Indian Agriculture: Changing Landscape

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Abstract

Tracking the revolutionary changes in the Indian agricultural sector, it is quite clear that technology, institutions, and markets have had a very important role to play. Of course the public sector played a pivotal and catalytic role when India ushered in Green Revolution in late sixties and early seventies. The public sector imported new seeds, organized their distribution and demonstration, and provided price and market support, all "not-for-profit". The cooperative sector, supported and facilitated by the government, again with the spirit of "not- for- profit", helped bring in the White Revolution in milk through Operation Flood in 1970s and 1980s. This spirit is now being gradually replaced by "for-profit" objective driven by the private sector, as is demonstrated in the revolutionary changes brought about by the introduction of Bt technology in the cotton sector during 2002-07. On top of this, the corporate sector is also changing the complexion of Indian agri-system through notable changes in organized food processing and retailing. This change in spirit from "not-for-profit" to "for-profit" in the growth process of Indian agriculture has significant implications on the concept of CISS, i.e., competitiveness, inclusiveness, sustainability and scalability, which needs to be studied carefully and in detail. Accordingly, this paper traces some of these dynamic changes and their likely implications.

1.Introduction

Indian agriculture has undergone some noteworthy revolutionary changes in the past, much of which has been sporadic to a few selected crops, or regions. As result, its overall performance in terms of growth on sustainable basis has been rather modest. Since the reforms started in 1991, overall growth in agricultural GDP has hovered around 3 percent per annum, with some ups and downs. Historically, India has grown out of a period of shortages, particularly in grains and has emerged as a regional/global player at least in rice for quite some time now. Spearheaded by the green revolution in the late 1960s and early 1970s, India was able to overcome productivity stagnation and improve food grain production from 51 million tonnes in 1950/51 to 108.4 million tonnes in 1970/71 and 230.67 million tonnes in 2007/08. This was followed by the well known white revolution, i.e., operation flood in 1970s and 1980s, which revolutionized liquid milk production, and marketing in India. What could have followed this was a yellow revolution in the oilseed sector, yet another breakthrough in production for self-sufficiency, but unfortunately it could not be sustained, as reduction in high tariffs on edible oils resulted in increasing imports, and in 2007-08, India was importing almost half of its edible oil consumption. Contrary to this was the success of Bt technology in the cotton sector, which resulted in a massive expansion of cotton production followed by an unprecedented surge in exports in 2007-08 when India exported more than 8 million bales, the highest ever in its history.

[1] My sincere thanks are due to Kavery Ganguly who provided excellent research support in writing this paper.

The food security concerns have always prompted the Indian policymakers to focus on increasing production of food grains and with the gains of the first green revolution fading away, many are of the opinion that it is time for a second green revolution. However it is important to recognize that the gains from traditional crops particularly food grains are limited and the future sources of agricultural growth lie in the high value sector (viz. horticulture, livestock, and marines). Fisheries in India have emerged as a vibrant sector with exports of nearly $ 1.8 billion in 2007/08. This sector has posted a robust growth of more than 4% since 1970s, and riding this high growth scenario, a blue revolution could be underway. Also, given the fact that India is already a significant producer of fruit and vegetables (second largest, producing 63.5 million tonnes of fruit and 125.8 million tonnes of vegetables), the next revolution is likely to emerge in the fruit and vegetable sector (both fresh and processed segments). However this will not occur in a business as usual scenario but requires developing efficient value chains and improving upon the existing firm-farm linkages, which in turn will require greater investments (both public and private), creation of enabling institutions and readjust the existing incentive structure that is heavily skewed in favor of the traditional grain sector.

In tracking the past revolutionary changes in the agricultural sector, it is quite clear that the main drivers of change have been technology, institutions, and markets with a changing role of the public, cooperative and private sectors. To start with, the public sector played a very proactive role in terms of providing price and market support during the period of green revolution, all for "*not-for-profit*" in partnership with the Consultative Group of International Agricultural Research (CGIAR) network. Over time, the government played an indirect interventionist role, facilitating the functioning of new institutions and participation of the private sector. Now with the emergence of the private sector in the agricultural market spearheading the newer revolutions be it cotton or horticulture crops, an era of "*for-profit*" is beginning. This is interesting in terms of its implications on the principle of CISS, i.e., competitiveness, inclusiveness, sustainability, and scalability of the growth process. The rationality of India's coming out of a protective regime and allowing free play of market forces has been debated for long. Economic liberalization in early 1990s led to a wider integration with the world economy but there are still differences on whether India should fully liberalize the agricultural sector and adopt a more aggressive market driven approach. This is primarily because poverty and hunger are critical developmental challenges for India. While growth alone will not ensure food security of the masses, it will be necessary to streamline the food grain management system, ensure better targeting, and develop social safety net and protection networks to maximize the welfare of the poor in particular. Hence food security will remain high on the policy agenda and the Indian policymakers will have to get their act of balancing food security concerns and higher growth objective right.

This paper attempts to analyze some of these issues and map the significant changes (revolutions) in the Indian agricultural sector in terms of what resulted in their success or failure and what are the key lessons learnt. While all of these contributed to higher growth in the respective sector, success in certain cases was short lived and did not pan out in due course of time. The paper discusses the role of the public sector, technological innovations, markets for high value commodities, and improved farm-firm linkages in a changing

landscape of Indian agriculture. Also, in the context of regional and global integration of agricultural markets, and the structural change of the Indian agri-system, important policy reforms and institutional changes that still need to addressed are discussed herein.

2. Changing Landscape of Indian Agriculture

The Green Revolution and thereafter

Food security concerns in India were triggered by the Bengal Famine in 1943, and until early 1960s, the country experienced several droughts raising concerns about food security. What made the situation worse was not only inadequate domestic production, but negligible foreign exchange reserves to buy grains from international markets[2]. This resulted in increasing dependence on foreign aid, which had its own political fallout. The immediate concern of the government then was to attain self sufficiency in food grains in a sustainable manner and the only feasible option was increasing domestic production. This resulted in a major technological breakthrough to overcome stagnation in yields ushering in the Green Revolution. The 'miracle seeds' from Mexico found their way to the Indian fields and soon there was an escalation in the adoption of high yielding variety seeds for various other crops. There was sizeable increase in the production of wheat and rice from the much needed productivity boost. While the all India picture improved, with the states of Punjab and Haryana leading the way, the success was not very widespread. Between TE 1959/60 and TE 1969/70, production of wheat increased from (-) 1.1% to 27.2% in Haryana; 3.8% to 25.1% in Punjab; and 3.8% to 10.3% at the all India level.[3] In the case of Punjab, the year 1966/67 is said to have marked the completion of the cycle of the green revolution which started in 1947 owing to better infrastructure, irrigation facilities, and zeal of the farmers (Singh 2001). The success of green revolution has been criticized of being confined to the resource abundant regions of the country, crafted to benefit the rich farmers. But one should not miss out the fact that it was because of the green revolution that India was able to come out of the import dependence including food aid and meet the demand requirements through domestic production.

The success of green revolution required a political commitment and the government struck an alliance with CGIAR network to adopt the high yielding technology. However higher production meant better pricing and marketing policies and this again saw the government assuming a prominent role in providing these services. In 1965, came into existence the Agricultural Prices Commission (APC) and the Food Corporation of India (FCI), to ensure 'remunerative prices' to the producers and also facilitate marketing and distribution of food grains. The *"not-for-profit"* approach of the public sector steered the import substitution policy and helped India achieve self sufficiency in cereals, except for some single years of import of grains. However the benefits of the green revolution started fizzling out toward the end of the 1970s and lost its steam toward the end of the 1980s. Thereafter the performance

[2] In 1965, if all foreign exchange reserves had been spent on importing wheat, the total amount of wheat that could be imported was not more than 5 million tons (Rashid, et.al. 2008).
[3] TE refers to triennium ending.

of the cereal sector has been quite fluctuating, with a considerable decline during TE1999/2000 at the all India level. While many scholars have raised concerns regarding stagnating yields of wheat and rice, it has been less observed that demand patterns started shifting away from cereals in response to rising income levels since mid 1980s or so. This resulted in piling up of stocks of grains, despite slower rates of growth in production. For example, in July 2002, India accumulated 63 million tonnes of rice and wheat (against a buffer norm of 24.3 million tonnes) which had to be disposed through subsidized export. At present, in July 2009, with more than 230 million tonnes of food grains production in 2007/08 and almost the same in 2008/09, stocks are bulging at more than 53 million tonnes, double of what is required under buffer stock norms (26.9 million tonnes). Hence issues related to better food grain management and marketing need to be addressed rather than just emphasizing on increasing production alone.

The high yielding varieties seeds (introduced during the green revolution period) being extremely input intensive had an adverse impact on the environment and the states which pioneered the revolution are now facing an acute problem of soil and water degradation (from increased use of fertilizer and pesticides) and severe groundwater problems (depletion of groundwater to precarious levels) (Sud, 2009). Keeping these after effects into mind, it may be worthwhile to shift the cereal basket from the northern states like Punjab and Haryana, and parts of Uttar Pradesh to the eastern region.

The White Revolution: Success of Operation Flood

The growth of liquid milk production, marketing, and distribution (i.e. the *white revolution*) is ascribed to the success of Operation Flood launched in 1970s and executed in three phases until 1996.[4] India's milk production increased from 21.2 million tonnes in 1968/69 to 104.8 million tonnes in 2007/08, becoming the largest liquid milk producer in the world. The per capita availability of milk increased from 112 grams per day in 1968/69 to 252 grams per day in 2007/08. The growth of milk production was abysmally low; just 1.2% in 1960/61 to 1973/74, after which it gathered momentum and peaked at 5.5% during 1981/82 to 1990/91. During 1991-2007, daily milk supply by the cooperatives to each 1000 urban consumers increased from 37.3 to 66.3 litres. Also, the dairy cooperative network in India comprises of 177 milk unions spread over 346 districts, and owned by nearly 13.4 million farmer members of village level societies, 28% of them are women. Facilities like bulk vending and automatic milk collection units and bulk milk coolers at the village level have revolutionized the process of milk collection and preservation. Now milk travels 2,200 kilometers to deficit milk regions by rail and road milk tankers (NDDB 2009).

While Mr. Verghese Kurien spearheaded the revolution, three crucial factors which ensured its success were: co-operatization of the milk value chains; technology that helped procure, store and supply to distant markets; and creation of large milk markets that absorbed increased production. Like any other agricultural value chain, the traditional milk

[4] This was inspired by the success of Amul (Kaira District Cooperative Milk Producers' Union registered in 1946) which started with just two village cooperatives handling 250 litres of milk per day, and now with 13,328 village societies handling an average of 8.4 million litres of milk per day.

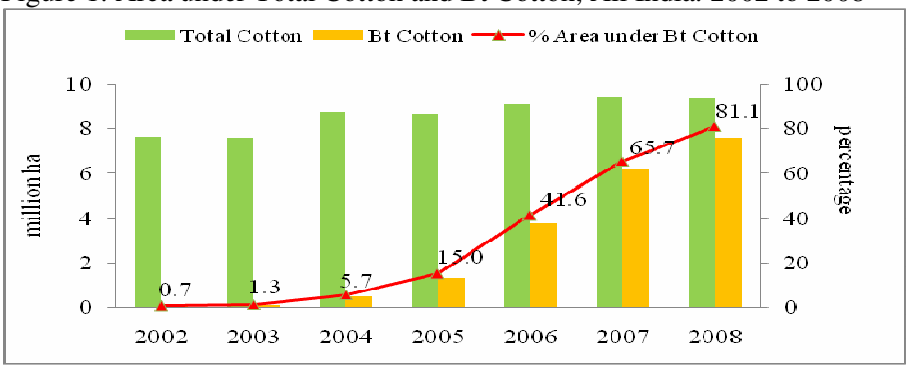
procurement and marketing was controlled by the village middlemen resulting in lower incomes for the farmers. Absence of an organized value chain forced the milk farmers to sell to the middlemen, more so owing to the highly perishable nature of milk. Operation Flood executed in three phases; phase I (1970-80); phase II (1981-85); and phase III (1985-96) was co-financed by the sales proceeds of the grants provided by the European Commission (through the World Food Program in the form of skimmed milk powder and butter oil), the World Bank loans, and internal resources of the National Dairy Development Board (NDDB) (NDDB 2009). It started with linking just 18 premier milk sheds with the four metro cities (Delhi, Mumbai, Kolkata and Chennai) and by the end of the period, in 1995/96, there were 72,744 dairy collection centers (DCS) in 170 milk sheds in the country with a membership of 9.3 million milk farmers. Although the public sector played an important role in channeling the grant received to develop the dairy sector, it was not involved in providing direct support. Factors like technology and markets played a more dominant role and ensured the sustainability and scalability of this endeavor. During the period of Operation Flood and thereafter, cooperatives operated under the licensing regime to protect them from the competition with the private sector. However the amendment of the Milk and Milk Products Order in 2002 marked the entry of the private sector and is likely to overtake the cooperatives in the near future. It is forecast that by 2012, private corporate sector will be processing about 20% of milk production while the share of cooperatives will be 10%, the two together still processing only 30% of all India milk production (Dairy India, 2007). The next breakthrough is likely to come in the value added segment and given the low levels of processing through the organized chains, the private sector with their capital resources can exploit the economies of scale.

3. Other Big Changes since 2000

Success of Bt Cotton in India- driven by the Corporate Sector

One of the big bangs in Indian agriculture has been the success of Bt (*Bacillus thuringiensis*) cotton. Cotton cultivation in India for long has been associated with the unfortunate incidents of farmer suicides (concentrated in Vidharba district of Maharashtra, northwest Andhra Pradesh, and northern Karnataka). However amidst much controversies and regulations, the Bt technology was introduced by the private sector, and adopted by the Indian cotton growers (in Gujarat) in 2001 even before the official approval came by in 2002. As a result, India today has the largest area under Bt cotton (greater than that in China) and the expansion has been phenomenal since its introduction in 2002. Within seven years, more than 80% of the cotton area has come under Bt variety; doubling from 3.8 million hectares in 2006 to 7.6 million hectares in 2008 (see figure 1).

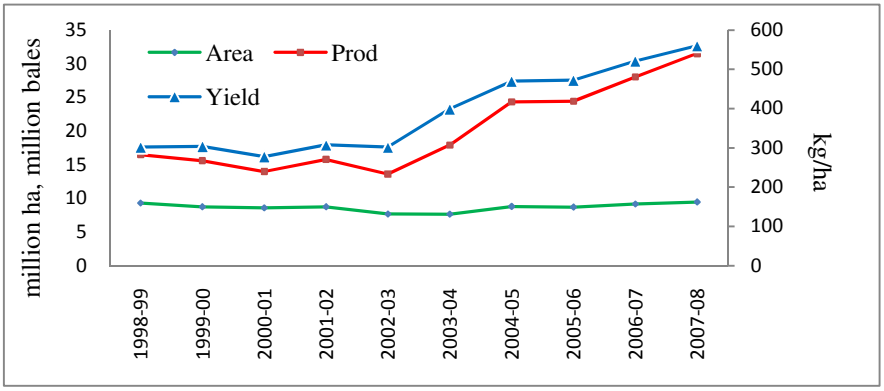
Figure 1: Area under Total Cotton and Bt Cotton, All India: 2002 to 2008



Source: Cotton Advisory Board, 2009 and James, 2008

Also, the overall cotton yield increased from 302 kg/ha in 2002/03 to 567 kg/ha in 2007/08; an 87.7% increase in five years (see figure 2). Production in India doubled from 15.8 million bales in 2001/02 to 31.5 million bales in 2007/08 (Cotton Advisory Board, 2009). The breakthrough in cotton has been unprecedented in the history of technology adoption in the agricultural sector in India, the results of which have been spectacular in a relatively short period of time. Also, it has been more widespread than the earlier revolution which had a distinct regional demarcation. In contrast to other revolutions, the introduction of Bt technology was met with opposition from the non-government organizations and had to be steered by the private multinational and domestic companies. However it was again the zeal of the Indian farmers that resulted in its spreading like wild fire; more than 80% of the area under cotton is under the Bt variety.

Figure 2: Area, Yield and Production of Cotton, All India: 1998/99 to 2007/08

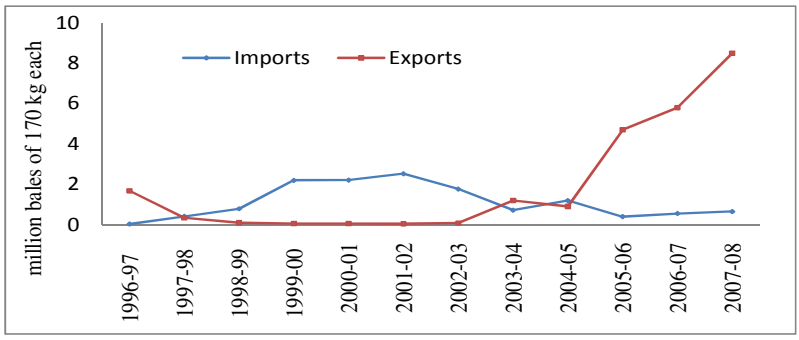


Source: Cotton Advisory Board, 2009.

In this case markets too played an important role in carrying forward this production boom and unlike in the case of the green revolution when the government played a pivotal role in providing markets through guaranteed procurement, export demand played an important role in absorbing surplus production. India's consumption of cotton hovers around 20-24 million bales while the production went to more than 30 million bales. This would have led to a major market crisis if the surplus cotton could not have been exported. Increased production

led to a surge in cotton exports from 1.2 million bales in 2003/04 to 8.5 million bales worth $ 1.9 billion in 2007/08, making India the second largest exporter of cotton, overtaking the US in 2006/07 (see figure 3).

Figure 3: Export and Import of Cotton, All India: 1996-97 to 2007-08



Source: Cotton Advisory Board, 2009.

This is the highest ever export of cotton from India during the last sixty years. This was achieved when the global economy was in upswing and textile sector was doing very well, and even China started importing raw cotton from India for its textile and garment sector. But since the recession hit the western world in 2008, demand for textiles and garments has been declining in the US and Europe, leading to a major crisis in China which is drastically cutting down imports of cotton from India. Despite a dip in the production (29 million bales) and export levels (5 million bales) in 2008/09, India still has a carry forward stock of 6 million bales (Cotton Advisory Board 2009). As a consequence of this shrinking market, the expansion and benefits of cotton revolution in India are likely to hit a major road block.

Next Revolution could be in Bt Brinjals (Eggplants) and Hybrid Maize

The next Bt revolution in India is likely to come in brinjals (eggplants), the first biotech food crop under evaluation for commercial release in the country and also the first GM brinjal crop to be released globally. In 2000, Mahyco started the research and development work on Bt brinjal complying with the prevailing regulatory system. In 2008/09, upon approval, Mahyco undertook experimental seed production of seven Bt brinjal hybrids. The commercial release can be any time in 2009 or 2010 (Choudhary and Gaur, 2009). It would be interesting to see the impact of Bt technology on this crop, the second highest consumed vegetable after potato. India accounts for a quarter of the global production and is the second largest producer after China. Also, highly prone to pest attacks, brinjal uses maximum pesticides amongst vegetables. Multi-locational trials have confirmed that the Bt brinjal hybrids on an average use 80% less insecticides than the non Bt varieties and this culminates to 42% reduction in use of insecticides (Ibid). With the Supreme Court having already lifted restrictions on the release of GM food crops in India in 2008, India might witness an increased acreage under transgenic varieties. There are several other biotech crops that are at field trial stage. Most of them are food crops such as cabbage, cauliflower, okra, potato, tomato, groundnuts, corn and even rice. Success in many of these food crops

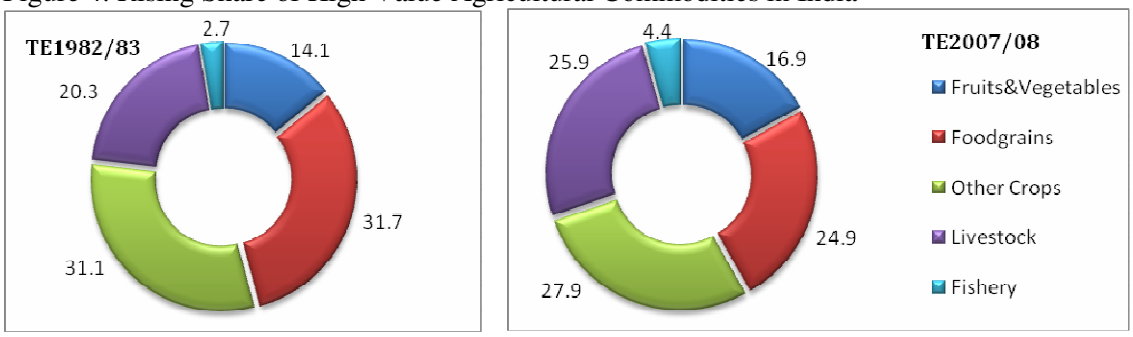
can address the food security concerns in the near future. Perhaps India is already on its way toward a technological infusion, triggered by the private sector, although lately Government of India is also increasing its investments in biotechnology. At present, many civil society groups and non government organizations are crying foul and think that advent of Bt brinjal will be 'putting poison on the plate'. It will be a major challenge to temper down these reactions and will require greater transparency in the bio-safety measures and dissemination of the same. There is a need for improved public private dialogue in understanding the benefits of adopting transgenic crop varieties and take caution for potential adverse effects, if any.

The next big cereal crop that is experiencing reasonably healthy change in production is maize, up from 12 million tons in 2000/01 to 18.96 million tons in 2007/08, registering a rise of 58% over seven year period. The increase in production comes partly from area increase as also productivity enhancement driven by hybrid seed technology led by the corporate sector, and supported by expanding market for maize for poultry as well as exports.[5] The drought tolerant maize variety currently being experimented and due for release in 2012 in the US are best suited for dry land areas, and India could think of introducing this variety to the farmers (James 2008). What could have been a yellow revolution in the oilseed sector did not take off in a big way and now with the advent of biotechnology, similar breakthroughs could be engineered in the oilseed sector too, particularly soybean. The other group of agricultural commodities which is likely to drive future growth is the high value segment comprising of horticulture, livestock and marines.

Rising Production of Fruit and Vegetables: Opportunities for Modern Marketing

Indian agriculture is in the diversifying mode and the share of high value commodities such as horticulture, livestock and marine products comprise of more than 47% (in TE2007/08) of the total value of agricultural output (see figure 4).

Figure 4: Rising Share of High Value Agricultural Commodities in India



Source: National Accounts Statistics, Central Statistical Organization, GoI 2007 & 2009

[5] The feed consumption by livestock (12%) and poultry (40%) together account for more than 50% of the total consumption demand for maize (Narayanan, et.al. 2008).

Over time, it has emerged as a leading producer of many of these high value commodities. Marine exports are nearly $ 1.8 billion and the sector is growing at nearly 5% during TE2007/08. It is the largest producer of liquid milk, (100.7 million litres); second largest producer of fruit (12% of the global production) and vegetables (13% of the global production). With the advantage of diverse agro climatic zones, India currently grows 41% of world's mangos, 23% of bananas, 24% of cashew nuts, 36% of green peas and 10% of onions. However it accounts for just 1.38% of the global fresh produce market (AsiaFruit 2009). The processing levels are also quite low; less than 3% of fruit and vegetables are processed. Given the rising demand for fresh and value added products, there is scope for scaling up processing. The rise of the organized food processing and retailing sectors provide an added impetus to both domestic and global marketing of processed commodities. Despite the fact that India exported $ 1.1 billion worth of fruit and vegetables, its share in the world export market is very small. While total fruit and vegetable exports account for 6.1% of the total agricultural exports, the share of fresh is about 3.8%. Of the total value of output of fruit and vegetables about 2.8% of the fresh is exported, indicating that there is a huge domestic demand to cater to and also potential for increasing the export share.

However huge post harvest losses, lack of quality raw materials and low processing levels have been some of the serious impediments to the growth of the Indian horticulture sector. Unlike in the west, processed food items are much expensive in India than fresh; for instance, on an average when tomatoes sell for Rs 3 per kg, value added tomato ketchup is marketed for nearly Rs 70 per kg (Aneja and Bhalachandran, 2009). Markets for fruit and vegetables are quite fragmented and lack of direct marketing practices result in low incomes for the farmers. For instance, a farmer selling at the Azadpur market has to pay a commission agent a fee of 6% for an auction that takes about five minutes. Similarly, in Vashi market in Mumbai, the commission agent's fee is about 8%. While all this is legal, these commissions go up to 10% in Azadpur market and 15% in Vashi market. This is in sharp contrast to the milk marketing, which perhaps explains why the milk farmers receive nearly 66% of the consumer price, while farmers growing fruit and vegetables receive less than 20% (Aneja and Bhalachandran, 2009). There are variable estimates on the gap between the price paid by the consumer and that received by the farmer (IFPRI 2009, The World Bank 2007a). In catering to the export market, transportation costs are too high; (15%-30%) higher than in other countries, which render the exports non-competitive (The World Bank 2007b). To overcome the costs of inefficient marketing practices and improve the returns to the farmers as also the revenues accruing to the sector, it will be inevitable to improve marketing services as also establish direct marketing linkages between the firms and the farmers. Implementation of the Model Act 2003 (amended Agricultural Produce Marketing Act, APMC) in its true spirit by states will be a major move in this direction.

Marketing of horticulture produce is being done by private players in an uncertain policy environment and the trend is somewhat mixed. While these models are quite competitive, given the large capital base, but issues related to their sustainability and scalability remain a concern. However despite many odds, some of the private players have expanded their business, while others are moving on a fast track. For example, Mahindra Shubhlabh Services Limited (MSSL) entered the grape exports business in 2005 by exporting 6

containers, and by 2008, they have become the largest exporter of grapes in the country by exporting more than 280 containers (each container of roughly 14 tons), and expecting to export anywhere between 350 to 400 containers in 2009 (AsiaFruit, 2009). There also exists Mahagrapes, the marketing arm of a cooperative society of grape growers in Maharashtra which has been in business since 1991 and has exported about 180 containers in 2008. Both as corporate and a cooperative entity are tying up with farmers which is essential to keep the supply chain moving.[6] There are several other private players in the fresh market who are tying up with farmers; like, Bharti Del Monte India Private Limited, which started its operations in 2004 operates on roughly 400 hectares of land and has shipped 200 tons of baby corn in 2008-09, becoming India's biggest exporter of baby corn (Asia Fruit, 2009).

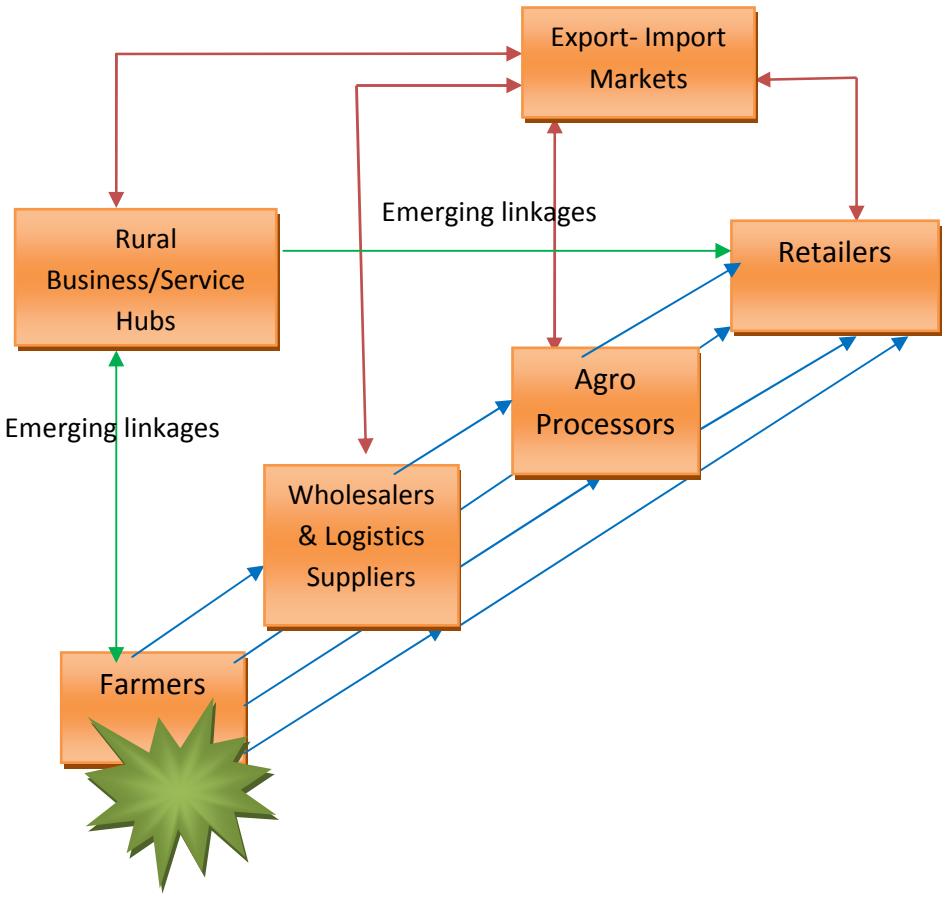
Unlike the revolutions in the past where public sector played a major role both in terms of providing subsidies, direct market interventions, as observed in the cases of green and yellow revolutions and a somewhat indirect role in facilitating the use of foreign grants like in operation flood, the future revolution in the high value segment, (particularly fruit and vegetables) will be increasingly driven by the private sector. The focus will be on investments to improve and scale up forward and backward linkages with the farmers, as also the business operations in the front end. The government will be playing a pivotal role in facilitating the big changes.

Emerging Transformation of Agri-System

Yet another noticeable trend in recent years has been the structural transformation of the Indian agri-system that comprises of input dealers to farmers to aggregators, wholesalers, processors and retailers (see figure 5). In the traditional network, most of these players operate in an uncoordinated manner giving rise to costs of fragmented operations. The transformation basically marks a shift toward organized market structure guided by economies of scale, which has started to unfurl over the last few years and have a long way to go. As mentioned earlier, the next revolution in Indian agriculture is likely to be led by the private sector and this is reflected in the emerging role of the private players in the organized processing and retailing sector. During the last five years, particularly 2002/03 to 2007/08, organized food and grocery retail sector has been growing at a phenomenal pace. The top 10 Indian food and grocery retailers, for example, have grown at an average annual rate of more than 70% per annum during 2002-07, albeit started from a low base. This trend is likely to continue for the next 10-15 years not to rule out some bumpy ride during 2008-2010. The organized food processing industry has been growing very fast; nearly 13.7% in 2008 compared to 7% in 2004 and is poised to grow at 20% by 2015 (Sud 2009). The structural shift is quite evident from the fact that the organized food processing sector contributes about 81% of the gross output of the industry.

[6] About 2,250 grape growers from 16 grape grower cooperatives from 5 districts (Sangli, Solapur, Latur, Pune and Nasik) in Maharashtra supply to the export market through Mahagrapes. MSSL sources grapes from about 300 registered growers and 2,000 acres of table grape vines in Maharashtra (AsiaFruit 2009).

Figure 5: Dynamics of the modern agri-food system



Source: Gulati & Ganguly, 2009

It is observed that the front end of the agri-system is expanding at a rapid pace and international experience shows that this growth momentum has a large spillover effect on the entire chain and outside (i.e. the unorganized sector) (Reardon and Gulati, 2008). For India, the key question that arises is: can this transformation ensure growth with inclusiveness? Indian agriculture is dominated by marginal and small farmers (operating on less than 2 hectares of land) and the national average holding size is about 1.06 hectares (as estimated in 2003, Government of India (GoI) 2006). Nearly 88% of the holdings in India are of less than 2 hectares which together occupy about 44% of gross cropped area and the contribution to the total value of agriculture output is about 51%. Shrinking farm sizes in India cannot be wished away and hence prudence lies in being able to innovate to link this pool of farmers with the markets. India has the legacy of mobilizing farmers in groups, be it as co-operatives or farmers' organizations as observed in the dairy, poultry, and now in the horticulture sector. The challenge lies is replicating the best practices (with some innovation) and also learning from the failures. The dairy sector in India is a classic example of how clustering of small milk producers through co-operatives brought about a revolution "operation flood". Cooperatives which dominate the sector is likely to be overtaken by the private players who entered the market in a big way after the amendment of the MMPO in

2002. As mentioned by Kurien in his interesting auto biographical sketch, "*One of the earliest lessons I had learnt was that Amul existed because, barely a few hundred kilometers away, Bombay existed… Indeed there would have been no Anand if there were no Bombay*" (Kurien, 2005; p.56). [7] As mentioned in the above section, there are several smaller success stories in the horticulture sector, both in increasing production as well as capturing even the most difficult export markets in Europe and elsewhere. They range from individual farmers, farmers' companies, and corporate houses, and in myriad commodities ranging from grapes to bananas, from baby corns to gherkins, and so on.

As the forward linkage is gaining roots, the need to establish strong backward linkage is being felt. There is a vacuum of quality input services in the rural areas and this is a sector that many of the retailers, processors, and also third party service providers are venturing into. The rural market for services such as supply of quality seed, pesticides, technological knowhow and extension services is ever expanding and this provides a large business opportunity for the private players. Also, a strong backward linkage can also enthuse farmers to enter into buyback arrangements with the retailers and processors. It has a potential to create a win-win situation wherein the farmers benefit from assured markets and the firm can monitor the supply chain. Private players like ITC (Choupal Saagar), DSCL(Hariyali Kisaan Bazaar), Tata(Kisan Sansar), and Future group (Aadhaar) are some of the key players operating in this segment of the agri-system, what is popularized as rural business hubs (RBHs). The origin of this model lies in the Public Private Panchayat Partnership (PPPP) model led by Confederation of Indian Industries (CII) and the Ministry of Panchayati Raj which aimed to develop villages into business hubs. Some of these RBHs are similar to rural malls which offer not only agri inputs and services but also consumer goods, household items, grocery, food courts, fuel stations and also medical services. However the challenge lies in competing with the existing traditional network, scaling up these operations and reaching out beyond the hinterlands.

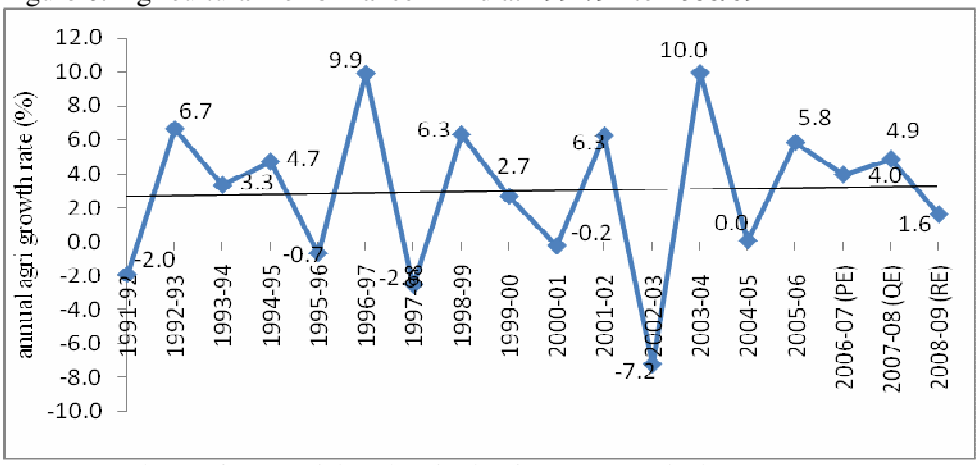
Despite these positive changes, the overall agricultural growth in India has not been spectacular and at the same time has not been a debacle either, as is sometimes made out to be. There are pockets of agrarian distress which have had a negative impact on the performance of the overall agriculture sector. But then there are states which have done very well on agriculture and have lessons that other states might want to consider what has been driving the growth in these states. However, looking at a long time horizon, agricultural growth in India is determined by a host of factors, notably, climatic conditions, particularly the monsoons and also regional and global changes that tend to effect the international price movements.

[7] See 'I too had a dream' by Verghese Kurien as told to Gouri Salvi, Lotus Collection/Roli Books, 2005.

4.Agricultural Performance in India

Agriculture growth in India has been quite fluctuating owing to periods of erratic climatic conditions particularly the monsoons and also the international price movements. While many have interpreted this as an agrarian crisis, the time series of agricultural growth from 1991/92 to 2008/09 does not show a systematic downturn (see figure 6).

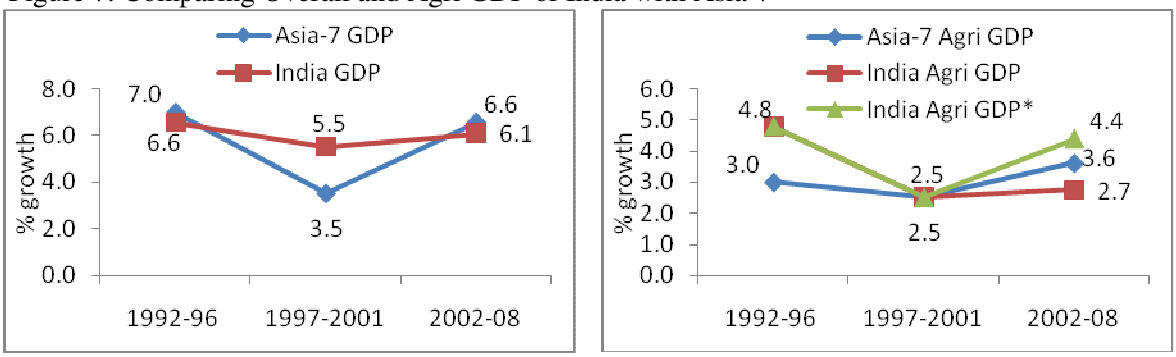
Figure 6: Agricultural Performance in India: 1991/92 to 2008/09



Note: QE and RE refers to quick and revised estimates respectively.
Source: Calculations are based on data published in National Accounts Statistics, CSO, GoI, various issues.

The trend growth rate for the same period is about 2.8% which is less than the desired rate of growth but not indicative of a crisis. In the recent past, 2002/03 had been a bad agricultural year due to deficit rainfall resulting in severe drought, about 61% of Indian districts received deficient/scanty rainfall, and growth rate dropped to minus (-) 7.2%. The average growth for the period 2003/04 to 2008/09 has been an impressive 4.6%. However the agricultural performance at the state level has been quite undulating with states like Gujarat, and Rajasthan growing at the rate of 9.6% and 8.5% respectively since 2000/01 and that of Uttar Pradesh and West Bengal crawling at 1.6% and 2.7% respectively, subject to high year-on-year volatility. It is interesting to note that the growth trend experienced by India is quite similar to other south and southeast Asian countries. Agricultural performance was at its lowest (2.5%) during the time period 1997/2001, compared to the periods 1992/96, 2002/08 and 2003/08. This was true for both India and the group of Asia-7 countries (see Figure 7).

Figure 7: Comparing Overall and Agri GDP of India with Asia-7



Note: * indicates that the year 2002 has been omitted and the time period is 2003-08.
Asia-7: Pakistan and Bangladesh from south Asia, and China, Indonesia, Philippines, Thailand and Vietnam from south-east Asia
Source: Asian Development Outlook, various issues. Data for India are obtained from National Accounts Statistics, Central Statistical Organization, GoI, various issues.

Much of this can be ascribed to the south-east Asian crisis, which led to a significant fall in the overall GDP growth. During that time, the region as a whole experienced a demand compression, which in turn led to dramatic fall in global agricultural prices, thereby affecting the incentives and growth in agriculture in several Asian countries, including India. While Indian agriculture performed better than the agriculture of these seven countries (Asia-7) in 1992/96, it has remained behind during 2002-08, with a growth rate of 2.7% compared to 3.6% of Asia-7. The lower growth rate of Indian agriculture during 2002/08 has been primarily due to the severe drought of 2002/03 as mentioned earlier. Excluding 2002, the growth rate increased to 4.4% for the period 2003-08 for India and that of Asia-7 to 3.9%. Looking at some of these trends, it will be incorrect to conclude that Indian agriculture is undergoing a crisis. Hence it is important to distinguish between under-performance and a crisis to avoid knee jerk reactions in policy making. In the long run, however, investments in agricultural R&D, infrastructure, markets, etc have to be increased to augment food supplies as also accelerate the rates of growth in Indian agriculture.

5.The Way Forward

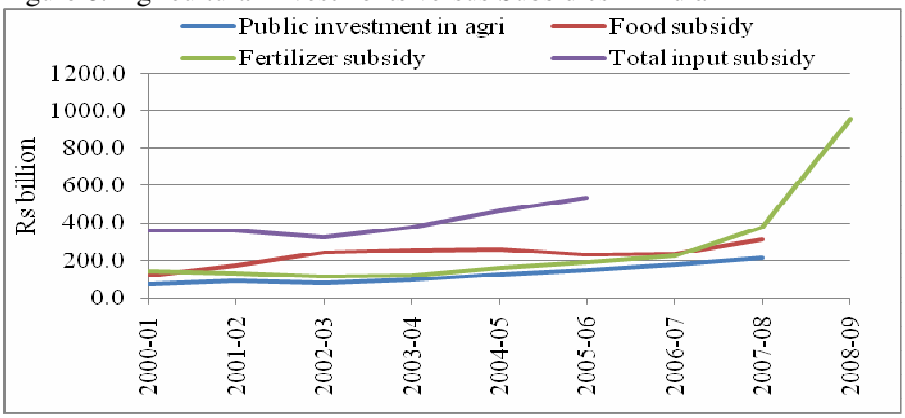
Agricultural growth in India is important to address the food security concerns as also to improve farm income and overall agricultural growth. While food security is linked closely to availability of food grain, accessibility and affordability require better food grain management policies and also a relook at the existing public social safety net and social protection programs. Whereas increasing farm income is likely to come from the growth of the high value sector as the future gains from food grains are limited. The demand patterns are changing in favor of high value fruit and vegetables, dairy, poultry and fish across the globe and there are emerging market opportunities both at home and abroad. As observed, the India agri system is responding to these changes and there are certain policy choices that will be essential to help the transformation gain momentum. In India, given the large base of smallholders, the objective of growth with inclusiveness is very high on the policy agenda and hence the issue of firm-farm linkages has been gaining prominence. If the country has to

take advantage of the growing agricultural markets, certain distinct policy choices have to be made in terms of increasing investments, bringing about institutional reforms, and adjusting the existing incentive structure. This can be done without sacrificing the objective of food security but will require some policy prudence and a long term vision. The key levers of change can be classified as investments, institutions, and incentives. In each of these cases, the role of the public vis-à-vis the private sector will be a determining factor with large implications on "CISS". Of course, the role of the public and private sector will be an overriding factor in this process of change.

Investments & Subsidies

At present nearly three-fourth of the public resources going to agriculture are used as input subsidies (fertilizers, irrigation and power) and the remaining one-fourth is used as public investment in agriculture, of which nearly 90% is spent on major and medium irrigation. Since long, input subsidies have outgrown public investments in agriculture (see figure 8).

Figure 8: Agricultural Investments versus Subsidies in India



Note: Total input subsidy comprises of fertilizer, power and irrigation subsidies
Source: Agricultural Statistics at a Glance, GoI 2008, and Indiastat website

A likely fertilizer subsidy bill of about Rs 950 billion ($19 billion) is a huge financial burden for the central exchequer. It will be important to rationalize these subsidies to enhance public investment in agriculture. An IFPRI study reports that the returns to investment in agriculture is very high compared to that from subsidies (Fan, Gulati, and Thorat 2008) (see table 1).

Table 1: Returns in Growth to Investments and Subsidies

	1960s-70s	1980s	1990s
Returns in Agricultural GDP (Rs per Re. Spending)			
Roads	19.99	8.89	7.66
Education	14.66	7.58	5.46
Irrigation Investment	8	4.71	4.37
Irrigation Subsidies	5.22	2.25	2.47
Fertilizer Subsidies	1.79	1.94	0.85
Power Subsidies	12.06	2.25	1.19
Credit Subsidies	18.77	3	4.26
Agricultural R&D	8.65	7.93	9.5

Source: Shenggen Fan, Ashok Gulati, and Sukhadeo Thorat 2008.

Investment in agricultural R&D is estimated to be around Rs 12 billion, which is about 0.5% of agricultural GDP, need to be enhanced. Higher public investments act as a stimulus to private investments and creation of an enabling environment can help attract both domestic and foreign investment. Of late the issue of foreign direct investment in organized multi brand retailing is stuck in a policy debate, opening up of which will be a boon for this sector and also serve as a major driver of agricultural growth.

Institutions

In order to attract greater private sector investment in the agricultural sector, particularly processing and retailing, certain institutional hurdles that restrict their entry or discourage firm-farm linkages need to be done away with. For instance, the Model Act (amended APMC Act) that encourage direct firm farm transactions and contract farming amongst other things, need to be implemented by the states without further delay. Agriculture being a state subject has been cited as the primary reason for the centre's inability to intervene. This will need some rethinking because it holds the key to efficient marketing and improving the firm farm linkages in the high value agricultural sector. Also, the land lease market needs to be freed up to encourage private firms to go for long term investments. Creation of a vibrant land market will impart greater transparency in land deals and also allay the fears of losing land ownership. Abolition of the Essential Commodities Act (ECA) will be essential to prevent bottling up of agricultural commodities in the producing states by removing zoning and movement restriction. Free flow of goods across the country will help overcome the seasonality issue and temper down price spikes. These institutional reforms are deemed essential to link the producers with the markets which have a positive impact on the returns accruing to various stakeholders in the value chain.

Incentives

In agriculture, the incentive structure is highly skewed in favor of rice and wheat through subsidized input provisions as also a support price mechanism and a guaranteed procurement network. This discourages farmers from switching away from the traditional grain sector despite prospects of higher gains from high value agriculture. Also, this has had a retarding impact on the process of diversification, particularly for states which continue to be the cereal basket owing to the guaranteed public procurement network (at the cost of the soil health and groundwater conditions). It has been proposed several times in the past to delink the procurement price from the minimum support price and link domestic price policies with international price movements. In order to safeguard the food security concerns, the role of FCI could be downsized to procurement and distribution of grains to meet the buffer stock requirements. Since agricultural growth alone cannot address these concerns, the government has come up with large public programs to ensure livelihood and food security of the poor such as the National Employment Guarantee Act (NREGA) which provides employment for at least 100 days to people seeking work in rural areas. The government is most likely to come up with a National Food Security Bill, giving highly concessional food (wheat and rice) to people below poverty line. The challenge is to identify the poor and reach them in a fool proof manner. The debate is also in terms of whether to distribute food physically or go for conditional cash transfer methods for reaching the benefits to the poor. Better targeting through issue of food coupons and income augmenting programs will have to be tested as alternatives. On the other hand, the grain market should be opened up to the private sector and also international trade, particularly at a time when India has accumulated large stocks of cereals. It has also been proposed to shift the cereal baskets to the water abundant regions, i.e. the eastern part of the country. This will help reduce the pressure on natural resources in the over exploited states of Punjab, Haryana, and parts of Uttar Pradesh. Rather these states should be encouraged to diversify their agricultural basket toward high value commodities. It will be important to incentivize the high value sector not as much through subsidies but by creating an enabling environment.

Things on the agricultural front have begun to change in India but at a somewhat slower pace in contrast to other countries, particularly China. Despite fall in poverty levels, it poses as a threat to the development objectives and also has had a decelerating impact on the overall growth momentum. However, now India is in a much better position to deal with the food security issues than it was when it launched economic reforms. On the other hand, the emerging structural changes in the agri system are in favor of the growth of high value agriculture. It will require a long term vision and strategic thinking to harness the growth potential of this sector.

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