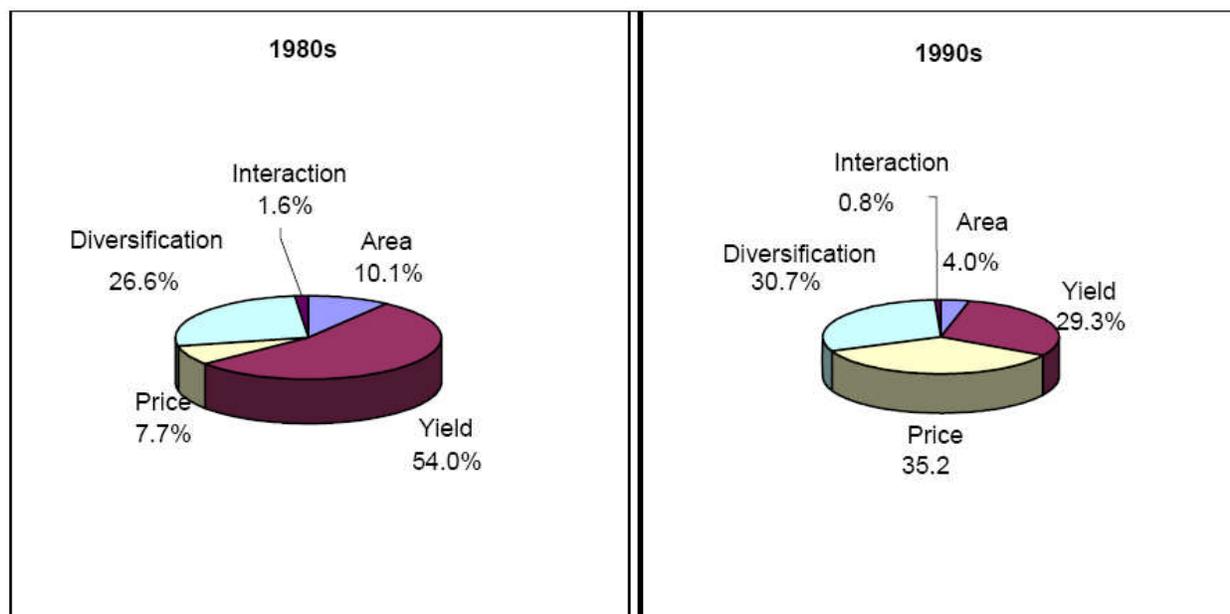
Region	period	Sources of Agricultural growth				
		Area	Yield	Prices	Diversification	Interaction
Northern	1980s	1.4	75.4	-6.5	29.7	0.1
	1990s	10.1	16.6	44	28.2	1.1
western	1980s	11.6	36.5	7.3	39	5.5
	1990s	13.4	24.8	25.7	35.8	0.4
Eastern	1980s	17.8	49.7	11.8	19.7	1

	1990s	-29.7	38.7	45.8	42.6	2.6
Southern	1980s	10.4	39.5	16.8	32.1	1.3
	1990s	-8.7	36.2	29.3	45	-1.8
All-India	1980s	10.1	54	7.7	26.6	1.6
	1990s	4	29.3	35.2	30.7	0.8

Source: Joshi, 2005

From the table 4 it is clear that yield contributed higher share to the growth of agriculture not only overall India but all the regions in the country. During 80's 54 per cent of agricultural growth was contributed by yield alone while 26 per cent was contributed by crop diversification. Yield contributed very high share 75 per cent in the growth of output due to wide spread of green revolution to northern regions. Coming to post reform period, the share of yield growth to total growth had decreased nearly half from pre reform period to 29.3 per cent. In the post reform period prices and crop diversification has played crucial role in the growth of agriculture with the contribution of 35.2 and 30.7 per cent. The same trend witnessed in all regions in the country. We can conclude that agricultural growth in the post reform period is mainly due to high market prices for the produce and crop diversification towards high value commodities from the food grains as shown in table 3.

**Figure: 1 Share of different sources of growth in agriculture in India**



Source: Joshi, 2005

The above figure 1 is drawn from the table 2.4 to show graphically the share of growth in the overall growth rate. It does not show the trend how cropping pattern is changing and to which crops it is changing and it does not show how price, yield and area effect is changing on different crops. So in the following table 2.5 we decomposed the area effect, yield effect, price effect, and diversification on growth over various food grains and commercial crops.

**Table: 5 Share of different commodities in the sources of agricultural growth in India during 1980s and 1990s (percent)**

commodity	1980's					1990's				
	Area effect	Yield effect	Price effect	Diversification	Interaction	Area effect	Yield effect	Price effect	Diversification	Interaction
Rice	23.2	37.38	-70.73	9.17	4.21	23.13	29.65	29.95	4.58	30.59
Wheat	12.6	17.6	-48.67	-3.46	-5.88	11.8	22.25	26.79	17.83	60.51
Coarse cereals	6.35	6.17	-26.58	-13.98	-12.06	6.16	7.84	8.11	-10.18	2.47
Pulses	6.8	2.64	67.88	-0.83	31.31	5.95	2.49	5.66	-4.88	13.35
Oilseeds	15.07	7.13	25.71	45.27	54.51	14.48	17.43	-20.55	11.06	-28.49
Fibers	8.3	17.36	5.82	-3.81	-52.43	7.88	-5.38	-3.92	7.09	-28.3
Sugarcane	7.54	5.84	-2.63	10.95	5	6.73	4.52	12.45	8.76	15.07
Beverages	1.59	1.26	17.28	1.28	4.58	1.3	4.16	2.21	1.6	8.16
Fruits & vegetables	16.18	2.99	93.29	56.26	29.13	20.02	12.84	32.67	60.69	49.16
Spices	1.7	1.16	24.5	-1.69	40.88	1.84	4.88	1.01	1.01	-20.65
Others	0.67	0.47	14.13	0.84	0.75	0.75	0.2	1.75	2.44	-1.87
Total	100	100	100	100	100	100	100	100	100	100

Source: Joshi, 2005

Each of the above growth sources has implications for future agricultural development policies (Minot 2003). If the growth stems from the technological change (yield improvements), investments in research and extension need to be accorded priority. The area-driven growth implies need for greater extension efforts to make agriculture broad-based, while the price-driven growth requires an appropriate pricing policy for a balanced growth of the agricultural sector. If the growth occurs due to crop diversification, there is a need for increasing investments in development of markets and infrastructure.

Surprisingly, the share of real prices of all cereals, which depicted a declining trend during the 1980s, turned out to be positive during the 1990s, which eventually contributed to agricultural growth. The prices of a majority of commodities, except oilseeds, increased during the 1990s, with maximum rise in prices of rice, wheat, and fruits & vegetables. Rice and wheat were, however, covered under the government policy of 'Minimum Support Price' (MSP); consequently their prices were consistently increased to protect the interests of the farmers. But for fruits & vegetables, it was the growing demand that pushed up their prices. The yield-effect on agricultural growth slowed down during the 1990s. A majority of crops depicted either stagnation or deceleration in their yield levels during the 1990s as compared to values in 1980s. It was a clear indication of the fatigue in the technology being used for these crops. The improved technologies were reported inaccessible to the farmers due to various reasons. This indeed is a matter of concern as the potential yield of most of the crops is yet to be tapped to harness the benefits of improved technologies. Moreover, with only a limited scope of expansion in the area, increase in yield through technological innovation is the only viable option as the source of agricultural growth in the future.

The crop diversification emerged as a prominent source of growth in agriculture both during 1980s and 1990s. The rise in its share in the growth was an indication of the changing production portfolio in favor of superior and high-value commodities. It was noted that the areas under most of the coarse cereals, pulses, and spices had shifted towards fruits & vegetables and other more remunerative crops. During the 1980s, the area substitution was in favor of oilseeds, while the trend shifted to wheat and fruits & vegetables in 1990s. The share of fruits & vegetables in crop diversification went-up to 61 percent during 1990s from about 56 percent during 1980s. Their share in the total cropped area increased from 2.8 percent in TE 1981-82 to 4.8 percent in TE 1999-2000. Their corresponding share in the gross value of agricultural output moved-up from 8.9 to 17.5 percent during this period( see table 3).

It was interesting to note that the contribution of output prices and crop diversification (particularly fruits & vegetables) had gone-up in agricultural growth during the reform

period, whereas during the pre-reform period, it mainly relied on technology and crop diversification (particularly oilseeds and fruits & vegetables). During the reform period, the focus was on agricultural prices, particularly of rice and wheat, whose prices depicted a change of 30 and 27 percent, respectively. However, a continuous rise in the output prices is not a sustainable source of growth in the long-run. Increasing production and globalization could suppress the output prices and may affect the agricultural growth adversely. Thus, accelerating the pace of crop yields (through technological change) and crop diversification (in favor of high-value commodities) are the options to provide sustainable sources of agricultural growth in future.

**Table: 6 Rate of growth of area, production, yield and area under irrigation for major crops (In percentage)**

Years	Rice	Wheat	Pulses	Foodgrains	Cotton	Oilseeds	Sugarcane
<b>Growth in the area under crops</b>							
1989-90 to 2006-07	0.14	0.73	-0.35	-0.26	0.86	-0.02	1.15
1992-93 to 1996-97	0.46	1.51	-0.33	0.17	4.04	0.56	2.6
1997-98 to 2001-02	0.34	-0.15	-1.82	-0.57	-1.26	-3.38	1.77
2002-03 to 2005-06	-0.29	1.09	2.06	0.55	1.26	5.62	-1.67
<b>Growth in the production</b>							
1989-90 to 2006-07	1.17	1.9	-0.03	1.18	2.04	1.25	1.13
1992-93 to 1996-97	1.73	3.6	0.66	1.88	4.88	3.57	3.74
1997-98 to 2001-02	1.13	1.26	-2.52	0.67	-5.79	-4.68	1.23
2002-03 to 2005-06	1.75	0.42	3.27	1.61	20.22	9.81	-1.23
<b>Growth in yield</b>							
1989-90 to 2006-07	1.02	1.16	0.32	1.43	1.17	1.24	-0.04
1992-93 to 1996-97	1.27	2.06	1.01	2.05	0.77	2.96	1.14
1997-98 to 2001-02	0.75	1.41	-0.76	1.23	-4.56	-1.38	-0.53
2002-03 to 2005-06	2.1	-0.66	1.25	1.09	18.48	4.11	0.36
<b>Growth in area under irrigation</b>							
1989-90 to 2006-07	1.33	1.42	1.85	1.25	0.88	-0.28	1.94
1992-93 to 1996-97	1.97	2.18	3.57	1.74	5.24	2	2.73
1997-98 to 2001-02	1.26	0.34	0.78	0.91	-2.64	-4.8	2.38
2002-03 to 2004-05	-1.86	1.03	5.11	-0.06	-4.43	7.35	-4.7
Note: All growth rates are based on moving averages of three years							

Source: Economic survey, 2007-08

There has been a considerable decline in the rate of growth of area, production, productivity and area irrigated for the major crops. The area under the production of foodgrains over a 16-year period witnessed an average annual decline of 0.26 per cent during 1989-90 to 2005-06, largely because of a shift in area away from coarse grains. The trend, however, was moderately reversed during 2002-06, partly because of a low base. Cotton and oilseeds also witnessed an increase in area during the period. Average annual rate of growth in production and yield varied across crops and over different time periods. For cotton and oilseeds, the rate of growth in production remained high during 2002-06, while in case of wheat and sugarcane, annual growth in production peaked during the initial phase of reform period, that is, 1991-92 to 1996-97. Rice maintained a positive growth in yield during this period, but in case of wheat, average annual growth in yield during 2002-06 was negative. Growth of productivity in pulses fluctuated over the three Plan periods. It became negative during 1997-2002 (Ninth Five Year Plan period), but turned positive again during the Tenth Five Year Plan. Increase in production and productivity of cotton during the Tenth Five Year Plan may be due to increased use of BT cotton.

**Table: 2.7 Growth Rate in Area, Input Use, Credit and Capital Formation in Agriculture Before and After Reforms (Per cent/year)**

Variable	1980-81 to 1990-91	1990-91 to 1996-97	1996-97 to 2004-05
Gross cropped area	0.43	0.43	-0.48
Net sown area	-0.08	0.04	-0.55
Cropping intensity	0.51	0.39	0.07
Gross irrigated area	2.28	2.62	0.51
NPK use/ha NSA	8.255	2.401	2.044
Electricity consumed in agriculture/ha NSA	14.162	9.39	-0.159
Area witnessed crop shift (per cent)	5.6	5.6	4.8
Terms of trade	0.189	0.947	-1.63
Public sector net fixed capital stock/ha NSA	3.939	1.872	1.976
Private sector net fixed capital stock/ha NSA	0.642	2.134	1.721
Total net fixed capital stock/ha NSA	2.085	2.01	1.838
Credit supply/ha NSA	3.81	7.466	15.336

Source: Chand et al (2007)

*Note:* Growth rates in the area and crop intensity are up to year 2003-04.

The above table 7 gives a broad look about the factors that affect growth in three periods period I represents the pre reform period 1980-81 to 1990-91, period II represents initial phase of reforms 1990-91 to 1996-97 and third period represents the period after globalisation 1996-97 to 2004-05. Gross area under cultivation remained constant from pre reform period to period II and declined after globalisation period. After 1996-97, almost all factors except credit, turned unfavourable for the growth of agricultural output. Net sown area witnessed a decline at the rate of 0.55 per cent which was not compensated by an increase in cropping intensity. Gross cropped area also declined on the trend. The biggest setback to output of the crop sector came from the decline in terms of trade for agriculture and slowdown in expansion of irrigation. The terms of trade for agriculture after 1996-97 have declined annually by 1.63 per cent. Liberalisation of trade has led to increased integration of the domestic market with the international market. Accordingly, a downward trend in international prices of agricultural commodities after 1997-98 has been transmitted to domestic prices resulting in deterioration in TOT for agriculture.

#### **4 Factors affecting Agricultural Growth:**

In the preceding section we have seen what are the main sources of growth and their changes in the reform period. It is identified that the sources of growth have changed compare to the pre reform period. The main changes are area reduction both in terms of gross cropped area and net sown area, reduction in the yield for many crops both food grains and non food grains and hence its contribution to total growth has declined and finally there is cropping pattern change started from the 80's and accelerated in the 1990's (table 2.3) from food grains particularly coarse cereals to non food grains high value crops like horticulture crops, cotton, oilseeds and sugarcane which contributed to growth. It is broadly understood that it is cropping pattern mainly crop diversification that drive growth with the support of high prices for these commodities. In this section we will try to explore the underlying factors responsible for the above changes.

#### ***Factors affecting area***

Expansion of area under cultivation depends on the prices of crops, but the acreage of cultivable land was adversely affected by the urbanisation, industrialisation through special economic zones and marginalization of land holdings resulted mainly in the post reform period. The study of Parthasarathy et al (2004) shows that in the world of globalisation, with the vast development of secondary and tertiary sectors, and their spread to the semi urban areas led to the substitution of cultivable land and also rapid development of special economic zones to some extent played a role in reducing acreage. In addition to this there is marginalization of land holdings in the post reform period with the increase in landlessness to 48 per cent in the post reform period compare to 30 per cent in 1970's (Reddy and Mishra 2008). A persistent trend in Indian agriculture is the shrinking farm size. This is a long-term trend and unless addressed can have permanent adverse consequences for the sector, impinging upon its prospects. At the same time as the smaller farms have come to predominate, due to the fixity of land, they have come to account for the greater part of the area operated. In 1960-61 over 60 per cent of the cultivated area was operated by farms exceeding 4 hectares by 2002-03 the figure is less than 35 percents farm size is reduced while size marginal farmers increased from 6.9 in 1960 to 22.6 in 2002-03 as marginalization of land increases the members of the family are driven to look outside the farm to supplement their income, in turn being forced to neglect production management, thus slowing growth. The decline in land holdings and area cultivated in a way contributed to the decline in output.

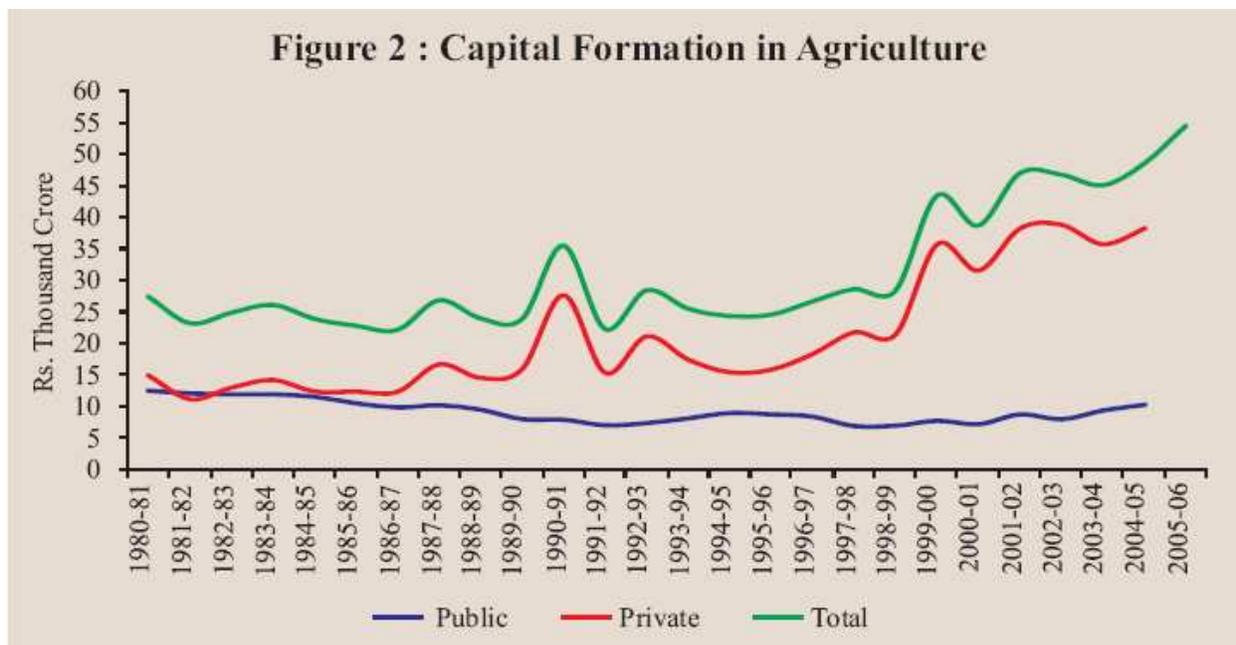
***Factors affecting yield:***

Agriculture growth after Green revolution period was mainly sustained by the impressive growth in the yield of all most all crops. As we have seen yield played significant role in the growth of agriculture during 1980's. But it turned out very disappointing in the post reform period with the massive reduction in yield for major principle crops (table 2.6). Analysis of new varieties released of major crops (rice, wheat, maize, groundnut, mustard and sugarcane) shows significant deceleration of the growth of yield potential, with negligible increase over the last decade due to advent of neo liberal policies. There are many supply

side factors that have affected yield in the post reform period in the market led economy such as public investment on irrigation and infrastructure development, fertiliser, seed varieties, price policies, technological progress, weather, intensive farming etc. The policies of the Government in the post-liberalisation phase have had direct and indirect adverse effects on agriculture and the peasantry. In terms of fiscal policies, the reduced spending of Central and State governments was the most significant feature. We will enquire the details how the above factors turned adversely with the introduction of market led policies in the post reform period (Patnaik 2005).

### *Public investment*

It is well known that fixed capital formation is essential for sustaining the growth of agriculture as it reduces the transaction cost for private farmers besides reducing the operational cost of cultivation. However, fixed capital formation by the public sector in agriculture has been continuously declining both in absolute terms and also in relation to agricultural GDP. It plays a crucial role in the expansion of irrigation and research and technology for improved seeds and inputs and also infrastructural development in the improvement of yield of crops. The reduction in the public investment in the post reform period did show a significant effect on yield. The trend in the public investment has shown a decline from 80's onwards and it further squeezed in the post reform period as India had gone for structural adjustment policy which impacted on reduction in the fiscal deficits though reduction in investment.



Source: Balakrishnan et al (2008)

Aggregate capital formation appears to collapse with the initiation of reforms remaining depressed throughout the nineties. The behavior of private capital formation is more volatile, unlike public capital formation, collapsing with the onset of the reforms and remaining depressed during the first half of the nineties. However, unlike public capital formation it begins to rise from the mid-nineties, only to stagnate from around the year 2000. Dhar and Kallumal (2004) suggested that throughout the 1990s, the share of agriculture in gross capital formation (at constant prices) has remained in single digits, which explains the slackening of its growth momentum during the past decade. Gulati and Bathla (2001) observed that there has been an increasing role played by private sector investment in agriculture over time while there is a decline in public sector capital formation in the sector. Public sector investment along with terms of trade has an inducement effect on private sector capital formation. Desai (2002) suggested that government expenditure should be focused on agricultural R and D, education and extension services, rural electricity, roads and marketing, irrigation and watershed development, etc. The reduction in capital formation has witnessed in the less R&D

development in agriculture in terms of seeds and fertilisers which adversely resulted in the decline of yield of crops in the post reform period.

### *Natural factors*

Agro climatic situation in India is diverse across regions in terms of soil, temperature and rainfall distribution and hence yields to the crops also different. In India nearly 41 per cent gross cropped area is under irrigation in 2005<sup>2</sup> remaining land depends on rainfall hence rainfall and availability of water resources significantly affects productivity in addition to that monsoons and flood affect yield in agriculture. Lack of adequate irrigation is another reason for cropping pattern changes towards cash crops such as horticultural crops which are grown in rain fed areas. Flood prone mainly Assam, Andhra Pradesh, Tamilnadu and other states. Irrigation is considered to be the paramount factor that determines the performance of agriculture. Though the net irrigated area has increased substantially from 20.58 million hectares in 1950-51 to 53 million hectares in 1994-95, there is no appreciable improvement in it since the mid-1990s because of inadequate allocation of funds required for completing ongoing projects and poor monitoring of irrigation projects by the state agency. This poor growth in surface irrigation has compelled farmers to rely heavily on groundwater irrigation. The increased dependence on groundwater irrigation increases the cost of cultivation. It also depletes the water level and increases the rate of well failures in many places in peninsular India. Farmers in most of the regions in India are fed up with crop cultivation because they have not been able to recover even the cost of cultivation in the past several years now. The SAS data clearly acknowledges this fact [Narayanamoorthy 2006; Balakrishnan et al 2008].

### *Factors affecting crop cropping pattern*

From the previous section it is observed that, it is changing cropping pattern towards high value commodities from food grains that contributed to growth of agricultural sector in the initial phase of reforms and when there is reduction in both area and yield and. But growth

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<sup>2</sup> Own calculation based on RBI Hand book of Statistics

in the post WTO period is turned out to be very disappointing. There are various factors explaining the growth crisis such as Economic factors (input and output prices), Technological factors (improved seeds and irrigation), and Institutional factors (market and road density and access to credit) Policy induced factors (fertilizer and irrigation subsidy, procurement price and Trade liberalisation)). In addition to these factors cropping pattern is determined by climate, rainfall, soil type, irrigation and drainages. Changes cropping pattern takes place according to changing irrigation facilities, cost of cultivation, and returns from the cultivation, credit and market facilities. Among various factors irrigation facility is considered as significant factor in rising crop intensity and permits changes in cropping pattern in favour of more productive crops. So cropping pattern is influenced by both irrigation facility and rain fed area (Renuka 2003).

### *Economic factors*

Economic factors played equal role in the growth of agriculture in the initial period of reforms and deceleration of growth in the total growth due to very low remunerative prices for output in the post WTO period. With the high remunerative prices for the commercial crops during late 80's and early 90's the crop intensity of those high value products which resulted in the growth rate of horticulture crops, mainly crops of non food grain in the pre globalisation period and same is the cause for deceleration of growth in the food grains which are considered as less profitable crops (table 2.2). On the other hand with the reduction of subsidies on fertilisers and other agricultural inputs and with the entry of foreign players due to the opening up of boundaries among countries domestic input market has taken a new shape in the production of seeds and inputs had also affected on rising input prices. Growing reliability on commercial crops have adversely affected whole peasant class due to the highly volatile output( because most of the commercial crops are grown in rain fed area) and its prices with high input costs put farmers in distress. High cost of cultivation of crops with very less remunerative prices for the produce has become a reason for the slowdown of agricultural growth.

### *Technological factors*

As it is already mentioned in the preceding section due to the reduction public investment the investment on improving seeds has come down. Application of traditional inputs without proper irrigation which is a significant source growth of output resulted in the decline in the production in the post reform period.

### *Institutional factors*

In India, the marketing conditions for agricultural produce were never good. If the farmers are not aware of market signals about price and demand conditions, they cannot really reap produce the demanded goods in the country and access to market also play a crucial role in agricultural output. Another factor which affects agriculture significantly is credit. It has always been maintained that the availability of concessional credit would help the farmer to adopt new technology, encourage investment in machinery and irrigation and augment the use of quality inputs to increase agricultural productivity. After trade openness in agriculture, with the entry of foreign nationals in the input market, the prices of input have gone up which were not supported by ample credit supply to the farmers. It is observed that there is cropping pattern shift towards cash crops which need high investments on inputs like fertiliser, seeds and adoption of new and improved technology etc. to compete in the world market. But Indian farmers are as it is already mentioned small and marginal who cannot take any investment activity without financial support by the credit institutions. In India accessibility of formal credit is very low and hence the new production initiatives are shrinking which is also due to un-remunerative pricing. Finally, these factors together contribute to the slowdown in agriculture.

### *Policy induced factors*

The policies of the Government in the post-liberalisation phase have had direct and indirect adverse effects on agriculture and the peasantry. Factors mainly affected by the policy initiatives are fertiliser and other input subsidy, irrigation and procurement price and trade liberalisation. Indian economy, before economic reforms was supporting farmers with enormous subsidies on fertilisers and inputs, assisting peasant community to increase production capacity with low cost of production. Advent of economic reforms has led to

withdrawal of state support on these subsidies and others. In a market led economy, providing subsidies to farmers is not feasible. The withdrawal of subsidies in the post reform era has shown its impact on cost of cultivation of crops and also reduction in yield. Another factor is price supports to the farmers. Peasant agriculture depends heavily on the support of the state for its survival and growth. There was no proper price support in terms of MSP by the government. It was argued by the proponents of liberalisation that freeing agricultural markets and liberalising external trade in agricultural commodities would provide price incentives leading to enhanced investment and output in that sector, while broader trade liberalisation would shift inter-sectoral terms of trade in favour of agriculture (Gulati and Kelli 1999). External trade in agricultural commodities have been liberalised, first through lifting restrictions on exports of agricultural goods, and then by shifting from quantitative restrictions to tariffs on imports of agricultural commodities. Trade liberalisation in agriculture accelerated from the late 1990s, in tune with WTO commitments, and import tariffs were reduced progressively. The single most adverse effect of trade liberalisation has been the combination of low prices and output volatility for cash crops. While output volatility increased especially with new seeds and other inputs, the prices of most non-foodgrain crops weakened, and some prices, such as those of cotton and oilseeds, plummeted for prolonged periods (Pillai 2006). This reflected not only domestic demand conditions but also the growing role played by international prices consequent upon greater integration with world markets. Without ensuring remunerative prices backed by procurement operations, it is not possible either to increase agricultural production or to make Indian agriculture internationally competitive.

### *Why diverse explanations in the literature?*

It has been observed that there are vast range of studies came up explaining the deceleration in the growth performance in the agriculture in the recent years in which, some of them are cited above. The fascinating issue is that, each study on poor performance of agriculture came out with diverse reasons though there are some commonalities in the diversities. So it is essential to have a look at it to know why so many interrelated factors

are explained in each of the study and also to observe whether all factors explained are equally important in analyzing crisis in agriculture. In the literature, it is found that many studies have highlighted some common factors like reduction in public investment, withdrawal of domestic subsidies and trade liberalisation. Giving central importance to these three factors, many other interrelated factors are explained in the literature. In this particular study focus has been made to understand how and in what context the explanations are different from other studies. It is understood that as agrarian crisis is subject to multi dimension issue, it is viewed in different dimensions with various methodologies to understand the factors and thus it gave rise to different explanations of crisis. For instance, the studies on farmers distress by Suri (2006), Mishra and Reddy (2008) Mishra (2008) Vakulabharanam (2005) Vaidyanathan (2004) Galab and Reddy (2006) showed that heavy dependency on commercial crops has led to increased cost of cultivation due to use of expensive seeds and fertilisers and rising input prices which were not backed by favourable output pricing and credit facilities and also depletion of natural resources and other natural factors. Studies on trade liberalisation by Rao (2001) Gulati and Kelli (1999) attributed agricultural crisis to the volatile prices in the international market and lack of competitiveness. Another study on economic liberalisation by Vyas and Reddy (2001) and Vakulabharanam (2008) Balakrishnan et al (2008) Chand et al (2007) argued that withdrawal of state intervention has resulted in decline in public investment and domestic subsidies on irrigation, fertiliser and inputs. Having looked at the broad classification of literature in terms of explanations, one can derive a conclusion that factors varied according the dimension of the studies and its methodologies. Coming to the second point, whether all factors play equal role in the deceleration of agricultural growth? The answer is no. having explained each and every factor clearly it would be fair to argue that mainly policy induced factors such as price, domestic support and credit plays important role in growth performance of agriculture. In addition to this public investment also plays an important role but the trend showing that private investment is continuously rising and gross investment is also increasing. Many argued that Agriculture has become unviable in the post reform period. If it is so, there is no explanation as to why private investment would

keep on increasing unless there is a hope profit from the agricultural sector and by looking at the trend in public investment it is observed that public investment started declining right from the 80's on the other hand there was increasing trend in growth in agriculture till mid 1990's. from the we can derive that more than public investment, some factors play an important role in agricultural crisis.

## **5 Summary and Conclusions:**

To conclude, this paper essentially tried to look into the growth performance of Indian agriculture and explanations for dismal performance in agriculture by observing its sources of growth mainly area, yield and cropping pattern in the recent years and tried to explore what mainly contributed for slow growth by critically examining the literature.

While many arguments say that, during the era of neo liberal period the policies initiated were acted against agriculture and negligence of agriculture, the growth rate in agriculture during the first half of 1990's was recorded better than pre reform period at 3.62 per cent during 1990-91 to 1996-97 from 3.2 per cent during 1980-81 to 1989-90. After agreement with WTO, growth in agriculture has actually come down to less than 2 per cent. So, we could attribute the crisis in agriculture to the policies that have come up after trade liberalisation.

Sources of growth of agriculture have been changing right from the independence. Area cultivated both in term of net sown are and gross sown area has shown a decline in the post reform period due to urbanisation, industrialisation and marginalization of land holdings which had an impact on growth on agricultural production. Yield which played a significant role in the growth of agriculture during 80's due to spread effects of green revolution has come down during 90's with the advent of neo liberal policies due to reduction in public investment on irrigation and seeds, technology and extension has greatly affected yield. The engine of agricultural output during post reform period is cropping pattern. It is observed that, there is a shift in cropping pattern towards from food grains to commercial crops due to favourable prices and terms of trade but these factors turned negative which had significant effect on growth of agriculture.

There are number factors contributed for the slowdown in growth of agriculture in addition to reduction in public investment. Volatile output prices, reduction of subsidies on inputs, dependency on high cost inputs increased cost of cultivation which was not backed by adequate credit supply on the one hand and on the other hand crop failures and faulty remunerative prices affected whole peasant community and pushed them into debts. The NSS 59<sup>th</sup> round Survey on *Indebtedness of Farmer Households* conducted in 2003 reported that 48.6% of farmer households were indebted.

Finally, all sectors in agriculture and sections among the peasantry are affected by the deepening agrarian crisis. The poorer sections among the peasantry, especially the small and marginal farmers and the agricultural labourers, who constitute the vast majority of the Indian population, are the worst sufferers.

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