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Growth and Transformation of the Agribusiness Sector: Drivers, Models and Challenges*

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I

INTRODUCTION

Agriculture is undergoing a huge transformation. In the past, agriculture was seen as a subsistence activity of farmers involving crop and livestock production. For centuries agriculture was the same as farming, and most people lived on farms or nearby and were largely self-sufficient. This is, however, changing substantially in the recent years. Today, agriculture is rapidly turning into a technology and market oriented “industry” which extends from agricultural production, to sophisticated agriscience, and agribusiness. It now connects strongly to the national and global economy. Many people who work in agriculture actually do not work on farms but are engaged in businesses of seed, fertiliser, agro-chemical, farm machinery, food-processing, marketing and trade. Many are engaged in finance, research, distribution, and marketing activities which provide services to the production agriculturalists. Agriculture has become a big business.

The pioneers of the field of agribusiness at the Harvard Business School, Davis and Goldberg (1957) defined agribusiness as the sum total of all operations involved in the manufacture and distribution of farm supplies; production operations on the farm; and the storage, processing, and distribution of the resulting farm commodities and items. Another definition describes it as consisting of profit-motivated enterprises involved in providing agricultural supplies and/or in the processing, marketing, transport, and distribution of agricultural materials and consumer products, Ricketts and Rawlins (2001). Roy (1980) defines agribusiness as the co-ordinating science of supplying agricultural production inputs and subsequently producing, processing, and distributing food and fiber. Many authorities exclude farming, or actual production of food and fiber, from the definition of agribusiness. Production agriculture is indeed a business, but is often separated from agribusiness.

Agribusiness provides inputs to the production agriculturalist (farmer), and the production agriculturalists produce food, fiber and byproducts. Input agribusinesses provide farmers with supplies and equipment needed to produce and protect their crops. Many provide services to such as credit, insurance and information. The output is taken by output agribusiness firms that process, market, and distribute the agricultural products, (see Figure 1). Agribusiness traders and commodity organisations are engaged in buying

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and selling as well as coordination, promotion, advertising, and even lobbying for agricultural products. Many are engaged in food marketing and services. Research, education and extension help improve the performance of agriculture and agribusinesses. Millions of people are employed in agribusinesses, and people throughout the world depend on agribusinesses, some for production needs and others for food and non-food requirements. See Table 1 for a list of agribusiness types and activities.

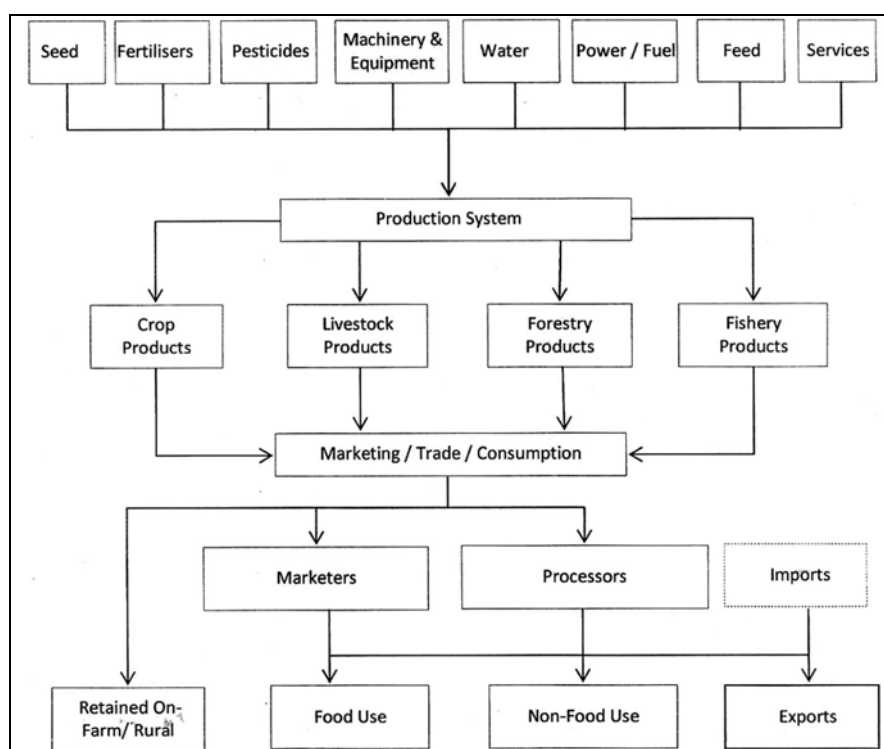


Figure 1. An Overview of the Agribusiness System.

TABLE 1. KINDS OF AGRIBUSINESSES - EXAMPLES

(1)	(2)
<ul style="list-style-type: none"> • Seeds • Fertilisers • Agro-Chemicals/ Pesticides • Organics and Manures • Farm Machinery and Equipment • Water/ Irrigation Structures and Equipment • Animal Feeds • Veterinary Products • Agricultural Research/ Biotechnology • Crop, Livestock, Fishery and Forestry Production 	<ul style="list-style-type: none"> • Raw Material Procurement • Food and Agro Processing • Food and Agro Marketing • Agricultural Trade/ Import and Export Marketing • Forest-based Industries • Food Supply Chain Management • Inspection, Grading, Quality Certification/ Control • Agricultural Finance / Banking • Agricultural/ Rural Development • Agri Information • Agri Consulting

II

DRIVERS OF AGRIBUSINESS DEVELOPMENT IN INDIA

In the recent decades, there has been substantial growth and transformation of the agribusiness sector in India. What explains this change and what drives the development of the agribusiness sector? The transformation of agribusiness in developing countries such as in India appears to be driven by significant constraints, demands, and shifts that occur in the economy as development proceeds. An effort is made here to identify some of the important shifts and constraints that emerge, and the impact they generate and will continue to have on agriculture and agribusiness development. This is important not only to understand what the origins and causes of agribusiness growth are, but also the likely direction of future changes. The major drivers can be identified as:

- Scarcity of Land and the Need to Improve Productivities
- Markets, Urbanisation and Increasing Commercialisation of Agriculture
- Need for Change in Scale and Reorganisation of Production and Marketing
- Economic Liberalisation, Reducing Government Involvement, Income Growth, WTO and Trade
- Changing Food Consumption Pattern and Demand for Quality and Convenience
- Development of the Rural Economy, Infrastructure, Rural-Urban Migration, and Globalisation
- Information and Communication Technology Revolution.

2.1 Scarcity of Land and the Need to Improve Productivities

The rise in population, as health care improves, coupled with the scarcity of cultivable land and its fertility are major drivers for the development of large sections of agribusiness in India. The constraint to area expansion and its limitation as a source of production increase has led to substantial dependence on yield increase for achieving food production growth. This has resulted in an intense focus on science and technology for increasing crop yields which has led to the need for numerous modern inputs for increasing production. These include:

- Better genetics/ high yielding variety seeds
- Better plant nutrition through fertilisers
- Better water provision through water sourcing technology and management
- Better pest control through pesticides
- Farm power and machinery for better physical and time efficiency.

These developments have galvanised the growth of numerous agribusinesses/ agroindustries. This includes the seed industry, fertiliser industry, irrigation equipment industry, agro-chemical industry, and farm machinery industry. These agribusinesses are making a huge contribution to the overcoming of land and resource constraints in

agriculture. It would be unthinkable envision feeding the world today without the contribution of these vital agribusinesses.

The growing population pressure, the resulting food demand, as well as the need to boost rural employment and incomes has also pushed the governments and international development organisations into putting enormous efforts to improve agricultural productivities. This includes fostering the development of the necessary agribusinesses. As farmers see the advantage in using new technologies for increasing production and profits, there is a growing demand for latest state-of-the-art technologies including the harnessing of the potential of biotechnology. This will continue to create further opportunities for development of agribusinesses.

Table 2 below provides a picture of the growth in the size of the major input agribusinesses in the last three decade – from early 1980s to 2010-11. It shows that the seed business has grown over 6 times from 45.0 to 277.3 lakh quintals. The fertiliser business has grown about 5 times from 60.6 lakh tonnes to 281.2 lakh tonnes. The pesticide business has not grown much in quantity terms – it grew from 47.0 to 72.1 thousand tonnes from early 1980s to early 1990s but declined to 39.8 thousand tonnes by 2005-06, and grew again a little to 55.5 thousand tonnes by 2010-11. This maybe due to their toxic nature, environmental concerns, the use of more effective less bulky chemicals, and the adoption of resistant seed varieties such as with Bt cotton. Groundwater irrigation and its equipment business have doubled in coverage from 187.4 to 390.6 lakh hectares. The tractor business representing farm machinery has increased the most - by over 7 times from 74.3 to 545.1 thousand tractors.

TABLE 2. GROWTH OF SELECTED INPUT AGRIBUSINESSES - INDICATORS

Years	Certified quality seeds (sales lakh quintals)	Fertilisers consumption in nutrients (lakh tonnes)	Pesticides technical grade material sales (thousand tonnes)	Groundwater irrigation (wells and tubewells) net irrig. (area lakh hectares)	Tractors (sales number thousands)
(1)	(2)	(3)	(4)	(5)	(6)
1981-82	N.A.	60.6	47.0	187.4	N.A.
1983-84	45.0	77.1	55.0	193.9	74.3
1991-92	57.5	127.3	72.1	260.4	150.6
2001-02	91.8	173.6	47.0	351.8	225.3
2005-06	126.8	203.4	39.8	360.7	296.1
2006-07	155.0	216.5	41.5	376.4	352.8
2007-08	179.1	225.7	43.6	384.0	346.5
2008-09	215.8	249.1	43.9	388.0	342.8
2009-10	257.1	264.9	41.8	390.4	393.8
2010-11	277.3	281.2	55.5	390.6	545.1
Increase (multiple)	×6.2	×4.6	×1.2	×2.1	×7.3

Sources: India, Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, 2011, and Fertiliser Association of India, 2011.

2.2 Markets, Urbanisation and Increasing Commercialisation of Agriculture

The increasing use of externally purchased cash inputs and the growing off-farm food demand due to urbanisation, and has led farmers to commercialisation, or producing for

the market. Agriculture is no longer practiced just for subsistence or own needs but substantially for markets, profits and incomes. A clear manifestation of this is the growing marketed surplus of the farmers. Table 3 below shows the recent levels of marketable surplus in selected crops. It shows that even in the recent years there is a rising trend in marketed surplus and for major staple crops it has risen to high levels such as 81 per cent for rice and 73 per cent for wheat. Even for “inferior” staples, it has reached high levels such as 62 per cent for sorghum and 67 per cent for pearl millet. For

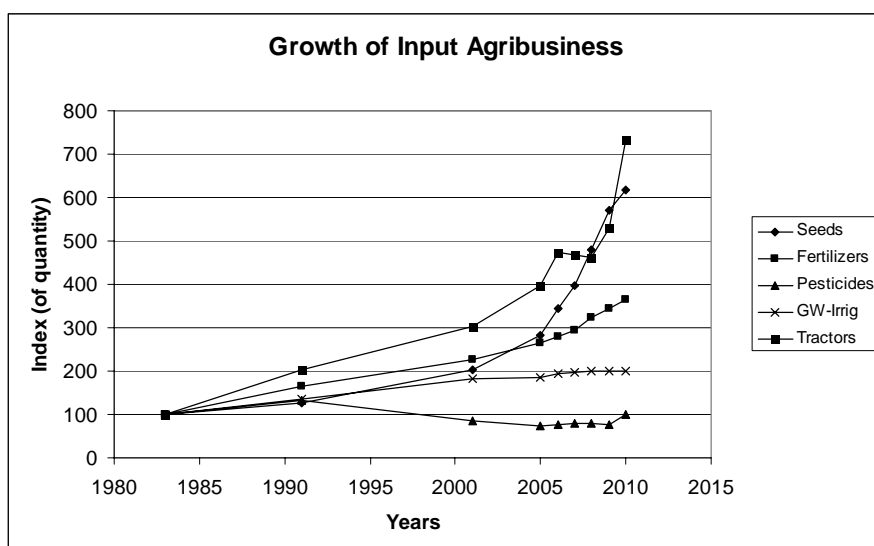


Figure 2. Growth of Input Agribusiness (Index).

TABLE 3. MARKETED SURPLUS OF SELECTED CROPS

Crops (1)	Marketed surplus (percent of production)		
	2008-09 (2)	2009-10 (3)	2010-11 (4)
1. Rice	66.8	79.7	80.7
2. Wheat	70.9	72.3	73.2
3. Maize	85.5	86.8	86.0
4. Sorghum (Jowar)	54.6	65.0	62.0
5. Pearl Millet (Bajra)	57.8	70.3	67.4
6. Pigeon Pea (Arhar)	75.4	76.5	73.8
7. Chick Pea (Chana)	74.2	89.5	86.7
8. Moong bean	82.5	82.5	81.5
9. Groundnut	91.8	92.9	93.4
10. Soyabean	77.3	91.8	95.7
11. Sunflower	65.2	99.6	99.6
12. Sugarcane	100.0	100.0	78.9
13. Cotton	97.7	95.4	99.8
14. Onion	98.2	99.7	97.3
15. Potato	81.6	76.3	81.0

Source: India, Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, 2012.

other crops too it is very high such as 74 per cent for pigeon pea, 87 per cent for chick pea and 81 per cent for potato. For commercial crops such as cotton, soybean and onion it is, as expected, as high as 96 to 99 per cent. This growth in marketed surplus has led to substantial agribusinesses development - for handling this huge marketed surplus: including procurement/purchase, transport, storage, processing, and marketing, as well as providing services such as finance, information and management.

Commercialisation has also led to diversification in the production, as farmers respond to market signals, needs and prices, and seek profits. There is a shift to high value crops/ products such as fibers, spices, vegetables, fruits, flowers and livestock products. This has stimulated the development of various agribusinesses which support and facilitate their production, undertake processing, and do the special supply chain management, marketing and trade arrangements they require. Table 4 below gives some statistics on the growth of high value agriculture in India. It shows that high value agriculture has increased in size by 4 times between 1971 and 2011, and some components such as milk and milk products have multiplied in size by nearly 6 times.

TABLE 4. INDIA: GROWING HIGH VALUE AGRICULTURE – GROSS VALUE OF PRODUCTION
(I mill. US\$ at constant 2004-06 prices)

(1)	1971 (2)	1981 (3)	1991 (4)	2001 (5)	2011 (6)	Increase (multiple) (7)
Milk and milk products	6417	9783	15320	23730	35910	×5.6
Meat, Egg, Fish	1315	1798	3120	4581	7890	×6.0
Vegetables	9893	12800	16773	23002	33417	×3.4
Fruits and nuts	6768	8460	10838	15273	24601	×3.6
Spices	647	719	955	1672	2435	×3.8
High value agriculture	25040	33560	47006	68258	104253	×4.2
Per cent of all agriculture	42.7	44.6	45.1	49.8	54.0	

Source: FAOstat.

Commercialisation and economic development also lead to increasing pressure on farmers and agribusinesses to be more profitable and competitive. This requires better management, decision-making, improving the efficiency of resource use, and strong marketing. This leads to and will continue to propel the development of numerous specialised agribusinesses such as extension and advisory services, consulting and input services, marketing and trade organisations, and those bringing the benefits of the latest information and communication technology to agriculture and the rural economy.

2.3 Need for Change in Scale and Reorganisation of Production and Marketing

Increasing competition within agriculture, rural-urban migration and the need to be profitable often lead to the need for having a larger or optimum scale in farming and related operations, to be competitive and viable. Even though agricultural land ownership is restricted, the scale needs often lead to land market transactions, if not through the route of sale, then through the route of leasing or consolidation within extended families. Mani and Gandhi (1994) found that despite legal and structural constraints, the rural sale and lease market for land is quite active in agriculturally progressive areas such as western Uttar Pradesh. Further, as shown in Table 5 below, the lease transactions lead to

a change in the distribution away from marginal farms and towards small farms which are larger (though medium and large farms do not show much change).

TABLE 5. IMPACT OF LAND LEASE MARKET TRANSACTIONS
IN THE SAMPLE HOUSEHOLDS

Land farm size group (1)	Number of holdings/ households		Total land operated (per cent)	
	Pre lease (2)	Post lease (3)	Pre lease (4)	Post lease (5)
Landless	8.5	23.5	0.0	0.0
Marginal (0 to 1 ha)	48.3	19.4	23.5	11.4
Small (>1 to 2 ha)	22.5	38.1	24.2	41.0
Medium (>2 to 5 ha)	19.4	17.3	46.7	39.2
Large (> 5 ha)	1.3	1.7	5.4	8.3
Total	100	100	100	100
Nos./Area ha	480	480	633.48	633.48

Source: Mani and Gandhi (1994).

This trend towards having a competitive/viable scale of operation to remain profitable begins to lead to re-organisation in some crops and farm activities. This is partly through sale/purchase or lease of land but more commonly through the reorganisation of some activities on lines such as organised contract farming for scale, and even corporate farming as seen in plantation agriculture. These changes stimulate the development of new kinds of agribusinesses and agribusiness collaborative networks in production, procurement and marketing to obtain and use the advantage of scale and efficiency.

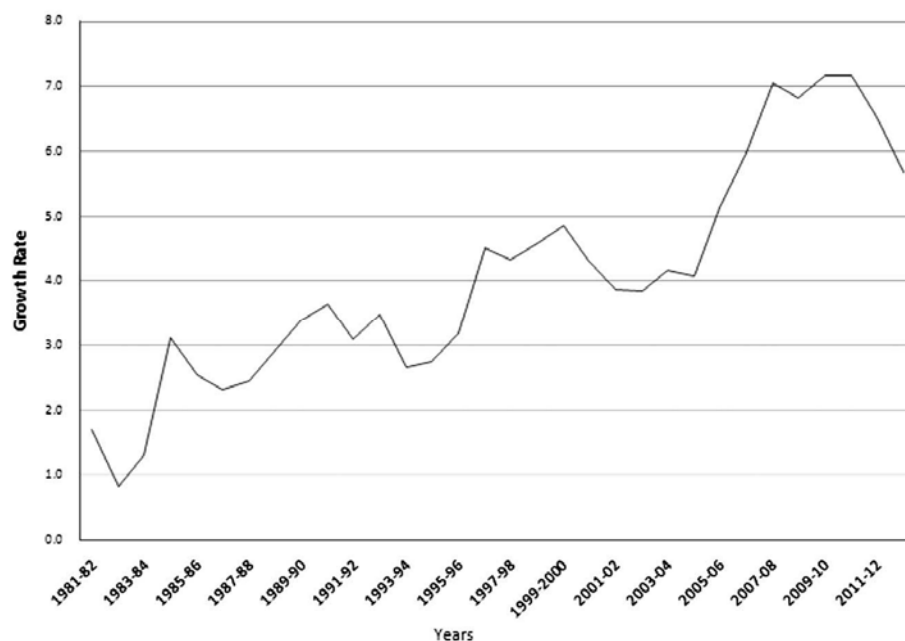
The need for scale and reorganisation also comes from the shortage of labour and rising wages in the rural areas with economic development, given rising industrial labour demand and migration to urban areas. Labour becomes increasingly scarce and expensive in the rural areas, giving impetus to labour-augmenting or labour-substituting technical change, and a movement away from labour-intensive agriculture towards capital use. This stimulates the growth of new agribusinesses, particularly farm machinery and equipment industry, as already shown in Table 2, as well other industries such as herbicide agro-chemicals and seed biotechnology. This is likely to continue for long in India.

2.4 Economic Liberalisation, Reducing Government Involvement, Income Growth, WTO and Trade

In the initial stages of development, the government often needs to play a major role in investment, stimulation and guidance of the processes of development. Given the strong imperatives and scarce financial resources at this stage, various controls and regulations may be imposed by the government. Even though initially helpful, these soon begin to prove restrictive for economic growth, and further development begins to go beyond the resources and abilities of the government. In the light of this, liberalisation is required, and the Indian economy has undergone substantial liberalisation since 1991 in which numerous government controls and regulations were removed and a relatively free hand was given to market forces and the business sector. This has brought huge changes

in the economy, and with the liberalisation, there has been a quantum increase in national income growth rates from around 3 per cent to as high as 9 per cent per year.

With the population growth rate slowing down, liberalisation results in a substantial acceleration in the growth of per capita incomes. Figure 3 below shows that in terms of a 5-year moving average the per capita income growth rate has risen substantially from 2 to 3 percent in the 1980s to over 7 per cent in the 2000s (though there is some tapering off in recent years). Huge number of people have been lifted out of poverty/low incomes and this has had an enormous impact on the demand for food and agricultural products. In the recent years, the growth has resulted in a sharp increase in food price inflation, which would result in a substantial rise in the incentives for different sections of the agriculture and a substantial impact on the development of the agribusiness sector. This development and the improvements it would bring should help in controlling inflation in the long run.



Source: Based on India, Ministry of Planning, Government of India, New Delhi.

Figure 3. 5-Year Moving Average Per Capita Income (GDP) Growth Rate in India.

The process of liberalisation also included a large reduction in the government involvement in a number of activities, and often an encouragement to private sector involvement in them. This has created space and opportunities in several spheres for agribusinesses to develop and fill the gaps. Where incentives were conducive, many agribusinesses have developed. This can be seen particularly in the seed industry, pesticide industry and agro-processing industry. Besides, many government-owned and controlled units have been privatised. Such transfers and a free hand to market forces and

private sector have led to rapid change in opportunities and growth of a number of agribusinesses. The resulting better organisation of production and marketing and a quicker supply response has had huge implications for the economy and business. It has brought about further agribusiness development resulting in great improvement in the availability and quality of a large number of agricultural products. This may also help to bring food price inflation under control in the long run.

Another aspect of liberalisation has been the opening out to foreign investment, leading to a rise in the investment and participation of international and multinationals firms in agribusiness. A number of sectors in agribusiness such as seed and agro-chemicals have seen substantial acceleration and transformation due to this. Another major change is the move away from sole dependence on government research in agriculture and encouragement of private research. Public research, though having played a major role in the past, was often found insufficient in innovation, funding and impact in many fields of agriculture. With opening out and encouragement to private research, a substantial amount of research is being done by agribusinesses. The Bt cotton varieties which gave the recent boost to cotton production (cotton revolution) (see Gandhi and Namboodiri, 2006) is a very significant example of the contribution of private agribusiness research.

Beyond liberalisation at the national level, there has also been liberalisation at the international level especially with the formation of the World Trade Organisation (WTO) in the mid-1990s. This has substantially accelerated the process of globalisation of agriculture and agribusiness. Trade barriers and subsidies have been reduced giving agribusinesses engaged in agricultural trade a major boost. Table 6 provides a picture of the growth in agricultural exports based on FAO data, and Figure 4 shows the break-up of the exports based on national data. Besides the impact on trade, WTO also brought about stronger intellectual property right protection which has stimulated agribusiness research and the sharing of innovations across the countries. This is having and will continue to have a major impact on the development of agribusinesses through enhanced profitability prospects.

TABLE 6. GROWING AGRIBUSINESS TRADE - AGRICULTURAL EXPORTS OF INDIA

(million US \$)

Years (1)	Cereals (2)	Pulses (3)	Oilseeds (4)	Fruits and vegetables (5)	Dairy products, eggs and meat (6)	Fodder and feeds (7)	Total agricultural products (8)
1981	447.3	0.5	54.7	335.5	80.7	191.2	2698.0
1991	372.2	16.0	46.0	464.5	100.9	379.7	2796.1
2001	1071.8	82.5	210.9	871.9	337.0	534.8	5233.9
2007	3588.1	133.0	721.7	1741.7	1217.7	2002.6	16706.7
2008	3493.2	125.4	753.2	2276.2	1559.5	2419.5	17278.2
2009	2956.4	84.4	673.8	2184.2	1459.4	1670.0	15645.5
2010	2953.4	193.2	910.8	2341.0	1948.7	2038.4	19933.9
2011	5414.6	228.9	1632.6	2844.6	2850.6	2744.7	30288.8

Source: <http://faostat3.fao.org/faostat-gateway>.

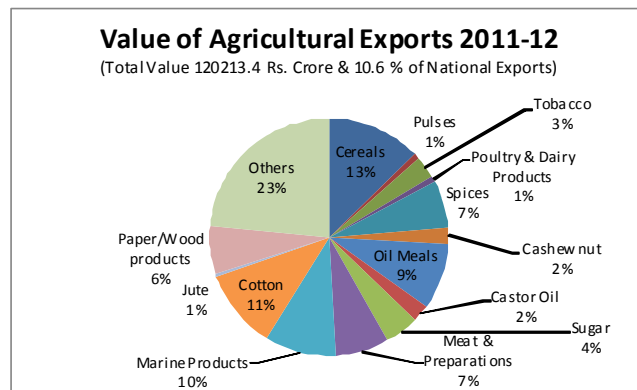
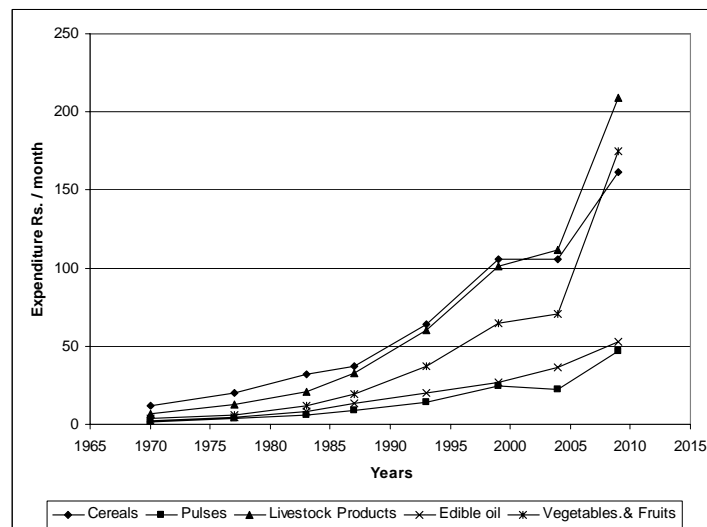


Figure 4. Value of Agricultural Exports 2011-12.

2.5 Changing Food Consumption Patterns and Demand for Quality and Convenience

The rapid growth in the incomes of the people resulting from economic liberalisation is causing big changes in food consumption patterns of the population, see Figure 5. There is a shift away from staples such as cereals, and towards other foods such as livestock products, vegetables, fruits and edible oils, see Gandhi and Zhou 2010. It can be seen that the urban consumer expenditure on both livestock products and vegetables and fruits has crossed that of cereals in the last decade. This has created a substantial need to cater to these new demands. With the large and growing population, this is leading to



Source: Based on National Sample Survey Organisation Reports, various years.

Figure 5. Per Capita Consumption of Different Foods – Urban.

huge new opportunities for agribusiness development. This includes agribusinesses supporting these changes in agriculture production from the input side – such as animal feeds, seeds and breeds, as well as those engaged in efficient processing and marketing of these products to the consumers.

Apart from the change in the consumption mix, there is also a growing demand for processed, branded and packed food of assured quality. Consumers are demanding convenient, processed and ready-to-eat foods, and food services. This is leading to numerous new opportunities for agribusiness development. Besides, as incomes rise, there is a reduction in the consumer price sensitivity in food. With consumers willing to pay high prices for quality food products, convenience, and food services, the scope and profitability of numerous agribusinesses involved with this has increased substantially. This includes national and international firms engaged in producing quality processed foods and various food services including fast foods.

2.6 Development of the Rural Economy, Infrastructure, Rural-Urban Migration, and Globalisation

The commercialisation of agriculture and economic liberalisation and growth has also resulting in a substantial increase in the rural incomes. This is leading to a huge expansion in rural demand and participation of rural consumers as buyers in the market.

Thus, the rural areas are turning not only into large producer bases but also large consumer bases. These changes are also giving significant opportunities to agribusinesses and other businesses in food, agriculture, consumer and industrial goods.

Economic liberalisation also greatly accelerates the migration of people from rural to urban areas. It is believed that about half the population of China and India will soon be living in urban areas – this has already been reached in China. The change requires movement and marketing of huge quantities of agricultural produce from the rural to urban areas. This creates numerous opportunities for agribusinesses to develop. Substantial development of marketing linkages needs to take place through agribusinesses. In the recent years, there is acceleration in the development of organised retail in which food and agribusiness have a major share. This may be further transformed and accelerated through foreign direct investment (FDI).

In this connection of linkages, the rapid development of infrastructure such as roads and transport connecting rural areas to all other areas is extremely important and plays a significant role in boosting agribusiness development. With economic growth, there is huge strain on transport, ports, power, and other services. These substantially limit agribusinesses which need to connect to distant rural areas. The removal of these infrastructure bottle-necks and constraints has substantially helped agribusiness development. Numerous agribusinesses develop to better manage the supply chain linkage from the farmers to the consumers overcoming such constraints, but their work is facilitated and costs are reduced with better infrastructure.

At the international level, increasing globalisation results in growing inter-dependencies across countries and this leads to rising opportunities for linkages and international trade. This boosts the development of agribusinesses involved in exports and imports of food and agricultural produce. The globalisation process has been further

accelerated with the advent of the WTO. There is also a growing internationalisation in consumer preferences and demand for food leading to further opportunities for linkages and services through agribusiness.

2.7 Information and Communication Technology Revolution

One of the major problems in doing business with agriculture is the distance and remoteness of the rural areas and the farmers which they need to reach. This makes it difficult for businesses to connect and communicate with producers (and customers) and transact business. It often makes the transaction costs prohibitively high. This situation has changed substantially in the recent years with the advent of the new information and communication technology (ICT). This includes radio, television, computers, telephones, internet and mobile phones. It has now become far easier to connect with and reach communications to even remote rural areas and millions of farmers. Mobile phones have made it almost costless to reach far flung individuals and transact business. The computers and internet have made information transmission and search easy, and fast decision-making and financial transactions possible. This is giving a tremendous boost to agribusiness. It has also challenged agribusinesses to make use of ICT and the various available technologies and communication channels.

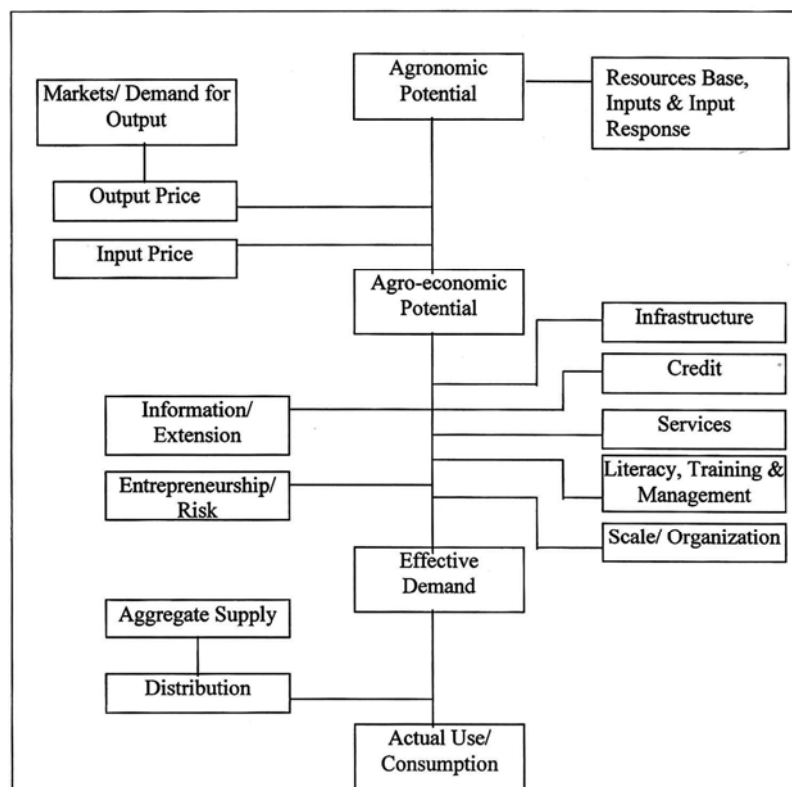
A factor that has helped this substantially is a significant increase in literacy and awareness of rural people. This has enabled them to use and benefit more from ICT, and has also helped agribusiness to connect with them better, creating new ways and opportunities. It has also led to a substantial increase in the awareness and power of the consumer. One aspect of this is increase in the environmental awareness of the people and as a result increasing concern regarding the environmental and health impacts of a number of agribusiness products and activities. This posing new challenges for agribusinesses and they need to address them and adapt to these concerns.

III

A FRAMEWORK FOR THE GROWTH OF INPUT AGRIBUSINESS

On examining the growth of input agribusinesses, the experience across developing countries indicates that growth of input markets and agribusinesses is affected by a number of factors including price as well as non-price factors (Desai and Stone, 1987; Gandhi and Desai, 1992, Gandhi and Patel, 2001). The framework of neo-classical economics is often unsuitable for explaining this growth in developing countries because the markets are in almost perpetually dis-equilibrium and prices alone are not sufficient to explain the phenomenon. For understanding this growth a more comprehensive analytical framework is required.

Studies to understand the growth and fluctuations of fertiliser consumption in India, China and Sub-Saharan Africa (such as Desai and Stone, 1987; Gandhi and Desai, 1992) have resulted in the development of a more comprehensive framework which can be used for explaining the growth of input markets and agribusinesses in developing countries. The framework is shown in the Figure 6.



Source: Based on Gandhi and Patel (2001), Desai and Stone (1987).

Figure 6: Framework for the Process of Growth of Input Agribusiness and Markets.

The different elements of the framework are explained below:

Agronomic Potential of an input is considered its basic physical potential. Fundamentally, it comes from an input and its ability to produce a good physical benefit such as an increase (or saving) in the quantity (or quality) of the output - the input response. The maximum rate at which an input can be used for a positive response is the major determinant of the agronomic potential. The available base of land, and within this, the planted area is also an important determinant. Research and development can significantly increase the agronomic potential, such as through development of new technologies, varieties, or agro-chemicals. Their acceptance through government approvals may also be important. Use of complimentary inputs such as irrigation or deficient nutrients can help expand the agronomic potential of other inputs. The agronomic potential can also increase or decrease over time due to factors such occurrence/susceptibility/ resistance to pests, variation in rainfall, or other changes in the environment.

Agro-economic Potential: The existence of an agronomic potential is however not enough. Farmers usually use inputs for profit and unless it generates an acceptable level of economic return, it would not be used. To transform the agronomic potential to an agro-

economic potential, the demand and price of the output must be significantly high relative to the input price/cost. This may also depend on government price supports and input subsidies, as well as output quality aspects and consumer perception. Due to the economics, more inputs may be used on high value crops, and the input demand will vary with the output demand and prices. The agro-economic potential of some inputs such as farm machinery and herbicides may depend on the cost of labour or animal power which they substitute.

Effective Demand: A good agro-economic potential is often not sufficient to create an effective market demand. For this firstly, it is important that the farmers know about this input and potential, and this may require effective communication through extension, company promotion or other means. Besides, the farmers need to show entrepreneurship and be willing to take the risk of adopting the new technology. Development of infrastructure such as roads, transport and communication is also critical for facilitating information-flow, sourcing and marketing especially for far flung small farmers. Often, credit may also be required due to lack of enough cash at the beginning of the season or when the input is to be purchased. Creation of effective demand may also depend on proper management by farmers, which may call for training on what and how to use, and the package of practices. In this, literacy may also play an important role. Use of some inputs may depend on the necessary scale, land rights or the organisation of the farmers.

Aggregate Supply: For businesses and markets to work/ transact, demand must be matched by supply. The creation of an adequate and reliable supply is required, and this needs production and/or imports. Production may require finance, investment and an attractive rate of return. It may also require access to the technology, such as for seeds and agro-chemicals, which may depend on intellectual property rights and royalties. The availability of supply also depends on the nature of the production process and this may be seasonal and farmer dependent such as for seeds. Investment, production and imports may be influenced in a big way by government policies such as for fertilisers.

Distribution: With small farmers and the huge geographic spread of farms, an effective distribution system for inputs is usually a must. This is critical to develop and often goes through stages of government, co-operative and private modes and depends on channel profitability and farmer demand. Factors such as timely availability, quality, credit/ incentives, guidance/ information, and other terms/ services offered by the distribution system also play an important in the growth of the agribusiness.

Developments on all these fronts together effectively determine and explain the growth of any agricultural input agribusiness. Efforts to grow the agribusiness must look at all the key determinants and constraints in all the different elements of this framework. It must identify and address particularly the critical ones to grow the agribusiness.

IV

FEATURES, DEVELOPMENT AND MODELS IN THE GROWTH OF AGRO-PROCESSING AND OUTPUT MARKETING AGRIBUSINESS

Agro-processing industries/ agribusinesses have been given high priority in India due to their significant potential for bringing value addition to agricultural output, and contribute to rural and small farmer development. The priority can be linked to Mahatma

Gandhi who in 1920s made the emphasis on village-based agro-industries a part of India's independence movement. Even now agro-industries are given great importance in India (Government of India, 2008) for similar reasons including their contribution to bringing value-addition to agriculture's output, increasing rural incomes and employment, and alleviating poverty in the rural areas. The sector, however, faces a number of challenges to its growth including difficulties in sourcing quality raw materials, rural market imperfections, supply-chain inefficiencies, investment constraints, and product marketing challenges (Srivastava and Patel, 1989; Goyal, 1994; CII-Mckinsey, 1997; Gandhi, Kumar and Marsh, 2001).

The development of agro-industries has gone through three phases in India, see Table 7. The first was Mahatma Gandhi's approach of village-based agro-industries which was founded on a strong social, political and economic ideology (Goyal, 1994). This "swadeshi" concept sought to uplift and connect the rural masses to the mainstream of the economy and the independence movement, and reduce dependence on British imports. But it later failed since it became a blanket basis for nationalists to favour less efficient techniques of production, oppose modern industry, and its incompatibility with market demand and preferences (Gandhi and Jain, 2011). In the second phase, after India's independence and up to the early 1980s, the industrial policy was largely dominated by the ideas of Nehru and his planner Mahalanobis, who argued that India needed a limited number of large-scale public industries for the capital goods sector, while the consumer goods sector should be reserved for small-scale and agro/rural industries which required less capital and employed more labour. Regulations and policies were accordingly made and this was consistent with the scarcity of capital at that time, and the need to increase employment. However, such small-scale industries, due to their relatively inefficient technologies were eventually unable to meet the rising demand for quality goods from a

TABLE 7. HISTORY OF DEVELOPMENT OF AGRO-PROCESSING INDUSTRY AND AGRIBUSINESS IN INDIA

Phases (1)	Features (2)
Pre-Independence: Gandhian-Swadeshi Phase – up to 1950	<ul style="list-style-type: none"> • Encourage the use of own rural products • Discourage imports • Generate rural employment and incomes, uplift and bring rural masses to mainstream
After-Independence: Nehru-Mahalanobis Phase: 1950-1984	<ul style="list-style-type: none"> • Fight against colonial rule • Industrialisation strategy • Capital goods reserved for large scale • Consumer goods reserved for agroindustries/small scale • Logic of capital scarcity – low capital requirement of rural/ small scale
Modernisation phase: 1984 - onwards (1991 – onwards)	<ul style="list-style-type: none"> • Labour intensive, generate more employment • Liberalisation • Focus on efficiency – modernisation, competitiveness • Focus on quality – use good technology • Focus on meeting consumer demand • Attract foreign investment

growing population with increasing incomes, making India a country of shortages and lacking competitiveness.

This forced the third phase from the mid 1980s and particularly after liberalisation in the early 1990s, in which the emphasis shifted to deregulation, modernisation, and opening out to competition. The industry moved towards meeting market demand for quality and quantity through up-to-date technology, efficient management and competitiveness. However, this trend led towards a structure of large, private, capital-intensive enterprises often with very weak connection to rural areas. The result is a negative outcome for rural employment, and a weakening of the development linkage for which agro-industries were in the first place given high priority in India.

4.1 Features of Agro-Processing Agribusinesses in India

Data from the Annual Survey of Industries (Government of India, 2005/06) shows that 37 per cent of all factories in India are agro-industries that contribute 18 per cent of the manufacturing value added and 37 per cent of manufacturing industry employment (in addition, substantial employment is generated in agriculture). These figures indicate that agro-industry contributes substantially to both employment and manufacturing gross domestic product (GDP), substantiating the national priority given to it in India (Table 8).

TABLE 8. IMPORTANCE OF THE AGRO-INDUSTRY SECTOR IN INDIA:
SOME FEATURES

Industries (1)	No. of factories (2)	Percentage share	
		Employment (3)	Net value added (4)
Agro-based food industries	19.0	12.5	8.4
Agro-based non-food industries	18.3	24.04	9.4
Total agro-based industries	37.3	36.54	17.8
Other (non-agro) industries	62.7	63.46	82.2
All industries	100.00	100.00	100.00

Source: India, Annual Survey of Industries 2010-2011.

Table 9 shows the structural and financial characteristics of agro-industries in India. It shows that only 16 per cent of total industrial fixed capital is invested in agro-industries, but the sector contributes 37 of the industrial employment (Table 8). Agro-industries generate employment for 38 persons per given unit of fixed investment compared to 13 persons for other industries. This does not include the substantial employment generated in production agriculture and the supply chain. Thus with less capital, agro-industries generates substantially more employment. The share of working capital is greater for agro-industries. The share of labour wages in total value added is also greater at 35 per cent in agro-industries, compared with 24 per cent in other industries. These features indicate that these agribusinesses still largely deserve the priority given to them in the national strategy for development and employment.

TABLE 9. SOME STRUCTURAL FEATURES OF AGRO-INDUSTRIES VS OTHER INDUSTRIES IN INDIA

Description (1)	Share of fixed capital (percent) (2)	Total persons employed per factory (3)	Fixed capital per factory (Rs. million) (4)	Employment to fixed capital ratio (per Rs. 222100000) (5)	Emoluments- wages as a percent of net value added (6)	Percentage of working capital to invested capital (7)
Agro-based food industries	7.8	56.3	31.0	33.6	29.9	52.4
Agro-based non-food industries	8.6	98.8	35.7	40.6	37.6	39.0
Total agro-based industries	16.4	78.6	33.3	38.2	34.9	46.2
Other (non-agro) industries	83.6	71.9	101.3	12.8	23.9	29.4
All industries	100.0	74.2	75.9	17.6	26.0	32.9

Source: India, *Annual Survey of Industries* 2010-2011.

CII-McKinsey (1997) has indicated that there is tremendous scope and potential for development of food processing and agro-industry agribusienss in India. However, it has numerous constraints to its growth and development. These have been brought out by Gandhi and Jain (2012), Gandhi *et al.*, (2001), Boer and Pandey (1997), Gulati *et al.*, (1994), Kejriwal (1989) and Srivastava and Patel (1989). These include the following:

- Raw material supply constraints
 - Poor quality, inappropriate varieties, residues
 - Short period of availability - seasonality
 - Scattered supplies, perishable
 - Competing markets - fresh
- Constraints in processing
 - Old technology – poor efficiency, quality
 - Poor capacity utilisation due to seasonality
 - Not suitable for export or high value markets
- Constraints in Marketing
 - Limited market size/ nascent markets, changing customer preferences
 - High product and brand development costs
 - Long inefficient supply chains, small retail stores
- Financial Constraints
 - Requires more working capital
 - ♦ hard to get, higher interest rates
 - High investment requirements for latest technology
- Government Policy
 - Processed/ packaged foods considered luxuries
 - ♦ taxed heavily - affects the economics
 - Many special regulations – e.g. MPO
 - Squeeze between input price support and output price control
 - Ad hoc export and import controls

4.2 Models in the Growth of Agro-Processing and Output Marketing Agribusinesses

The challenges and complexities arising from these constraints on the one hand, and the need for their continued growth with multiple objectives including profitability and contribution to rural and small farmer development on the other, raises the need for innovative approaches and institutional models for the organisation of this agribusiness activity in India. Fortunately, many models and approaches have emerged and can be evaluated to provide lessons for what best is required.

Based on the literature and the experiences, a set of key success factors or objectives have been identified which can be used to examine these models and approaches (see Gandhi and Jain 2011, and Gandhi *et al.*, 2001):

- (1) The performance in organising production and procurement from large numbers of small farmers, achieving quantity, cost efficiency as well as impact on rural incomes and employment.
- (2) The ability to bring the adoption of modern technology and practices by the farmers so as to modernise agriculture and generate the required quality and quantity of the raw produce at a reasonable cost.
- (3) The ability to invest in the state-of-the-art modern processing technology to produce quality products, also meeting its high fixed capital need, and the working capital need of a business characterised by seasonality and variability.
- (4) The capacity and ability to deliver strong marketing effort to meet consumer demand, compete, and open nascent product markets in processed agri-foods.
- (5) Build an organisation with appropriate ownership, management and control structures which bring commitment, sustained performance, and benefits to the main stakeholders including farmers, consumers, investors, supply-chain members and the nation.

Examples of a few notable agribusiness models are examined below to bring out their features, how they have performed, lessons, and the extent to which they meet these objectives.

4.2.1 The AMUL Co-operative Model

A model which has been very successful in the dairying agribusiness is the AMUL cooperative model. This evolved out of a successful dairy co-operative initiative in the Kaira district of Gujarat state. The model and its methods were perfected under the leadership of its enlightened chairman, Tribhuvandas Patel, and its competent professional manager, Dr Varghese Kurien. It has grown enormously over the years, spawning other district cooperatives and becoming a state cooperative federation that now markets milk and milk products across the whole country.

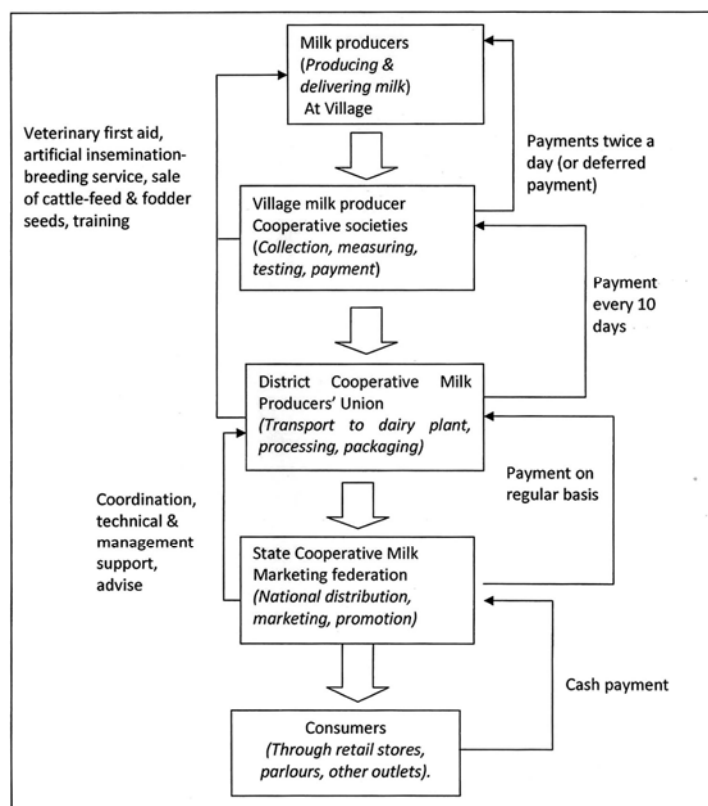
In this model, ownership rests with the farmers on a co-operative basis. It has a three-tier organisational structure, with primary co-operatives at the village level, a co-operative union at the district level, and a co-operative federation at the state level. The

village co-operatives procure the milk from the farmers/village milk producers, the district union transports and processes it, and the federation markets the milk and milk products nationally. The organisations are governed at the top by farmer-elected rotating boards/managing committees who confine themselves to strategic and policy decisions. The operational management is entrusted to professional managers/ staff who are largely independent and highly empowered. Apart from the milk business, the co-operative is substantially engaged in providing development inputs such as veterinary, breeding and feed services as well as extension. These enhance cohesion and commitment to the organisation and help long-term growth and development.

The base is the village co-operative society which consists of milk producer members-shareholders and an elected managing committee consisting of 9 to 12 voluntary representatives and an elected chairperson. The managing committee appoints a paid secretary and staff for day-to-day operations. The co-operative society collects milk from the milk producers, and makes payments at district union fixed prices based on objective measurement of the quantity and quality of milk. It also provides some services to the members such as veterinary first aid, artificial insemination (AI) breeding service, and sale of nutritious cattle-feed. The village societies are members of the district-level co-operative milk union, represented by their chairpersons. The union is governed by an elected board of directors consisting of 9 to 18 representatives from village society chairpersons and an elected board chairperson. The board appoint a professional managing director and staff. The union collects the milk from village societies, sometimes chills it, and transports it to its own modern dairy processing plant. Here it is pasteurised, stored, packaged or processed into milk products. The union also proactive in initiation, training and supervision of the village societies, and arranges for a number of important services including veterinary doctor services, AI breeding services, cattle feed supply and vaccination. The district unions are members of the state-level co-operative milk federation represented by their chairpersons. The federation is governed by a board of directors elected from among the union chairpersons, and an elected federation chairperson. The board appoints a professional managing director and staff. Federation undertakes and coordinates the marketing of the milk and milk products of the milk unions. The Amul structure is outlined in Figure 7.

The state federation, the Gujarat Co-operative Milk Marketing Federation (GCMMF) markets the milk and milk products under the popular brand names 'AMUL' and 'SAGAR' (Kurien, 2003) and has developed a massive network covering over 3500 dealers and 500,000 outlets. There are 47 depots with dry and cold warehouses to carry inventory. The distribution network comprises 300 stock keeping units, 46 sales offices, 3000 distributors, 100,000 retailers with refrigerators, a 18,000-strong cold chain, and 500,000 non-refrigerated retail outlets. Products marketed include fresh milk, UHT milk, beverage milk drinks, infant milk, milk powders, sweetened condensed milk, butter, cheese, ghee, yogurt/curd, breadspreads, pizza, *mithaee* (ethnic sweets), ice-creams, chocolate and confectionery.

AMUL represents a model of an agribusiness enterprise that has ensured a high level of governance and business effectiveness. The model benefits from commitment of the farmers, and cost-efficiency in raw material production as well as procurement which



Source: Based on Sridhar and Ballabh 2006.

Figure 7. Outline of the AMUL Model.

become its major competitive advantage. It also extensively engages with small farmers as well as the landless rural poor who may keep even 1–2 animals, contributing significantly to rural incomes and employment. However, some of its drawbacks include the need for enlightened and committed leadership, and of capable management, which is sometimes difficult to ensure. The board is elected and could become politicised and detract from sound business practices. Further, antiquated laws governing co-operatives often invite government interference, and prevent use of financial markets for raising capital which would be useful for expansion and growth.

4.2.2 The Nestlé Model

Nestlé is one of the largest private food and beverages companies in the world. The company uses the milk district model for its agribusiness activity in India. Nestlé milk processing factory in the Moga district of Punjab produces milk powder, infant products and condensed milk. In 2008, it covered about 100,000 farmers and had a procurement of 1.25 million litres milk/day. A milk district setup involves negotiating agreements with

farmers for twice-daily collection of milk, establishing collection centres and chilling centres at larger community collection points or adapting existing collection infrastructure, arranging transportation from collection centres to the district's factory, and implementing a programme to improve milk quality. Each of the six districts from which Nestlé sources raw milk are referred to as 'Moga Milk Districts'.

In the Nestlé or 'Moga model', the job of sourcing milk from farmers is carried out by a private commission agent appointed by the company. Nestlé operates a network of 1100 agents who receive a commission on the value of the milk supplied to the dairy. Dairy farmers supply milk under contract and the company maintains their records. The company has stringent quality specifications. Nestlé staff members regularly monitor milk quality and performance *vis-à-vis* contractual obligations, and the farmers obtain feedback on milk quality at the collection points. Company technologists determine quality in laboratories with samples being taken in the presence both of the farmers and the company representatives. Nestlé is not obliged to collect milk that does not meet the quality standards specified in the contract. The contract also allows the technologists to penalise the producer with a 30-day ban. If antibiotics are found, the price of milk is reduced by 15 percent. Repetition of any discrepancy is considered a serious breach of contract. Farmers have the right to complain through registers located at each collection point if they believe there is a problem. The system works because it provides an assured market for the farmers at remunerative prices for the milk.

Comparison of the Nestlé Model with the AMUL Model

In terms of scale and reach, Nestlé's milk procurement pales in comparison with that of AMUL. During 2000-01, AMUL's unions procured an average of 4.58 million kg of milk per day from over 2 million farmer-members in Gujarat. Every third litre leaving a milch animal's udders in the state was collected by societies affiliated to AMUL, (*Business Line* 2001). Nestlé's operations are much smaller and confined to districts around Moga. Nestlé's average procurement of 0.65 million kg per day covers barely 3 per cent of Punjab's annual milk output. The average Nestlé farmer supplies about 7.25 kg of milk per day, whereas figure for AMUL is about 2 kg per day, indicating AMUL's reach extends substantially to small/marginal farmers and landless farm labourers who may own only 1-2 milch animals.

With respect to price, Nestlé in 2000-01 paid an average price of Rs 9.84 per kg, lower than the Rs 13-14 per kg that AMUL paid to its farmers. However, adjusting for the fat content, there is little difference between the farm gate prices paid by Nestlé and AMUL. In 2000-01, Nestlé's payments to Moga's farmers for milk as well as development inputs amounts to almost 47 per cent of the value of the company's sales of milk products. In comparison, this proportion for AMUL and its unions is over 80 per cent. Thus, a much larger share of the consumer rupee reaches the farmers in case of AMUL as compared to Nestlé. It must be noted that Nestlé is a company accountable to its shareholders and investors, while AMUL is an entity owned by and accountable to the farmers (*Business Line*, December 9, 2001).

4.2.3 *Heritage Foods Model*

The Heritage Group based in Andhra Pradesh was founded in 1992 by Chandra Babu Naidu, a former Chief Minister of Andhra Pradesh. It is a growing private enterprise with three business divisions, dairy, retail and agri, under its flagship company Heritage Foods (India) Limited (HFIL). Heritage's milk products have a market presence in the states of Andhra Pradesh, Karnataka, Kerala, Tamil Nadu and Maharashtra, and it has retail stores in the cities of Hyderabad, Bangalore, and Chennai.

The company covers about 200,000 farmers and has the capacity to process 1.5 million litres of milk per day. The annual turnover reached Rs 34.7 million in 2006–2007. Heritage has established a supply chain which procures milk from farmers in rural areas, mainly in Andhra Pradesh and some parts of Karnataka, Maharashtra and Tamil Nadu. The Heritage model involves harnessing the current milk collection centres and rural retail points to penetrate the rural market. Two-way or reverse logistics are used to transfer and sell goods from the urban markets to rural markets, and through this retail presence also mobilise milk procurement. This enables economies of scale in supply chain costs, serves both the rural customer and producer, and improves penetration in the rural areas. This also provides opportunities for Heritage to launch its private labels in rural markets. The company's rural retail network has increased to 1515 stores with 13 distribution centres. A typical rural store is about 10 square metres in size and is based on a franchise model to cater to villages with a population of less than 5000. The objective is to deliver popular fast-moving consumer goods (FMCG) products and quality groceries at affordable prices to interior villages across South India, and leveraging for the milk procurement network.

Apart from milk, vegetables and seasonal fruits are also procured through contract farmers and reach pack houses via collection centres strategically located in identified villages. The collection centres undertake washing, sorting, grading and packing and dispatch to retail stores through distribution centres. Other features of the model include: promotion of an annual crop calendar of sourcing that seeks to ensure regular supply and higher income per unit area, technical guidance - agri-advisory services, training of farmers, input supply and credit linkage, package of improved farm practices for better productivity and quality, an assured market at the doorstep, assured timely payments, transparency in operations. The Heritage model provides an example of using the existing marketing points and chains for the purpose of agribusiness rather than building new/dedicated chains. This achieves faster roll-out and reach. It also provides an example of using two-way or reverse logistics for improving the efficiency and economics of the supply chain.

4.2.4 *Suguna Poultry Model*

India has a rapidly growing poultry market and its size is now estimated to be around Rs 12 billion (Business Standard, July 2008). However, the poultry industry is highly fragmented and disorganised. In this sector, Suguna Poultry is one of the largest organised players and is believed to rank among the top ten poultry companies

worldwide. The company is based in Coimbatore, Tamil Nadu state, and has operations in 11 states in India, offering a range of poultry products and services. The company pioneered contract farming in the poultry industry in India and sources its products through 12 000 contract farmers across different states. Its fully integrated operations extend from broiler and layer farming to hatcheries, feed mills, processing plants, vaccines and exports. Suguna sells live broiler chicken, eggs and frozen chicken, and has set up a chain of retail outlets providing consumers with fresh, clean and hygienic packed chicken. It has also implemented the Hazard Analysis and Critical Control Points (HACCP) system and has state-of-the-art processing plants.

In Suguna's business model, farmers who own land and have access to resources such as water, electricity and labour can become growers of Suguna's Ross breed of chicks. Suguna takes the responsibility and provides all the other required inputs - day old chicks, feed, medicines as well as supervision to the farmers. Suguna also brings good management practices and technical know-how that lead to higher productivity. The method of growing the chicks is standardised and must conform to the exacting standards laid down by the company; quality control checks are carried out by company staff to ensure the norms are being met. The broilers are procured by Suguna as long as they comply with established quality norms, and the farmer is paid a 'growing' commission or charge. If a farmer does not comply with procedures as laid down, or sells chickens to another party, this is considered a breach of trust and the contract is unlikely to be renewed. Suguna also offers farmers a safety net: it bears production and market risks, taking responsibility for losses from a change in the market environment. A rise in the feed prices does not affect the farmers because they are supplied with feed directly by Suguna. Similarly, when the bird flu attack occurred, Suguna absorbed the financial loss suffered by the farmers. Thus, farmers receive assured returns. Regardless of the market prices, the farmers receive the assured growing charge/cost, and incentives.

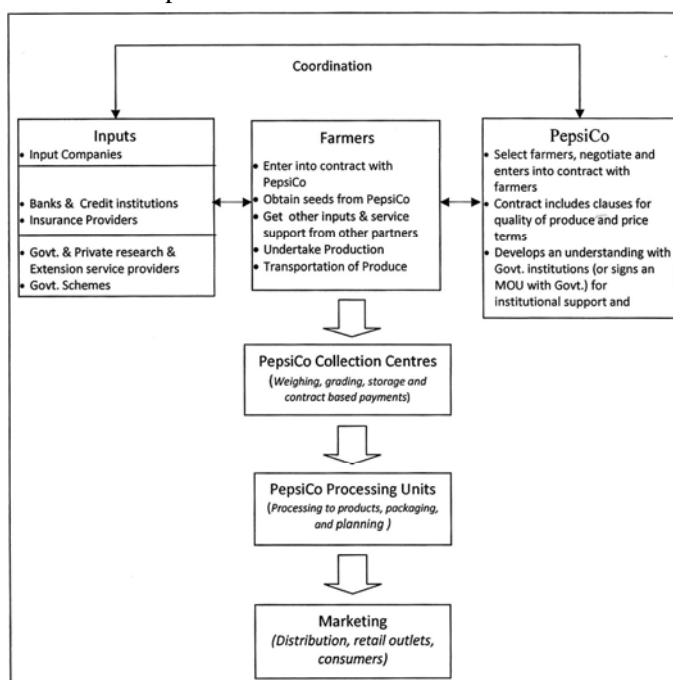
The Suguna model offers fast scalability because the company does not have to buy or lease farms. It keeps costs low, and offers economies of scale including in buying raw materials, feed and medicines. Suguna has benefited large numbers of rural households, improving their lives with its innovative business model. Seeing the impact, other States such as Andhra Pradesh, West Bengal, Punjab and Jharkand invited the company to set up operations in their States. Suguna has proved that every state in India is fit for poultry operations with its presence in 11 states. The model has also attracted visitors from abroad who are keen to learn from Suguna's initiatives and success and adopt the model in their countries.

4.2.5 *PepsiCo Model*

PepsiCo has been working with farmers in Punjab since the 1980s, starting with procuring tomatoes and producing tomato pulp. The model involves backward integration by a private company with strong marketing capabilities and established products and brands. Under this model contracts for production and procurement of tomatoes were made with small farmers. The company has built relationships of trust with farmers. It brought in experts and promoted the use of appropriate varieties and farm technology,

bringing to bear research and know-how available worldwide. Seedlings were provided to the farmers and planting was scheduled and programmed using computers. Tomatoes were procured by the company and it used the best technology in processing and its strong marketing capabilities and networks in selling quality end- products.

More recently, a similar initiative has been launched for potato, see Figure 8 below. The product quality parameters put in place through the chain are driven by the specific needs of processing, and of buyer requirements. Processing requires potatoes with low sugar content (0 per cent) and high solids content (between 15 to 20 per cent). Because the company is HACCP and ISO certified, stringent quality control is required at all levels in the chain. The requirements are met by ensuring quality compliance at every stage: farming, storing, processing, and packaging (Punjabi, 2008). The company has set up a 27-acre research and demonstration farm in Punjab to conduct trials for new varieties of tomato, potato and other crops.



Sources: Based on Punjabi (2008), Singh (2007).

Figure 8. Tripartite Model of PepsiCo India.

Extensive trials are undertaken before introducing the varieties to the farmers, and a package of agronomic practices suitable to the local agro-climatic conditions is developed in collaboration with Central Potato Research Institute (CPRI). This includes specific fertiliser recommendations and spraying schedules. Seed potatoes of the specific varieties are provided by the company. The company ensures that farmers have the availability of all the required inputs at the right time. The costs of inputs if provided are deducted during buy back of potatoes. The company had also introduced crop insurance and

weather insurance, and PepsiCo created an institutional framework roping in the Central Potato Research Institute (CPRI), agrochemical company Du Pont, Agricultural Insurance Company (AIC), and ICICI Lombard General Insurance company (Punjabi, 2008).

Teams of agricultural graduates employed by the company work with the farmers to provide technical advice and monitor production. One technical expert deals with approximately 100 farmers. As a result, the use of chemicals and fertilisers is timely and effective (Punjabi, 2008). The agronomists regularly monitor the fields including at planting, spraying, and harvesting. If an outbreak of any disease or pest is seen or expected, farmers are advised for timely spraying. The major problems are attended to in consultation with the company researchers if necessary (Punjabi, 2008). After harvest, the selected procured potatoes are taken to the hi-tech processing plant. There they are washed, peeled and inspected for physical damage and discolouration. Then they are run through rotating slicers, deep fried, mixed with spices and packed. The plant has a well-equipped quality testing lab. The new tomato varieties are said to have brought a yield increase from 16 tonnes to 54 tonnes per hectare (Punjabi, 2008). The introduced high yielding potato varieties have increased farmer yields and incomes and enabled PepsiCo to procure world class chip-grade potatoes. The company has partnered with more than 10,000 farmers working over 10,000 acres of potato across the states of Punjab, Uttar Pradesh, Karnataka, Jharkhand, West Bengal, Kashmir and Maharashtra.

This model is more than simple procurement or contract farming and entails substantial company involvement in developing a mutually beneficial partnership between the agribusiness and the farmers. The model can result in very good benefits to small farmers in a limited area, but it requires a long-term view and commitment from the company and a willingness to absorb substantial start-up costs and initial losses (Gandhi *et al.*, 2001). Singh and Bhagat (2004) conclude that the PepsiCo model is a better model of contract farming as compared to others such as HLL and Nijjer, though there are some operational problems. As the acreage under the crop increases, production increases and the open market prices may fall. The company may then base its contract price on this low open market prices and even fail to honour the contract. Singh and Bhagat (2004) indicate that it is necessary to learn from the experience of HLL that contract farming without building mutual trust might be problematic for the company itself. It should treat farmers as partners and share the benefits and risks with them, thereby creating a long-term sustainable business relationship and a win-win situation for both the farmers and corporates.

4.2.6 ITC *e-Choupal Model*

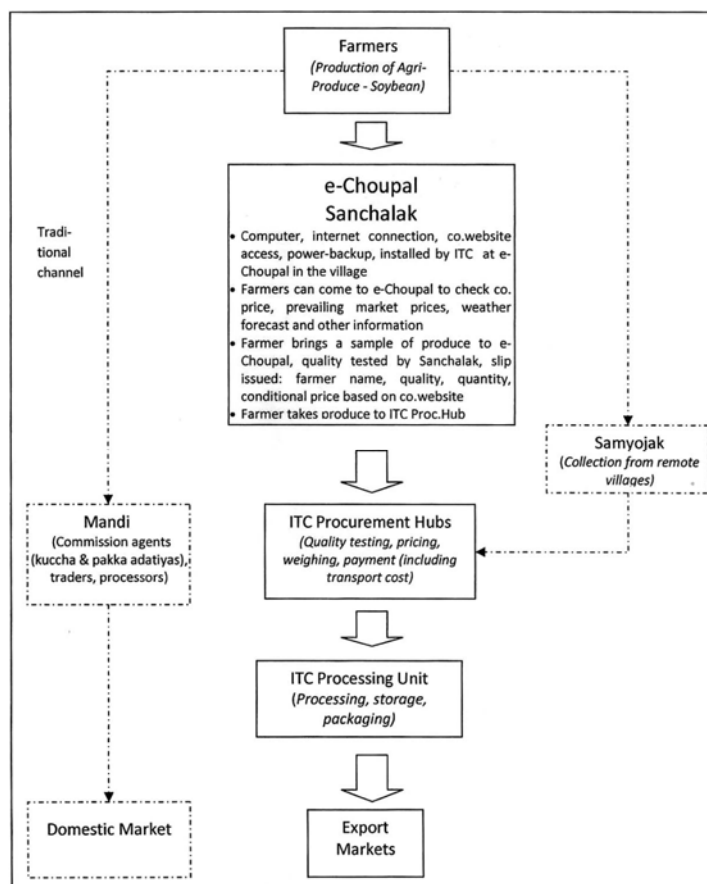
ITC, through its International Business Division (IBD), undertakes procurement, processing and export of agricultural commodities such as soybean, wheat, shrimp and coffee. ITC-IBD has developed a unique IT-enabled procurement, information and marketing model in rural areas, through village centres called *e-choupals*.

The model was launched by ITC in the villages of Madhya Pradesh in the year 2000. ITC opened three soya processing and collection centres and then identified six nearby villages for establishing *e-choupals*. The company identified an educated farmer to head

the *e-choupal* in each village. The person is called the *sanchalak* and is trained to operate and coordinate the activities of the *e-choupal*. To establish the *e-choupal*, a personal computer is installed at the house of the *sanchalak*, and the *sanchalak* is given training in using it. The computer is connected to the Internet via telephone as well as satellite and has back-up power. The *sanchalak* helps the farmers in using the system, guiding them to the specially created website of the company and to see the prevailing prices and other related information on it. To initiate a sale, the farmer brings a sample of the produce to the *e-choupal*. The *sanchalak* inspects the produce and performs quality tests (including foreign matter and moisture content) to assess the quality in the presence of the farmer and explains the if there are any deductions. He then obtains the benchmark price from the computer, makes the appropriate deductions, and conveys a conditional quote to the farmer. If the farmer chooses to sell to ITC, the *sanchalak* gives the farmer a note with his name, village name, particulars about the quality tests, approximate quantity and conditional price. The *sanchalaks* is paid 0.5 percent of the value of soya procured by ITC.

The farmer takes the note from the *sanchalak* and proceeds with his produce to the nearest ITC procurement hub. At the ITC procurement hub, a sample of the farmer's produce is taken and set aside for laboratory tests. A chemist visually inspects the soybean and verifies the assessment of the *sanchalak*. Deductions for the presence of foreign matter such as stones or hay are made based on visual comparison with other produce such as of his neighbour's and the farmer may accept the deductions and the final price. Laboratory testing for oil content is performed after the sale and does not alter the price. The farmer's produce is then weighed on an electronic weighbridge and following which the farmer can collect his payment in full at the payment counter. The farmer is also reimbursed for transporting his crop to the procurement hub. The process is accompanied by appropriate documentation. The farmer is given a copy of inspection reports, agreed rates, and receipts for his records. The system also has *samyojkas* (who were former commission agents) who are responsible for collecting the produce from villages that are located far away from the processing centres and bringing it to the ITC centres. The *samyojka* is paid a 1 per cent commission. At the end of the year, farmers can redeem accumulated bonus points through the *e-choupal* for farm inputs, or insurance premiums. The ITC *e-choupal* model is shown in Figure 9.

By 2007, the *e-choupal* services reached over four million farmers in about 40,000 villages through over 6500 *e-choupals*. This extended across the states of Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra, Karnataka, Andhra Pradesh and Kerala. ITC is extending its business model to other Indian States including West Bengal, Himachal Pradesh, Punjab and Haryana. Some procurement hubs also have Choupal Saagars which offer goods and services farmers may need including agri-equipment, agri-inputs, personal consumer products, insurance services, pharmacy and health centre, agri-extension clinic, fuel station and food court. Information and services provided by the *e-choupal* web site and e-commerce system include: weather information, information on scientific practices, guidance on how to improve crop quality and yield, access to input supply (fertilisers, pesticides) along with recommendations, and to soil testing service.



Source: Based on Bowonder, Gupta, and Singh 2002.

Figure 9. Outline of the ITC E-Choupal Model.

The model has principally aimed at increasing the efficiency of procurement, resulting in value creation for both the company and the farmer. In addition, the model takes internet penetration to the villages, offering information and global commercial contact. The *e-choupal* allows the farmers daily access to information on prices of many *mandis* which helps them to make better decisions on when and where to sell the produce. Thus, *e-choupal* tries to provide farmers a better price. The incremental income from a more efficient marketing system is estimated to be about US\$6 per tonne on average, or an increase of about 2.5 per cent over the *mandi* system.

Singh and Bhagat (2004) report that many farmers did not agree that they are getting a better price for their produce, and that there are only minor benefits like de-bagging expenses etc. One significant advantage however is correct weight, which is a major worry in traditional *mandi*. Even though there is a potential, the web portal does not have the enough richness to become an information and knowledge dissemination kiosk. The information on best practices, crop production, inputs, fertiliser and seeds, was not of

high quality. The main information disseminated is of prices and weather conditions. ITC has not paid enough attention to input trading through its *e-choupals* and proper partnerships with input companies are often not worked out. However, the model offers a quantum change and a huge potential for better service.

4.3 Comparison of the Different Models

How do the different models compare? There are of course, many other model but Table 10 below provides a broad comparison and evaluation of the models (for models not described here see Gandhi and Jain, 2011). As can be seen, the strengths vary substantially across the models. Whereas Amul and ITC e-choupal are strong in reach to small farmers, Suguna and Pepsi are strong in ensuring adoption of the right technology for quality and quantity. Nestle, Pepsi and Amul are strong on investing in modern processing technology as well as at delivering a strong marketing effort to reach a huge food market. Amul is strong on commitment and benefits to all stakeholders, Suguna is good at it too, and Pepsi is reasonably good.

TABLE 10. BROAD COMPARISON OF DIFFERENT MODELS ON PERFORMANCE PARAMETERS

Agribusiness model (1)	Reaching large numbers of small farmers and procuring quantity (2)	Ensuring adoption of good technology by farmers for quantity and quality (3)	Investment in modern processing technology and meeting the capital requirements (4)	Delivering strong marketing effort (5)	Organisation of ownership/ management and control to bring benefits to all stakeholders (6)
AMUL	Strong	Reasonable	Strong	Strong	Strong
Nestlé	Limited	Reasonable	Strong	Strong	Limited
Heritage	Good	Limited	Good	Good	Limited
Suguna	Good	Strong	Strong	Good	Good
Pepsi	Reasonable	Strong	Strong	Strong	Reasonable
ITC e-Choupal	Strong	Limited	Strong	Strong	Limited
Other Models					
Nandini	Good	Limited	Limited	Reasonable	Good
Mother dairy	Limited	Limited	Good	Good	Reasonable
Safal market	Limited	Limited	Good	Limited	Limited
HPMC	Reasonable	Limited	Good	Poor	Poor
McCain	Reasonable	Strong	Strong	Strong	Limited
Desai fruits and vegetables	Reasonable	Good	Good	Strong	Reasonable

V

CONCLUDING OBSERVATIONS

Agriculture has changed substantially from a subsistence activity to become a huge technology and market driven business. The agribusiness sector which serves production agriculture has shown huge growth in India in the recent decades. Its development in countries such as India is driven primarily by major changes, shifts and constraints that

occur as economic development proceeds in the country and the world. These include growing scarcity of land, the need to improve productivities, commercialisation of agriculture, change in scale and reorganisation of production and marketing, economic liberalisation and reducing government involvement in agriculture, changing food consumption patterns, development of the rural economy, infrastructure, rural-urban migration, and the communication and information technology revolution. These changes have led to huge growth in agribusinesses, particularly, the input agribusinesses including seeds, fertilisers, agro-chemicals, irrigation equipment and farm machinery. Further growth in these input agribusinesses will require addressing the various opportunities and constraints within a framework including the agronomic and agro-economic potential, creation of effective demand, generating adequate supply and managing distribution.

Agro-processing and marketing agribusinesses have been given substantial priority in India due to their significant potential to contribute to economic development. The beginning can be traced to Mahatma Gandhi's emphasis on the need for development of village-based agro-industries to uplift rural masses and connect them to the independence movement and the national economy. The study finds that the sector still contributes substantially to employment in agriculture and industry, and is crucial for value addition and income generation in the rural areas. However, its performance in enhancing development depends substantially on its design and capacity. This is related to the model of agribusiness that is developed and is given priority. The objectives to be met by a good agribusiness model should include reaching large numbers of small farmers and efficiently procuring quantity, modernising farming through adoption of good technology for quantity and quality, investing in modern processing technology and meeting its high capital requirement, delivering a strong marketing effort, and organising ownership, management and control so as to benefits to all stakeholders.

Numerous agribusiness models were examined ranging from Amul to Suguna to e-choupal, and the lessons indicate that there is a need for multiple business models to be experimented with for the organisation of agribusiness activities. No single model may be good for all activities and areas. Most government models do not demonstrate a good record of performance and sustained contribution to development. The AMUL co-operative model is an excellent farmer-owned design that brings commitment, contribution and substantial benefits to small farmers and the landless. However, such co-operatives must be kept out of political and legal constraints, and should have empowered professional managements. Some good private agribusiness models have also emerged, involving cogent technology and efficiency enhancing backward integration up to the farmers, from a foundation of strong industrial and marketing management capabilities. They too offer good promise. However, they need long-term commitment and investment from the private sector and a strong partnering approach to bring business success and benefits to large numbers of small farmers and poor. It is critical that alternative agribusiness models are experimented with. Those models which are organisationally and economically strong, contribute substantially to rural incomes/development, and which can transform and modernise the supply chain need particular encouragement.

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