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Agricultural Machinery Industry in India: A Study of Growth, Market Structure, and Business Strategies

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Foreword

The Centre for Management in Agriculture (CMA) at the Indian Institute of Management, Ahmedabad has been actively involved in applied, policy, and problem solving research on management in agriculture and allied sectors since its inception. It has conducted studies on various aspects of the agricultural and rural economy like WTO related issues, food quality, contract farming, fisheries, organic farming, agricultural marketing, marketing of agricultural inputs, forestry, irrigation, agricultural finance, dairying and rural development programmes. The research efforts span various functional areas of management like production, procurement, processing, marketing, strategy, and monitoring and implementation, including policy analysis.

The CMA has been doing studies on the marketing management and policy issues in agricultural input sector for quite some time now. But, the agricultural machinery industry as a subsector was not studied more recently despite the fact that it has witnessed many new players and policy changes. Therefore, it is important to examine the nature and dynamics of the agricultural machinery industry, including second hand tractor markets, from multi-stakeholder perspective i.e. manufacturers, dealers and farmer users. The present study 'Agricultural Machinery Industry in India' by Dr. Sukhpal Singh examines this industry comprehensively by taking up the three major subsectors i.e. tractors, combine harvestors and micro irrigation equipment. It not only examines company level issues and strategies but also dealer level issues and farmer level purchase and use of the machines and equipment including sale and purchase of old tractors.

It takes a case study approach and focuses on new players in the tractor industry especially those who have graduated into tractors from threshers and combines. It examines the organisation of marketing in three products and analyses the problems being faced by various players in each of the product chains especially farmer owners and users. In combine harvestors, it examines the operations of somewhat small scale and localised manufacturers in the major pocket of this industry in Punjab. In micro-irrigation, it examines dealer and farmer user level issues besides assessment of company performance and policy issues. I am sure the study will prove useful to policy makers in supporting the various players in the industry and in finding out ways to promote mechanisation for sustainable agricultural development.

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Samar K Datta
Chairman, CMA

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Mechanisation has an important role to play in Indian agriculture. Given that levels of mechainsation in Indian farming are low per se, there is scope to improve level of mechanization. The nature and degree of mechanization varies across crops and regions in India. Some regions and crops are over mechanised given the labour surplus nature of the agricultural economy and the other regions have not achieved even a minimum exposure to mechanization. In this context, it is important to understand the nature, growth and functioning of different segments of the agricultural machinery industry so that constraints to mechanization and appropriate measures to direct mechanization could be identified. This study attempts an analysis of the growth, structure and business strategies of major segments of the industry i.e. tractors, combine harvestors and micro irrigation equipment. These account for bulk of the agricultural machinery industry in India and are high cost machines and equipments. These are also relatively new in that they are either newly emerging sectors like micro irrigation and combines or have attracted new players like in tractors which has changed the nature and degree of competition in the industry. The tractor industry has witnessed the entry of many new players who have upgraded themselves from thresher or combine manufacturers to the manufacturers of tractors and have carved a niche. Due to this, these players as against traditional players are the focus of this study.

An attempt has been made to understand the completer dynamics of the three industries – tractors, combine and micro irrigation by understanding the various links in their chains like manufacturing agencies, dealers and farmers from their own perspectives to gain a complete understanding of the growth, constraints and opportunities in the sector. That has helped to identify various policy measures to encourage mechanisation and orderly growth of the various sub-sectors of the industry.

Many people have assisted in the successful completion of the study. It is important to mention who have played a direct role in it. I am grateful to Mr. Satish Kumar for collection of data from tractor dealers and farmers in Punjab, tractor dealers in Gujarat and combine manufacturers in Punjab and tabulation of the same. Mr. Jayesh Talati assisted in the collection of data from micro irrigation agencies, their dealers and farmers in Gujarat and processing and analysis of data. The Ministry of Agriculture, Government of India provided financial support for this study. I also acknowledge the support provided by the administration of the IIMA and the CMA for this study. I am grateful to the managers and the owners of the tractor, combine and micro irrigation equipment companies including the GGRCL for providing relevant information for the study about their operations, and to the dealers of these companies and the farmer owners and users of the machines and the equipment.

I am extremely grateful to Dr. Mohanana Pillai of CDS, Thiruvananthapuram, Dr. Surjit Singh of IDS, Jaipur and Dr. Lakhwinder Singh of Deptt. of Economics, Punjabi University, Patiala; for very insightful and timely comments on the report which has helped in making the report more focused. the I hope that the study will generate adequate debate and discussion on this very important agricultural input industry i.e. agricultural machinery industry so that the industry can contribute its

might for the growth of Indian agriculture which is crucial to the livelihoods of millions of producers and workers.

(Sukhpal Singh)

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Chapter 1
Introduction

1. Background

Agricultural machinery industry is an important segment of the agribusiness sector in India and plays a crucial role in furthering agricultural development. In the organised (ASI) sector, agricultural machinery industry accounted for 0.6% of all factories, 0.26% of fixed capital, 0.43% of employment, 0.76% of inputs, 0.79% of output and 0.98 % of value added in 1997-98. In foreign trade, it accounted for 0.03% of exports and 0.01% of imports in 2001-02 with more than 50% of the exports being to Nigeria, USA, and Bangladesh in 2002-03. The growth rate of imports in the nineties had been higher than those of exports. Haryana, Punjab, Tamilnadu and Maharashtra accounted for bulk of the factories (Kaur, 2004). There have been some studies of the impact of liberalisation on this industry and its adjustment strategies (Pillai, 2000).

Agricultural machinery and equipment industry comprises of a large number of segments even in the organised sector. Tractor industry is one of the most capital intensive industries in agricultural machinery industry with more than half a dozen major players in the market at present. In combine harvesters which got manufactured in India in 1970 for the first time, Punjab occupies a dominant place with more than 87% of the units located in the state. They were producing two types of combines-self-propelled and tractor operated. The other major parts of the industry are electric motors, diesel engines, pump sets, power tillers, drip and sprinkler systems, and tractor driven implements. Many of these industries are characterized by subcontracting and ancillary systems where small units work for the larger parent units supplying components or performing specific tasks in manufacturing process. In 2000-01, there were 2226000 tractors, 127000 power tillers, 151000 combine harvesters, 3090000 threshers, 109000 planters, 2740000 seed drills, 2812000 cultivars, 2881000 disc harrows, and 311000 power sprayers (Venkateshwarlu, n.d.).

1.1. Tractorisation in India

At present, the level of mechanisation in India is quite low compared with other countries. India was the largest tractor market in the world but ranked 8th in terms of

tractor population. By 2003, the tractor density in India was 12 tractors per 1000 hectares of GCA compared with world average of above 50. But, tractor density in Punjab was about 100 tractors. Punjab which had more than four lakh tractors in 2003 accounting for 25% of total tractors in the country (Singh, 2000), it is said, needed only 1.5 lakh going by its area and was thus over-tractorised. On the other hand, tractor industry in India experienced a slump in sales during this period (EPW, 2003). This raises issues related to the viable farm size for tractor ownership and the bank lending policy for such costly agricultural machines and alternative uses of such finance for other inputs which may be more suitable for small farmers. This is so as the price of the tractor is very huge and this makes credit an important determinant of tractor sales as 80-90% of the total tractor sales are due to bank credit. As per the NABARD norms, any farmer with 8 acres of land can take a tractor loan which is to be repaid in 9 years with 12.5% interest on the principal amount. The tractor is hypothecated as a primary security and there is registered mortgage of the land as a security against non-repayment (Singh, 2004). Various concessions by the government of India have also helped the small farmers in purchase of tractors which include exemption in the excise duty on tractors of less than 1800 cc engine capacity, Minimum land holding size required for a tractor loan was reduced from 10 to 8 and later even 4 acres and the repayment period was extended from 7 to 9 years. But, optimal land holding for a viable tractor use is 8-10 hectares for 25 HP tractor, and 25-30 hectares for 35 HP tractor, if used only for farming purposes (Raghuram, 2000).

There is both a replacement as well new demand for tractors. The demand for tractors in India is dictated by several factors like, monsoons, availability of irrigation and credit, farmers' disposable incomes, cropping patterns, and the minimum support price for farm produce. The major factors in the demand for tractors in India have been found to be gross irrigated area (cropping intensity), real price of tractor, demand for tractors in the previous year, and area under high yielding varieties (Gandhi and Patel, 1997) besides land holding and credit availability (Raghuram, 2000). But, in some regions like Punjab it is the cropping intensity, cultivated area, and credit availability along with demand for tractors in the previous year and social considerations which determine demand for tractors (Gandhi and Patel, 1997; Sharma and Grover, 1998). Most of these are agronomic and agro-economic factors. Companies have expanded capacities in expectations of good demand (Raghuram, 2000) and some companies

utilized 100% of their capacity during the 1990s (Gandhi and Patel, 1997). Attracted by the earlier growth figures in tractor industry, at least three new players, Bajaj Tempo, New Holland, and Case of USA (with M&M) have set up shop in India. The average annual sales for the period 1999-2000 to 2003-04 were of the order of 2,37,747 tractors with maximum from UP (58000) (Economic Survey, 2003-04).

But, during the late 1990s, tractor markets in the north reached a saturation point, with growth rates in Punjab and Haryana hovering around 1-2%, and the northern states of Punjab, Haryana and U.P. accounting for 44% of total sales compared with 54% a few years before (Raghuram, 2000). Also, most of the sales in this region are replacement sales. First time buyers are comparatively insignificant (Agriculture & Industry Survey, March 1998). Even if farmers buy new tractors, it is largely to obtain a loan from a bank to use for other purposes as most of the new tractors are directly taken to the 'tractor mandis' and sold at a discount of as much Rs. 50,000 per tractor. The tractor mandis where old and new tractors are sold are a common weekly affair in most of the towns of Punjab, especially in the cotton belt. There are more than a dozen tractor markets mainly in this cotton belt, which facilitate buyers and sellers of second hand tractors in quick transactions (Singh, 2004).

On the other hand, the southern and western markets (with shares of 10% and 20% respectively earlier) are now growing. Agriculture in these two areas presents great scope for mechanisation. The soil here is quite different to the Indo-gangetic plains. It is basically harder and requires more powerful machines, i.e. tractors with higher HP. Before 1975, there were hardly any big HP tractors sold. It is only now that the market has evolved. The farmer has also realised that the cost per HP is lower in the case of the high HP tractors. It is a convergence of technology, customer aspirations and economy that has driven the change (*Agriculture & Industry Survey*, March 1998).

Further, the most mechanised states of Punjab, and Haryana and parts of UP have seen a transformation in landholding pattern in the last three decades with the splitting of the families and land. Nevertheless, the requirement of tractor in these states has been steadily growing due to reverse tenancy and new crops. The usage being universal, the ownership of tractors is now extending to all segments of land holdings.

Tractor is now considered to be a production machine and an investment, and used extensively for agriculture and for other purposes by hiring out (Singh, 2004).

1.1.1 Buyer Behaviour and Underutilisation of Tractors

It is well known that the sales of tractors are credit dependent. Therefore, the farmer demand for tractors is realised largely due to credit facility availability. Further, past sales of a brand also affect its future sales as farmers go by the popularity of a tractor in their area. This is further reinforced by the after-sales service facility offered by the companies through dealers, price of the tractor, efficiency of fuel consumption, maintenance cost, and resale value of the tractor. Sometimes, factors like design or look of the body of the tractor and the driver convenience also affect brand and model choice (Singh, 2004; ICRA, n.d.).

Tractors have entered Indian farming pervasively owing to their functional versatility and vastly superior outturn of work. But quite often, they are found to be underutilised which affects their overall economics adversely (Singh, 2004). No specific relationship seems to exist between farm size and tractor size. Tractors are purchased not only for own farm work but to cater to custom work too (Gandhi and Patel, 1997). Tillage, threshing and transportation of farm produce and inputs constitute the major activities for which tractor is utilised. Together these activities account for 90 –95% tractor time. However, transport of people and material alone takes away 60% of a tractor's life and only 40% is spent on the field. The overall utilisation of available operational tractor capacity varies directly with farm size. However, over 40% of available tractor capacity remains unutilised (Singh and Sidhu, 1990). An average farmer finds work for his tractor for less than 400 hours in a year as against the norm of 1000 hours recommended by bankers to recover the fixed investment cost. Further, out of these 400 hours, less than 300 hours constitute strictly on farm operations and the remaining 100 hours are devoted to marketing of produce and purchase of inputs, custom hiring and social activities (Murthy, 1999).

Farm size, cropped area, cropping pattern and intensity, cultivation technology, captive versus custom use mode, etc. influence the return on investment in tractor. The break-even point of tractor operation varies directly with tractor size. To operate a tractor on no-profit no-loss basis, a minimum area should be available which varies

with the size of the tractor. Below this break-even value, it is not advisable to purchase a tractor. Fulfillment of peak seasonal capacity again requires certain minimum cropped hectares. This calls for critical review of the investment policy and the loan policies to check over-investment on tractors. There is a higher return on investment in tractor in situations of extensive use of crucial inputs like good quality seeds, fertilizers and irrigation (Balishter and Singh, 1997). But, interest on the loan obtained for purchase of tractor is one of the biggest cost components of cost at the farmer level which accounted for 30% of the annual cost of the tractor (Singh and Sidhu, 1990).

1.1.2 Segments in Tractor Market

The tractor market segments can be in terms of the power configuration. In India there are five categories based on the engine horsepower (HP) -- under 20 HP, 21-30 HP, 31-40 HP, 41-50 HP and over 51 HP. Of these five sub-segments within the industry, more than 55% of the total sales was accounted for by the 31-40 HP segment in 2000 (Raghuram, 2000; ICRA, n.d.). In recent months, changes seem to be taking place. Demand for higher HP tractors is expected to increase with choices shifting to high-powered tractors since they can be used for a variety of purposes. The demand for small HP tractors started when the farmers made primary transition from bullocks. Now the farmers have moved into higher HP tractors. Two factors are considered responsible for this. First, there has been erosion of the huge price differential between high and low HP tractors following a revision in the excise duty structure by the government. Second, there has been a shift in geographical demand patterns. Till recently, maximum number of tractors has been sold in the belt consisting of Punjab, Haryana and Uttar Pardesh (60%). The fertility of land and the resultant affluence of farmers have been the main reasons for this. Further, there are specific geographical segments for particular brands and HP of tractors in each state depending on the cropping pattern and the size of land holdings.

1.1.3 Market Structure and Nature of Competition

The Indian tractor industry has been traditionally dominated by six major players. But, among them, it is quite competitive (Raghuram, 2000) as indicated by the concentration ratios (55 for 3-firm and 68 for 4-firm). Mahindra & Mahindra, TAFE, Escorts, Eicher, HMT, and Punjab Tractors Limited are major players in the market

(ICRA, n.d.). Apart from these, there are smaller ones such as Gujarat Tractors and Haryana Tractors. There are also a few players in the unorganised sector concentrated in the Punjab-Haryana belt, which specialise in the used tractors industry. The overall market leader among these old guards is M & M, with a market share of 27.52%. The company has a presence across the three major categories of 25 HP, 35 HP and 45 HP. (It has yet to establish itself in the higher HP ranges). Moreover M & M has a strong presence in the western and southern markets consisting of Maharashtra, Gujarat, Andhra Pradesh, Tamil Nadu and Karnataka.

Arrival of MNC tractor majors like New Holland, and John Deere is bound to shake up the existing "big six". These MNCs have entering the Indian market with higher HP tractors just when the demand for higher HP tractors is increasing. The worldwide demand is more in the high HP segments, ranging between 65 HP and 200 HP. Multinationals have strong products in the high HP ranges, while the 35 HP range is not their specialty. Most of the new MNC ventures in India are coming into the 75 and 80 HP range. Given the current `boom time' market sentiments in the tractor industry, the entry of multinationals and the re-entry of Ford range under the `parental guidance' of New Holland could unsettle the market balance.

1.2 Micro Irrigation in India

Micro-irrigation includes drip, sprinkler, mulching, green houses, and perforated earthenware pipes. It is practiced mainly to increase water use efficiency in agriculture. It was originally designed for growing vegetable crops in Israel, which is also the pioneer in this new technique. Basically, drip and sprinkler systems are fairly simple technologies that maximize water-use efficiency by delivering water to plants, where and when they need it. Drip systems are composed of a network of porous or perforated piping (usually plastic) to deliver water, on or below the soil surface, directly to crop roots. Sprinkler systems require higher pressure and deliver water (by spray) to plant leaves, instead of roots. In each case, water is applied frequently and in low doses to maintain optimal moisture conditions for the crops and in the process, minimizing the potential for salinization (Behr and Naik, 1999). Drip irrigation is the new version of pot irrigation known for centuries where an earthen porous pot of water with a small hole at the bottom is buried near a plant, a foot or so deep near the

root zone, with a lid to keep the soil out and to replenish the water once in several days. A mulch of stones, leaves, twigs, and grass would slow down evaporation and keep the soil around the plant moist, and thus, irrigation could be reduced (Ranganathan, 2003).

1.2.1 Logic for Micro-irrigation in India

Since agriculture sector in India consumes about 85 % of the available fresh water, effective utilization of water in agricultural activity is most desirable (Anonymous, 2003). The water use efficiency (WUE), in Indian agriculture is the lowest (30-40%) in the world against a high of 55% in China. This requires a paradigm shift in water conservation and thus invites micro irrigation (MI) industry to play a catalytic role (CACL, 2004). In the micro irrigation system, the water use efficiency varies from 70 to 95 % which is just 35 to 40 % in the traditional irrigation techniques i.e. flood irrigation owing to large seepage, evaporation, distribution, conveyance losses, etc. (Michael and Ojha, 1997). Unlike the flood method of irrigation, drip can be efficiently operated in all types of grounds-undulating terrains, rolling lands, hilly areas, shallow soils, and areas which have saline water. Drip irrigation has many advantages over flood irrigation; water saving and yield increase being the foremost among them (Table 1.1). In drip system, conveyance and distribution losses could be minimized substantially since water is supplied at the root zone of the crops. Evaporation of water too is much less in this system. The rate of water saving varies with the nature of crops, condition and quality of the soil, etc. The yield increase due to drip system varies from a low of 2 % in cabbage and radish to as high as 98 % for pomegranate, and water saving from a low of 36 % in water melon to a high of 79 % in beet root. (Narayanamoothry, 1997).

Drip system also helps in the vegetative growth of crops, early maturity of crops and in improving quality of produce. In summary, the comparative advantages of drip irrigation over the flood method is that water saving is higher in this method by 40-100%, irrigation efficiency 80-90 % compared with only 30-50 % in flood method, and input costs lower. Besides, weed problem is almost nil, even saline water can be used, disease and pest problems are less, there is no water logging, water control is easy and high, and fertiliser use efficiency is very high. Further, yield increase is 20-

100 % higher though cost of capital is also almost double, but benefit cost ratio many times higher (Narayanamoorthy, 1997).

Table 1.1: Yield Increase and Water Saving with Drip Irrigation

Crop	Yield increase (%)	Water Saving (%)
Banana	52	45
Grapes	23	48
Pomegranate	98	45
Tomato	50	39
Watermelon	88	36
Ladies finger	16	40
Brinjal	14	53
Bitter gourd	39	53
Ridge gourd	17	59
Cabbage	2	60
Papaya	75	68
Radish	2	77
Beet Root	7	79
Chilies	44	62
Sweet potato	39	60

Source: INCID given in Chopra and Moshawir, 2004

Gujarat Green Revolution Company Limited (GGRCL) undertook a pilot experiment of drip irrigation system in 30 hectares land involving 56 farmers near Padra, of Baroda district and in Palanpur Taluka of Banaskantha District, Gujarat before implementing the state sponsored MIS project. The crops under experiment were Cotton, Castor, Chilly, Bhindi (Okra), Banana, Cauliflower, Cow pea and Mung. The pilot experiment generated very encouraging results in terms of water and energy savings by 40-60 % and 37-38 %, respectively. Besides, production expenditure reduced by 9-25%, and both crop production and income increased by 25-50%. GGRCL also highlights additional benefits such as fertilizer savings by 25-30 %, savings in cost of pest, disease and weed management by 15-20%, makes possible use of saline water for irrigation, makes undulating land cultivable, prevent soil erosion, due to regulated water supply crop plants can complete all metabolic processes at appropriate time and thus quality of produce is better, while promoting the MIS (Source: GGRCL, Baroda).

There are many compelling reasons for bringing more area under drip irrigation. India has been able to achieve self sufficiency in food production through depletion of

its precious resources. Further, water scarcity problems are growing in many parts of India, more so in the western parts. Improving water productivity in agriculture would be a key strategy when water becomes scarce. Given India's food policy, the nation's ability to produce food for the growing population in the coming decades would heavily depend on improving the efficiency of use of irrigation water, which will not be possible unless technologies like drip irrigation become more versatile and get adopted for some of the water intensive conventional field crops. The water available for irrigation has been steadily declining since most of the states have already exploited their easily available surface water sources for irrigation. Any further exploitation will call for construction of new dams and reservoirs, which means huge fresh investment, not to speak of adverse environmental impact. Under the circumstances, groundwater is the only source left, whose use again has been increasing continuously thanks to rapid commercialization of agriculture and cultivation of high water-consuming crops. The exploitation of groundwater is crossing socially acceptable limits in agriculturally advanced states like Punjab and Haryana. Water has been used highly inefficiently in Punjab agriculture. In the mid 1980s, there was wastage of water to the extent of 30 % (Bhatia, 1987). In Punjab, water table is falling by up to one meter per year (Chopra and Bathla, 2004). Already 90 % of the 138 blocks of the state have been declared black in terms of water table falling at an alarming rate in these areas (Sidhu, 2002). It is found that 93 % of the paddy farmers had tube wells and 44 % of them had been affected adversely due to the decline in water table. These farmers had to sometimes deepen their tube wells or place the pump sets at a lower place ore in the well itself. This meant an extra cost of Rs. 2000/- for deepening the tube well during the early 1990s and Rs. 4000/- during the late 1990s compared to that during the 1980s (Singh and Kalra, 2002). Now, there is excessive dependence on ground water for irrigation which accounts for 70 % of the irrigated area.

The exploitation of groundwater has also been increasing alarmingly in some parts of Tamil Nadu, Rajasthan, Gujarat, Uttar Pradesh and some Union Territories. In such a scenario, over-exploitation can be easily controlled by switching more areas to drip irrigation (Narayanamoorthy, 1997). One of the significant benefits that farmers obtain from the use of drips is the improved germination rate. The use of drip irrigation increases the germination rate from 60-65 % in the case of conventional furrow irrigation to 90-100 %. This is mainly due to the ability to sow in dry soil with

the use of drip irrigation while pre-irrigation is required for sowing with furrow irrigation. Pre-irrigation makes sowing work more tedious and effort intensive. The higher germination rate translates into benefits of saving on labour costs incurred for the gap filling sowing process (in the spots of failed sowing) with conventional furrow irrigation and also on cost of seeds required for gap filling (Sakthivadivel and Bhamoriya, 2004).

1.2.2Potential for micro irrigation in India

By 2004, only about 0.5 million hectares had been covered under MI against a potential of 69 million hectares (CACL, 2004). In India, almost 1.5 Lakh hectares of fruit crops and 2.5 Lakh hectares of vegetable crops are being added annually under drip irrigation (Khanna, 2004). India has enormous potential for drip irrigation. In fact, with the available technology, it can be used efficiently for some 80 crops including sugarcane, fruits, fibres, nuts, oilseeds, orchards, plantation crops, spices, vegetables, cotton, etc. Among these, sugarcane is one of the water-intensive crops which can be cultivated under drip irrigation. Currently sugarcane is cultivated in nearly 3.7 mh. in India and the area has been increasing steadily in the groundwater tract as it brings better returns. The entire area under sugarcane crop, which is currently under flood method of irrigation, can be brought under the drip method to increase productivity and also save on water as done elsewhere. Groundwater is the most suitable source for drip method of irrigation. It accounts as yet for about 50 % of the total irrigated area. If at least a half of this can be converted to drip method, it will not only extend the area under irrigation but help increase productivity of the crops too as yield is generally more in irrigated area. Furthermore, it will overcome problems resulting from over-exploitation of groundwater, such as fall in water table, increase in the fluoride content of water pumped out from deep aquifers and intrusion of sea water into fertile lands which has been on alarming increase. About 58 million hectares of land is available in the form of fallow land, cultivable waste, barren land, etc. At least, one half of these can be brought under drip irrigation (Narayanamoorthy, 1997). Since India is becoming a major player of flowers, medicinal crops, fine herbs, fruits and vegetables in the international market, it has a huge potential for scaling up MIS adoption (Anonymous, 2004a).

After realizing the vast potential of this untapped sector, the central government has already decided to invest Rs. 61,500 crores (Table 1.2). The tenth plan envisaged to cover 3 million hectare area under MI and the eleventh plan has provisions for coverage of 14 million hectare.

Table 1.2 Projected area and cost estimates for pressurised irrigation systems as suggested by Task Force on MIS

Year	Proposed area for adoption (million ha)			Estimated Cost of adoption (Rs. crore)
	Drip	Sprinkler	Total	
2004-05	0.5	0.25	0.75	2625
2005-06	0.7	0.35	1.05	3675
2006-07	0.8	0.40	1.20	4200
X plan	2.0	1.00	3.00	10500
2007-08	1.0	0.60	1.60	5400
2008-09	1.5	0.70	2.20	7800
2009-10	2.0	0.80	2.80	10200
2010-11	2.5	0.90	3.40	12600
2011-12	3.0	1.00	4.00	15000
XI Plan	10.00	4.00	14.00	51000
Total	12.00	5.00	17.00	61500

Source: Khanna, 2004

1.2.3 Economics of Micro Irrigation in India– The Drip system

A study on organic cotton fields in Nimar Valley in M.P. involving 10 farmers and 16 plots found that there are significant benefits to be gained by pre-ponement of the cropping calendar for cotton as it helps in increasing the net returns from cotton crop, gives the opportunity to access and increase returns from the wheat crop, and drip irrigation is the best way to do so as it enables summer irrigation with use of minimum amount of water and electricity. In the summer months, the supply is irregular and often in short supply. Drip helps in adequate irrigation despite irregular supply as it requires smaller quantum of electricity supply to irrigate even larger area than furrow irrigation. The maximum benefit that accrues to a farmer from the use of drip irrigation results from the opportunity to increase the area under summer sowing. Most of the farmers using drips were able to sustain plants till they stabilized and then shifted the drip to sow another part of their fields in the summer. This increased the benefits many folds. Drip irrigation does result in saving of water if the area and number of days in summer season are kept constant (Sakthivadivel and Bhamoriya, 2004).

Adoption of MI technologies does lead to improved water use efficiency at the individual farm level, unless the technologies are adopted on a large scale, the impact would not be significant at the basin or sub-basin level (Verma *et al*, 2004). It is clear that saving of water as a result of micro-irrigation can result at a meso-level only if a) adopting farmers do not have land to increase irrigated area, and b) a large number of farmers turn adopters in the area concerned. The saved water is being diverted to other uses – to expand area under irrigated cultivation in summers in the Nimar Valley. Thus, there is a need to take careful look at the proposition of using drip irrigation to effect water saving at a basin or meso-level or how to achieve the scale required for it. At the farm level, adopting drip irrigation means a number of benefits – more irrigation with same quantity of water or lesser water for same number of plants as compared to conventional furrow irrigation. It also helps in better irrigation with irregular and lesser power supply. There are significant gains from the increased germination rate that the drip offers to farmers (Sakthivadivel and Bhamoriya, 2004).

A study of drip irrigation of alfalfa crop in Banaskantha district of north Gujarat, a region where intensive use of groundwater for irrigation had resulted in many undesirable consequences and where alfalfa, a highly water intensive crop, is grown extensively and accounts for nearly 13 % of the total water diverted for agriculture in the region revealed that water saving from Family Drip System (FDS of Netafim, India) could be as high as 43 %. The yield rise was in the range of 7.4 to 10.8 %. The overall increase in water productivity was in the range of 17.5 % and 94 %. As regards economic performance, the private gains from using the drip system (B/C ratio ranging from 1.05 to 1.29) are just sufficient to take care of the added cost of installing it. Drip irrigation of alfalfa crop is economically viable (B/C ratio ranging from 1.18 to 1.83) from a macro perspective, if we consider the cost of producing electricity used for groundwater pumping, which is scarce. Economic viability improves (from 1.28 to 2.78) when one considers the price at which water is traded as the value of the resource. For water buyers, private gains from drip system would exceed the cost of the system, if they mange the system properly. Therefore, subsidies to this drip irrigation for alfalfa cultivation would be rational from both social and economic angles (Kumar *et al*, 2004).

In sugarcane, substantial water saving and productivity gains due to the drip method of irrigation has been reported. Single cane weight, girth, length, number of inter-nodes, and leaf length and breadth were also found to be higher with sugarcane cultivated under drip method when compared with that cultivated under flood method. Because of less moisture stress under this method, the recovery rate of sugarcane cultivated was also found to be higher. Importantly, a large-scale adoption of the drip method in sugarcane could help to solve the problem of water logging and secondary salinisation which is growing in some regions (Narayanamoorthy, 2004). A study of drip system in Haryana found that the IRR for drip system were ranging between 14-29 % for different crops under different systems of cropping, and BC ratio ranged from 1:1.76 for grapes to 1:3.70 for citrus (kinnow) which were much higher than those for surface systems (Luhach *et al*, 2004).

Verma *et al* (2004) studied the investment cost of *Pepsee* system in Maikaal region of MP and found that for cultivation of cotton (4×4 feet spacing) in one acre of land using *Pepsee*[1] systems, the total initial investment was calculated to be US$ 92.73 (1 US$ = INR 48). The initial investment for *Pepsee* systems is 41% less than the same for micro-tubes (Table 1.3) and 78% less than the same for conventional drip systems. Low financial investment and water scarcity are major reasons for rapid adoption of *Pepsee* systems.

Table 1.3: Fixed and variable costs of Pepsi system

Heads	*Pepsee* (US$)	Micro-tubes (US$)
Fixed cost	72.92	154.69
Operations and maintenance cost [a]	3.33	2.50
Other variable costs	16.48	1.22
Total	92.73	158.41

Source: Verma *et al*, 2004

a: Amount may vary over years and across farmers.

[1] Small candy manufacturers use light density plastics, disposable in nature, to fill ice candies, which are sold as "*Pepsee*" in the local markets in Maikaal region of Madhya Pradesh. This plastic roll is today being used in place of the drip tubes and is placed directly at the root zone of the plants in that region and it is know as Pepsee system. *Pepsee* systems are low cost substitutes for drip irrigation systems made up of low density polythene ranging from 65–130 micrometers. It is of non ISI standards. In 2001, IDE India recognized the success of this grassroots innovation and came up with its own version of the *Pepsee*, aptly named "easy drip", and targeted largely at vegetable-growing farmers. *Pepsee* systems are viewed as a "stepping stone" to adoption of a higher degree of sophistication and higher cost technologies (Verma *et al*, 2004).

1.2.4 Economics of Sprinkler System

The sprinkler system was first propagated in India during the 1950s but could not become popular due to abundant availability of water. The total area under sprinkler irrigation is estimated to be 6.58 million hectares of the total irrigated are (77.8 million hectares). A study of drip and sprinkler systems in Haryana where 85000 hectares is irrigated with sprinkler system revealed that these systems lead to significant saving in water and the sprinkler system also reduces operational costs as well as labour requirements. In Haryana, the average area under sprinkler irrigated farms was 9.65 hectares and number of irrigations applied 4.77 compared with pumpset based surface irrigation system where these averages were only 3.58 hectares and 3.54 irrigations. The labour requirement for irrigation was also significantly lower in sprinkler system (34 hours/hac/irrigation compared with 153 hours). The average cost of sprinkler irrigation was Rs. 4890 per hectares and per irrigation cost Rs. 1026 compared with Rs.10,100 and Rs. 2853 respectively in surface irrigation. This led to higher per hectare income for sprinkler farmers as against surface irrigation farmers. Also, the sprinkler farmers were able to bring additional area under irrigation. The net present value, IRR, pay back period and BC ratio were found to be 7970, 17 %, 7 years and 1:1.97. Thus, sprinkler system was more water saving, less costly and more efficient compared with surface systems (Luhach *et al*, 2004) which was the finding of another study in Maharashtra as well which compared traditional and modern methods of irrigation and found that modern methods make less excessive use of water and promote optimum utilisation of water and other inputs (Talathi and Hiremath, 2004).

1.2.5 Status of Micro irrigation in India

The economic returns to farmers' investment in micro irrigation are reported to be substantial and the government/s (central and state) in India have been trying to promote the technology through subsidies. But, still the progress is tardy and the micro irrigated area remains a small proportion of the potential (Namara *et al*, 2004). The area under micro irrigation in India is about 1.2 million hectares of which drip system accounts for 0.5 million hectares and sprinkler 0.7 million hectares. This is against the potential of 69 million hectares. However, the potential for both drip and sprinklers is much higher than what has been achieved till now. The potential for Drip is about 27 million hectares and for Sprinklers is about 35 million hectares. The area

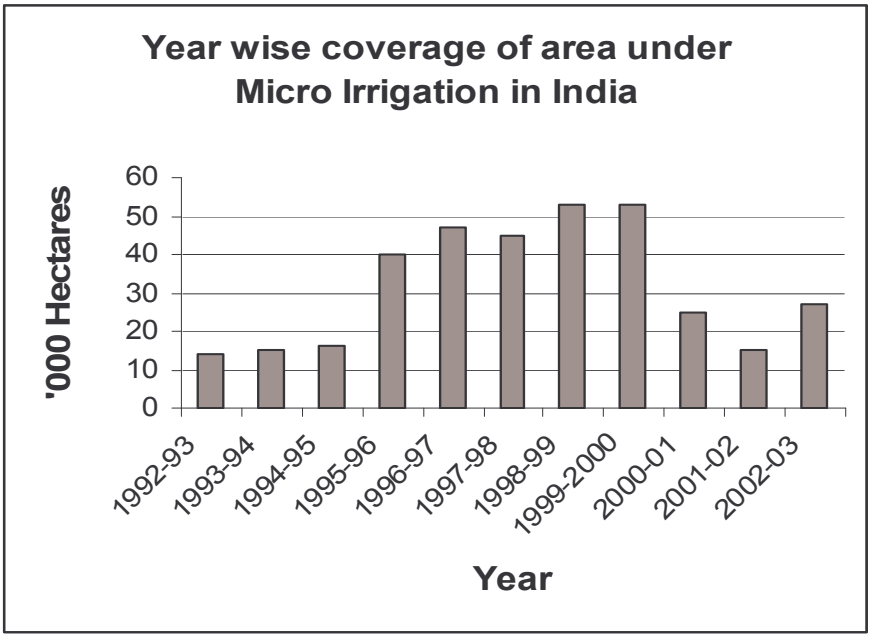
under drip is confined to mainly 12 states in India of which the maximum concentration is in the states of Maharashtra, Gujarat, Andhra Pradesh, Karnataka and Tamil Nadu. The growth of MIS coverage over a period of 11 years from 1992-93 to 2002-03 is depicted in figure 1.1. Area irrigated under drip in India Vs world is presented in table 1.4 (Chopra and Moshawir, 2004).

Table 1.4: Area irrigated under drip system in the World and in India (Ha)

Year	World	India
1970	56,000	---
1988	10,55,000	1,000
1991	16,00,000	55,000
1999	28,00,000	2,54,000
2001	30,00,000	3,10,000

Source: Chopra and Moshawir, 2004

Figure 1.1: Coverage of Micro Irrigation in India

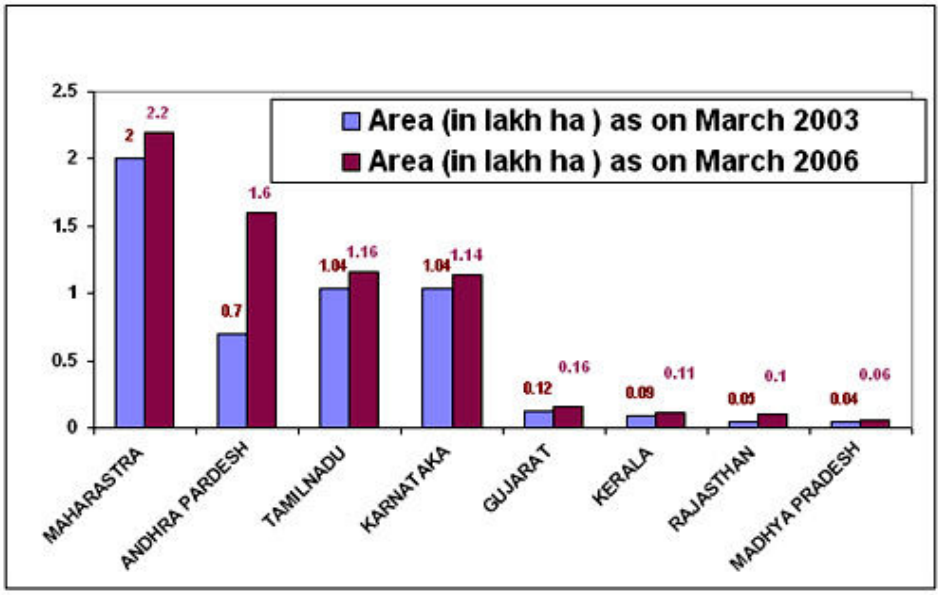


Source: Chopra and Moshawir, 2004

There are seven states which have adopted sprinklers to a significant extent. The major ones are AP, TN, Maharashtra, and Karnataka (Fig. 1.2). However, there are many states which have not taken up drip or sprinklers on a large scale. The major ones here are the North Eastern States, Bihar and Uttar Pradesh (Chopra and Moshawir, 2004). The crops covered under drip system of irrigation are coconut,

banana, grapes, mango, citrus fruits and pomegranate whereas sprinkler is more widely used in oilseeds, pulses and plantation crops (FICCI, 2004). Drip irrigation was introduced during the 1970s and has increased in terms of area from 1500 hectares in1985 to 259500 hectares by 2001 (Luhach *et al*, 2004). India is the second country after USA to implement drip irrigation. Though India started with MI much later in the global scenario, today it is the second largest user of MI technologies (Jain, 2004b).

Fig: 1.2 Status of Drip Irrigation in India: March 2003 Vs March 2006



Source: http://www.aphorticulture.com/apmip_details.htm downloaded on 29.06.2007

Some of the reasons pointed out by some research scholars (refer Verma *et al*, 2004) for the sluggish growth of drip irrigation technologies in India are: (1) high initial capital investment; (2) lack of credit facilities and (3) lack of information. The limited growth of micro-irrigation technologies in India so far can, to a large extent, be explained by the apparent gap between what has been marketed and where the demand lies. Over the years, government as well as non-government agencies have been promoting micro-irrigation as a "new concept in agriculture" through a "package solution" with the following salient features: (1) water saving; (2) good pay back period and internal rate of return; (3) customized and highly sophisticated technology; (4) higher yields and better quality of output; and (5) labour saving. The farmers, on the other hand, have different priorities and concerns. They demand solutions and

technologies that would provide them with: (1) assured returns; (2) lower costs; (3) simple technology; (4) generic applicability; and (5) higher and better yields with fewer pumping hours. Clearly, there is an urgent need to bridge this demand–supply gap.

There is a total lack of awareness building initiatives such as the word of mouth/ or advertisements/ hoardings / database / plays, etc. Lack of clarity on disbursement of subsidy, financial capability of the farmers and credit facility for the farmer are probably the major reason for the slow spread/adoption of MI in India (Jain, 2004a; Naqvi, 2004). Besides, there is a dire need for simple and maintenance free systems and components (Jain, 2004a). Micro-irrigation technologies have tended to become popular where between water and energy, water is scarcer. If the small farmers are to be targeted, policy makers must understand that they would be hesitant in making huge capital investments in new technologies unless they are very sure of their results. Even when they are convinced about the returns, they might not be in a position to incur the huge capital costs owing to poor access to good quality credit options. Unless the farmers feel totally comfortable and competent in handling the technology intended for them, there is little chance that even 60–70% subsidies would bring the desirable results (Verma *et al*, 2004).

1.2.6 Subsidy for micro–irrigation

Jha (2005) argued that being a capital intensive MIS needs to be treated as an infrastructure facility because other consequential benefits outweigh its own principal advantage of water saving. Having been done that the central and state governments have to provide enough financial support and subsidies till MIS get adopted on a scale, for which market can take care of, in leading it further ahead. Since the cost of micro irrigation system is quite high, government is trying to promote its use by providing subsidy and by making various water policies. The area under drip irrigation system has increased from 14000 ha in 1992-93 to 450000 ha in the year 2002-03 (Fig. 1.3). The area under sprinkler system has also increased up to about 700000 ha in the year 2002-03 (TFMI, 2004). But, the total area under micro irrigation system is still just about 1.9 % of total irrigated land.

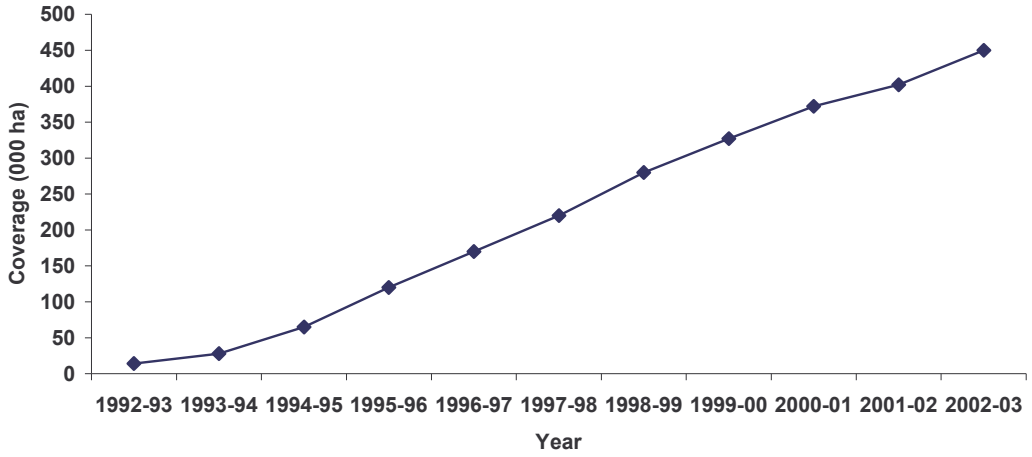


Fig. 1.3: Area under drip irrigation system (Source: Sengupta *et al*, 2004)

It was in 1998 that the then chief minister of Maharashtra initiated the work of drip irrigation in the country by the means of government support in the form of the first ever state subsidy scheme. This was further promoted by the implementation of the centrally sponsored scheme for sprinkler and MI in the VII and VIII plans, respectively. It was the late Deputy Prime Minister of India, Mr. Devilal who allocated Rs. 200 crores worth of subsidies for drip irrigation in 1992. Thereafter, a task force on MI had been constituted in 2003, by ministry of finance under the chairmanship of Shri. N. Chandrababu Naidu to suggest strategies to expand coverage of area under MI in the country. Central government is giving 25 % of financial assistance for MI in all the states of the country (Naqvi, 2004).

APMIP is one of the biggest projects in the world to promote irrigation. It has a target of covering 2.5 Lakh hectares of land under MI within a time frame of two years with an investment of Rs. 1200 crore (Anonymous, 2004b). As on 31 March 2006, the project brought 1.66 lakh ha under MIS by investing Rs. 419.91 crores with the subsidy assistance of Rs 209.96 crore (http://www.aphorticulture.com/apmip_details.htm). Rajasthan Government propelled the distribution of almost 2 Lakh sprinkler sets till 2003-04 investing around Rs. 175 crore (Sharma and Kumar, 2004).

Upto 1999-2000, the Government of India provided assistance for drip installation for horticultural crops @ 90% of the cost of the system or Rs.25000 per ha, whichever is less for small & marginal, SC/ST and women farmers and 70% of the total cost or Rs.25000 per ha, whichever is less for other category of farmers. Assistance was also provided for drip demonstration @ of Rs.22, 500 or 75% of the system cost per hectare whichever is less. During the ninth five year plan, differential subsidy was provided benefiting small, marginal, SC/ST and women farmers. The subsidy was 50% of the cost to small, marginal, SC/ST and women farmers subject to a maximum ceiling of Rs. 50,000/- per ha. and 33% of the cost subject to a maximum ceiling of Rs. 10,000 per ha for other category farmers. During the Tenth Five Year Plan, the subsidy was reduced to 25% for all categories of farmers. The emerging scenario of slashing subsidies (Table 1.5) and the failure of the government to pay back the companies has resulted in increase in farmer prices of the micro irrigation system and also the formulation of individual price decisions by the companies. These increasing prices may lead to lesser adoption of the micro irrigation system and irrigation companies need to make extra effort to increase their sales. In this situation irrigation companies marketing strategy would play vital role in their business (Sengupta *et al*, 2004).

Table 1.5: Subsidy Pattern for micro irrigation

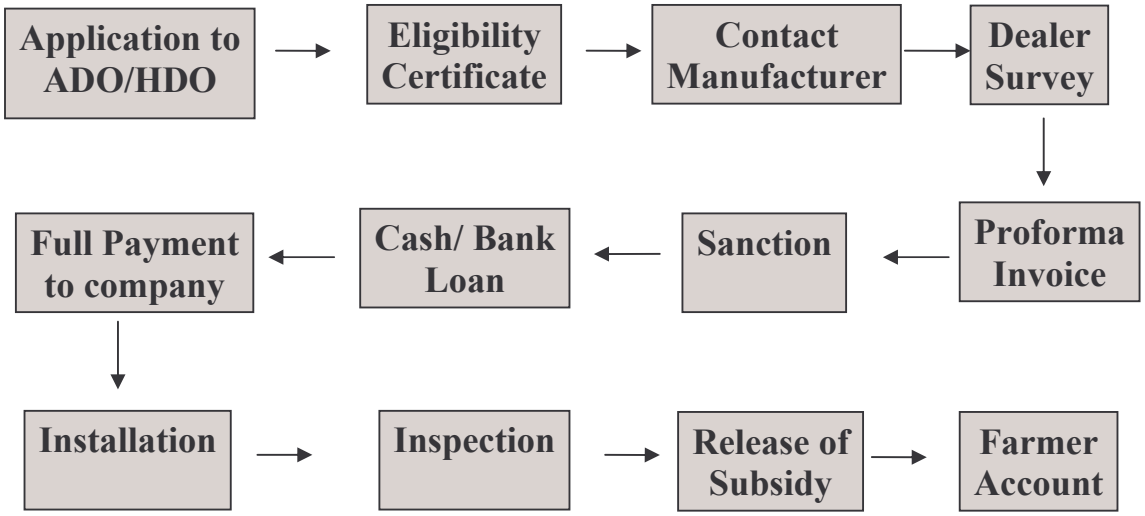
Year	Percentage Subsidy	Area Restriction
1989-1993	25-33	2 Ha
1993-1995	33-50	2 Ha
1995-1997	50	2 Ha
1997-2000	70-90	No restriction
2000-2002	35-50	4 Ha
2002-2004	25	4 Ha

Source: Chopra and Moshawir, 2004

It was feared that the subsidy reduction would reduce the sales of irrigation companies. But on the contrary, subsidy reduction has not affected their business and their sales have gone up. The declining water resources and government policy of fixed timing for electricity in rural areas have motivated farmers to use water saving techniques like drip system for irrigation purpose. The increasing level of awareness among farmers for water saving techniques has also increased the business of irrigation companies. In the higher subsidy regime, farmers were used to wait for government announcement for subsidy hike to purchase micro irrigation system, but

now, since amount of subsidy is very low, they don't care about it and purchase system whenever they realize its need. Companies also provide them cash discount which compensates for subsidy reduction. Before the Tenth five year plan, subsidy claim was the sole responsibility of the companies; they had to go for large documentation formalities before getting the money, the process was bit tedious and companies were spending significant time in this process but now government policy of providing benefit of subsidy directly to the farmers has made the work of companies easier (Sengupta *et al*, 2004).

Figure: 1.4 Schematic Representation of the Process of Availing Subsidy



Source: Chopra and Moshawir, 2004

1.2.7 Determinants of Adoption of Drip irrigation method

Phansalkar and Verma (2006) termed drip irrigation to be a silver bullet considering its highly favourable income effect, low entry cost; favourable effects on field-level water use efficiency; and significant poverty impacts. According to their study, after nearly two decades of promotion of conventional drip systems and about seven years work of International Development Enterprises, India (IDEI), drip systems have been adopted by not more than 1.5 % of the total potential users. Some reasons for low spread of drip irrigation can be traced to the perception of high investments needed for the adoption of drip system, prevalence of row crops such as staples for which drips are not optimal, flat tariff on electricity that reduces farmers incentives to

economize on pump usage, insufficient concern about saving of water and perceptions that drip systems lead to inflexibility in crop choices.

Micro irrigation is often associated with the capital intensive, commercial farms of more wealthy farmers and the systems used on large farms are often unaffordable for small farmers and are not available in sizes suitable for small plots (Namara *et al*, 2004). An important reason for lack of use of drip irrigation for conventional crops is that the technology has been viewed worldwide as a tool for precision irrigation rather than "water saving" irrigation. The demand for this technology in an area is primarily driven by considerations of the degree of precision and quality to be maintained in irrigating the crop, and therefore is determined by the type of crops that are dominant in an area; whether "high value" or "low value". In India, scale of adoption of micro irrigation is remarkable in regions where farmers have taken to growing high value crops. The past research focused heavily on high value fruit and row crops and large farmers. Little research based information is available in the country on the technical feasibility and economics of drip irrigation for conventional crops, though availability of water has become an important limiting factor in crop production. More importantly, very little research has really gone into innovating drip technology to make it cost effective, versatile, and economically viable for the more common crops. All these factors have posed constraints in scaling up adoption of drip irrigation technology (Kumar *et al*, 2004).

A study of micro irrigation systems (drip) in Gujarat and Maharashtra found that the major determinants of the micro irrigation adoption are: level of education of the household members, access to ground water and the technical characteristics of the well and the associated infrastructure such as pumps, cropping pattern, the social stratum of the farm household and the significance of agriculture in the total household economy. Surprisingly, farm size was not found to be a significant predictor of micro irrigation adoption. This is so as micro irrigation systems are increasingly becoming scale neutral due to farmers' own innovations in this field e.g. *Pepsee* systems in Maikaal area in M.P. and the efforts of development agencies like the IDE and other NGOs to redesign or develop systems which are accessible to the majority of the irrigators (Namara *et al*, 2004). This is somewhat different from what was found in study of determinants of adoption and use of drip irrigation in the USA in the early

1990s where water saving, experience and exposure to the technology, farm size, and type of crop (ratoon or plant) were found to be significant determinants of adoption of drip irrigation technology (Shrestha and Gopalakrishnan, 1993). In M.P. as well, the variation within the drip irrigating farmers with respect to water use in cotton crop clearly indicated that there were perceptional barriers to drip irrigation as a water saving medium for the farmers (Sakthivadivel and Bhamoriya, 2004).

Combine harvestors

Combine harvestor can reduce crop loss, reduce problem of peak labour shortage by combining the activities of harvesting, threshing, winnowing, and collection of grains and chaff. The field capacity of a combine is 0.7-1.0 acre crop harvesting per hour depending on the moisture content of the soil during harvesting (NABARD, 2005a).

There are more than 60 manufacturers of combines in Punjab with most of them located at Barnala in Barnala district, and Nabha and Bhadson in Patiala district. The major ones include: Standard, Balkar, Panesar, KS Agro (Dashmesh), Preet, Sansar and Hira. The later three are into self propelled combines. Kartar Agro at Bhadson is the oldest self propelled combined maker. Standard started making tractor driven combines in 1981. Before that, it was making self propelled ones. The cost of self propelled combine is Rs. 12 lakh and that of the tractor driven Rs. 4-5 lakh. That's why, tractor driven combines are more popular now. But, there are hardly any studies on combine harvestor industry and its use except reports by NABARD on the use of combine harvestors in Tamilnadu.

4. Need for the Study

Though tractor industry is well established and there have been studies of tractor purchase and use behaviour during the past, there has been no recent studies on the growth, structure, and competition dynamics and the firm behaviour and strategies in the light of the changing nature of the tractor market in terms of its locational shift and saturation in the traditional pockets of it symbolized by the emergence of second hand tractor markets and entry of many new home grown players in the market.

On the other hand, not much is known about the structure and organisation of the combine harvester and micro irrigation industry. At least, there is little documented evidence on these industries in India. Also, many of the combine harvester makers have diversified into tractor manufacturing and marketing more recently. There are some of the homegrown tractor producers in the country producing either both tractors and combine harvesters or only tractors. They have carved a significant niche for themselves in the recent past. Therefore, it is interesting and important to examine this phenomenon of indigenous growth and diversification in an increasingly competitive market for tractors. Further, there are no studies on micro irrigation equipment industry which is growing in importance due to changing cropping pattern and need for and focus on water saving technologies.

5. Objectives of the Study

In the light of the above, the study:

1. examines the nature of growth, and market structure in the tractor, thresher/reaper/combine harvester and micro irrigation equipment industries
2. explores the changing nature of demand in these industries especially tractor and harvesting industry
3. analyses the marketing and business strategies of the various types of players in this market like bundling of inputs, diversification, consolidation, etc. and
4. examines the tractor, combine harvester and micro irrigation equipment market with focus on buying aspects and underutilization especially functioning of the second hand tractor markets

6. Scope and Methodology

The study takes a case study approach and examines the industry as a chain of actors i.e. manufacturers and marketers, dealers and user farmers in order to understand the dynamics of the market in each industry sector.

Three industries within the agricultural machinery sector – tractor, combine harvestor and micro irrigation have been studied with focus on major locations of the industry especially that of the tractor and the combine harvester industry. The study begins

with secondary data based analysis and goes on to case studies of firms in both the industries with a view to understand their marketing and business strategies. It also analyses dealer and farmer level data to understand distribution level issues and strategies. Given the concentration of combine harvesting industry in a few towns in Punjab (Nabha and Bhadson in Patiala District) which accounts for 87% of the total units in India, and the emergence of some of these players as tractor manufacturers and marketers, besides the location of more than half a dozen tractor players in that region (Punjab, Haryana, and HP) (International Tractors, Preet Tractors, Standard Tractors, Indo Farm Tractors, Punjab Tractors, and the HMT), the case studies are conducted in these areas and focus on players who are into both combine and tractor business or were earlier into threshers business. Bhadson in Patiala is one of the natural modern small scale industry based high export potential horizontally coordinated agricultural implements cluster which has high scope for technological up gradation. Similarly, Moga district is horizontal natural cluster for wheat threshers with low export potential and high scope for technology upgradation (Singh and Jain, 2007).

On the other hand, some of the micro irrigation equipment firms, most of whom are based in western India, have been studied to understand their growth and business strategies. Dealer level analysis is carried out to understand the distribution dynamics in tractor and micro irrigation equipment sectors. There was no practice of dealership in combine harvestor industry. Farmer level analysis is carried out to understand the purchase and use practices in all the three industries.

Table 1.6: A profile of units, dealers and farmers studied across industries

Industry Sector	Location/s (state/s)	Companies/Units studied	Dealers interviewed	Farmers interviewed
Tractors	Punjab and Gujarat	Two new large scale and two small tractor mfrs.	36	23
Combine harvestors	Punjab, Gujarat and Maharashtra	3 large and 16 samll-scale	-	42
MI equipment (drip and sprinkler)	Gujarat	4	14	34
All		26	50	99

7. Chapterisation

The next chapter examines the secondary data to understand the profile and growth of the agricultural machinery industry followed by chapter 3 which examines the new players in the tractor industry specially home grown players who have moved into tractors from other businesses like threshers, combines etc.. This is followed by the perspectives of dealers of tractors in chapter 4 and the tractor farmers' purchase and use behaviour in chapter 5. Chapter 6 examines the combine manufacturers' profiles and strategies especially focusing on small scale (un) organised sector players and chapter 7 deals with the combine owners' perceptions and experiences of using the machine. Chapter 8 examines the profile and strategies of micro irrigation equipment companies, followed by analysis of the industry structure and conduct at the dealer and farmer level in chapters 9 and 10 respectively. The conclusions and recommendation from the study are presented in chapter 11.

Chapter 2

Growth and Use of Agricultural Machinery in India

Introduction

Agricultural machinery and implements are an important factor in agricultural production and productivity enhancement. There are direct as well as indirect effects of agricultural machinery and implements on productivity through better use of other inputs, more efficient and timely completion of agricultural operations and increase in cropping intensity (Venugopal, 2004). But, the adoption of machines is the result of many factors at the farm level like size of land holding, irrigation, labour, credit and risk orientation and socio-economic profile of the farmer. Still, level of mechanization of agriculture in India remains low (tables 2.1 and 2.1.1 to 2.1.4.). Except a few states like Punjab, Haryana, U.P., Rajasthan and Tamilnadu, the area under five major crops being tilled with tractors is low and, that too, is largely with hired tractors. Though it is not necessary for each farmer to own a tractor, but hired use also shows that there is scope for higher penetration of tractors provided their viable use can be made possible. This is also reflected in the number of tractors per 1000 hac of operated area (table 2.2).

Table 2.1: Level of mechanisation in Indian agriculture in 1996

Operation	% of cultivated area mechanized
Tillage	40.2
Tractor	15.6
Animal	24.7
Sowing with seed drill/seed-fert drill	28.9
With tractor	8.3
With animal	20.6
Irrigation	37
Wheat threshing with thresher	47.8
Paddy threshing wth thresher	4.4
Harvesting with reaper	0.56
Harvesting with combine	0.37
Plant protection	34.2

Source: Venugopal, 2004.

Table 2.1.1: Farm power availability in India – total and source-wise in %

Year	Total farm power (KW/ha)	Animate		Mechanical	Electrical
		Human	Animal		
1951-52	0.25	97.40	2.10	0.50	--
1961-62	0.31	94.90	3.70	1.40	--
1971-72	0.30	15.11	45.26	25.86	13.77
1981-82	0.47	10.92	27.23	44.10	17.70
1991-92	0.76	8.62	16.55	53.93	20.90
2001-02	1.23	6.49	9.89	62.36	21.26
2005-06*	1.50	5.77	8.02	65.47	20.74

*estimated
Source:Mehta, 2007

Table 2.1.2: Comparison of mechanization with other countries, 2001

Country	Farm power (KW/ha)	No. of tractors per 1,000 ha	No. of combine harvesters per 1,000 ha
India	1.23	9.43	0.026
Japan	8.75	456.24	234.42
UK	2.50	88.46	8.32
France	2.65	68.52	4.93
Italy	3.01	201.90	6.24
Germany	2.35	87.26	11.43
Pakistan	-	14.92	0.074
Egypt	-	31.32	0.8311

Source: Mehta, 2007

Table 2.1.3: Farm machinery availability in India

Agricultural operations / Machine	No. in lakh*		Command in percentage of net area sown
	1992	2003	
Tractors	12.22	23.61	25.0
Seed-drill			
(i) Tractor drawn	3.90	73.50	11.25
(ii) Animal drawn	51.03	23.77	12.06
Threshers			
(i) Wheat	10.76	7.26	17.0
(ii) Paddy	0.35	1.61	2.21
(iii) Multicrop	1.68	6.81	5.76
Plant protection equip.	29.56	58.31	48.39

Source: Mehta, 2007

Table 2.1.4: Growth of Agricultural machinery

Equipment	Population (Hundreds)		No. per 1,000 ha net area sown		Percentage change
	1992	2003	1992	2003	
Horticultural tools (power operated)	NR	12,681	-	8.9	Not calculated
Tractors	12,218	23,612	9.3	16.7	93.3
Power-tillers	3,297	2,799	2.5	2.0	(-) 15.1
Tractor-operated disc-harrow	6,456	9,330	4.9	6.6	44.5
Tractor-operated Cultivator	NR	17,715	-	12.5	Not calculated
Tractor-operated Rotavator	NR	1,330	-	0.9	Not calculated
Potato digger	975	2,955	0.7	2.1	203.1
Straw reaper	NR	26,605	-	18.8	Not calculated
Forage harvester	NR	25,739	-	18.2	Not calculated

NR: not reported
Source:Mehta, 2007

Table 2.2: State-wise Percentage of Mechanically-Tilled AFMC, Use of Hired Tractors and Power Tillers in India (January, 1998-June, 1998)

State	% of Tractor Tilled AFMC	% of Tractor Tilled AFMC Tilled with Hired Tractors*	No. /10,000 Ha.of Operated Area (1992)*	
			Tractor	Power Tiller
Himachal Pradesh	15	93	53	3
Jammu & Kashmir	36	89	27	6
Haryana	94	57	387	318
Punjab	97	34	1024	584
Uttar Pradesh	76	79	215	58
Gujarat	67	72	103	0
Rajasthan	89	79	91	10
Madhya Pradesh	36	63	73	12
Maharasthra	16	75	34	2
Andhra Pradesh	51	75	48	1
Karnataka	27	74	50	11
Kerala	15	73	3	15
Tamil Nadu	59	80	66	18
Assam	11	64	0	23
Bihar	48	75	59	25
Orissa	12	75	5	2
West Bengal	47	92	37	86
Arunachal Pradesh	9	44	3	0
Manipur	48	94	6	6
Tripura	37	76	9	18
India	54	72	109	41

Abbr.: AFMC : Area Under Five Major crops.
Source: Cultivation Practices in India, NSS Report No. 451, 54th Round (January, 1998-June, 1998).

Further, most of the machines and implements were used more by small and marginal farmers compared with that by medium or large farmers though it was used on hire.

But, total tractor use in terms of hours per tractor was higher on large farms (607.63) compared with that on medium (547.92) and small farms (503.9) (Venugopal, 2004). In Punjab, which has the largest number of tractors per thousand hectares, tractors were being underutilized at a much larger scale in small farms (77%) as against only by 50% and 32% in medium and large farms respectively with the overall idle tractor power being 43% for the region (Bathinda district). This indicates overcapitalisation of small farms in the state which has led to higher costs of cultivation due to fixed cost component. Even electric motors and diesel pumps which number more than 11 lakh in the state (GoP, 2005), were being grossly underutilized on small farms (16% and 84% respectively) as against overuse of the electric motors to the extent of 11% on both medium and large farms and underutilization of diesel pumps to the extent of 67% and 38% respectively (Singh and Sharma, 2004). Also, the machinery costs on small farms accounted for as much as 23% of all operating costs in 1991-92 and were no different from those on large farms (Jha, 2001).

Horse power of tractors and soil type mismatch

Surprisingly, for Punjab, Haryana, Rajasthan U.P., Orissa and Bihar, the recommended HP, given their soil conditions, was low but they all had most of the tractors being sold during the late 1990s in high HP category i.e. 31-40 HP or above 40 HP (Venugopal, 2004). Thus, 82% of all tractors sold in India were in these two HP categories. Where as medium and large farmers had higher on-farm use of tractors (44-47%), small farmers had higher hired use of their tractor (66%) (Venugopal, 2004).

An agro-climatic study of tractor owners and non-owners across states showed that in Gujarat the average rate of custom hiring with Disc and Cultivator was Rs. 942 per hac and Rs. 507 per hac respectively. The average rates for combine, harvester and thresher were Rs. 388, Rs. 316 and Rs. 270 per hac respectively in all the selected districts IASRI, 2006). In Punjab, the average custom hiring with disc plough was between Rs. 305 and Rs. 748 per hac. For combine harvestor, the custom hiring rate was between Rs. 639-1107 per hac and for tractors with harvester/thresher, it was between Rs. 254 and Rs.738 per hour (IASRI, 2006).

The northern region comprising of Punjab, Haryana, Delhi, Chandigarh and Rajasthan has more than 300 registered small scale agricultural machinery units and 9 tractor manufacturing units manufacturing tractors with horse power ranging from 20-70. The harvesting of wheat and paddy is highly mechanised (upto 80% mechanically harvested) in this region. In Punjab, cropping intensity was higher on non-tractor owning households though landholding was higher for tractor owning households. The number of tractors, power tillers, electric motors, diesel engines and draught animals per hac of net sown area was found to be 130, 2, 189, 229, and 245 respectively (IASRI, 2006). Six states –Punjab, Haryana, Gujarat, Rajasthan, M.P., and U.P. account for 78% of the total tractor population in the country.

Besides tractors, power tillers are the other major machines introduced in India in 1962 as a substitute for tractors which very small farmers could not afford viably. By 1993-93, almost 9000 power tillers were being sold annually. The growth rate in the production and sale of power tillers has been higher than that of tractors (table 2.3). But, the production is only 25% of the capacity (40,000) to produce tillers in India despite the subsidy for power tillers under various government schemes.

Power tillers are manufactured by two organised sector units and many small scale units with total production reaching 15665 in 2003-04 (table 2.4) from just 329 in 1965-66. Most of the power tillers are in the range of 5-12 hp. But, higher hp tillers are being imported. The growth rate of power tillers has been higher than that of the tractors both in production as well as sales though initial base is very small (table 2.5).

Table 2.3: Type of Farm Machinery Industries in India (2000-01)

Equipment	No. of Units
Agricultural tractors	14
Power tillers	7
Agricultural tools and implements	6980
Combines	15
Reapers	45
Tractors parts and accessories of agricultural machinery	546
Earth moving machinery and parts	188
Diesel oil engines	200
Rice processing machinery	300
Dairy and food industries	500

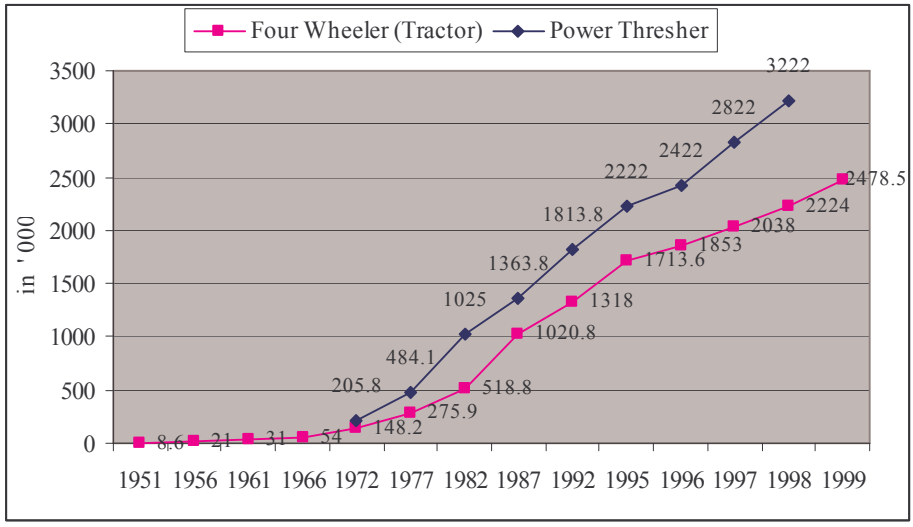
Source: Agricultural Research Data Book, 2001.

Table 2.4: Production and Sale of Tractors and Power Tillers in India (1982-83 to 2005-06)

Year	Production (No.)		Sale (No.)	
	Tractors	Power Tillers	Tractors	Power Tillers
1982-83	-	-	63073	2221
1983-84	-	-	74318	2901
1984-85	-	-	80317	4222
1985-86	75550	3706	76886	3754
1986-87	80369	3325	80164	3209
1987-88	92092	3005	93157	3097
1988-89	109987	4798	110323	4678
1989-90	121624	5334	122098	5442
1990-91	139233	6228	139831	6316
1991-92	151759	7580	150582	7528
1992-93	147016	3648	144330	8642
1993-94	136971	9034	138879	9449
1994-95	164029	8334	164841	8376
1995-96	191311	10500	191329	10045
1996-97	221689	11210	220937	11000
1997-98	255327	12750	251198	12200
1998-99	261609	14480	262322	14488
1999-00	278556	16891	273181	16891
2000-01	255690	17315	254825	16018
2001-02	219620	14837	225280	13563
2002-03	168742	14438	173098	14613
2003-04	190687	15850	190336	15665
2004-05	-	-	247693	17481
2005-06*	-	-	161155	1795

Note : * : Provisional till October, 2005.
Source : Department of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India.

Fig 2.1: Number of Agricultural Tractors and Power Threshers in India



Note: Data for 1992, 1995,1996,1997,1998 and 1999 are collected from Manufacturers Association.
Source: Agricultural Research Data Book, 2001 & Past Volumes.

Table 2.5:Growth of tractors and powers tiller in India

Particulars	Production (No.)		Sale (No.)	
	Tractors	Power Tillers	Tractors	Power Tillers
Growth period	1985-86 to 2003-04		1982-83 to 2004-05	
No of years	18	18	22	22
CAGR (%)	5.28	8.41	6.42	9.83

Source: Calculated based on the data of Department of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India & Past Issues.

State wise growth of agricultural implements and machinery

In 1960-61, India produced 880 tractors and imported 2997 tractors. In 2004-05, India produced 2.5 lakh tractors and the population of tractors had risen to 30 lakhs. Similarly, the energised pump sets (both electric and diesel) stood at 160 lakh. Overall, the investment in agricultural machinery which was Rs. 1000 crore in 1950-51 stood at Rs. 50,000 crore in 2004-05 (IASRI, 2006). Consequently, the average farm power availability went up from 0.25kW/hac in 1950-51 to 1.35kW/hac in 2001. There was also a shift from animal power to machines with the former accounting for only 185 of all farm power in 2001 compared with 97.4% in 1951. But, there are also large regional variations with Punjab topping the list with 3.5kW/hac in 2001, but, it was only 0.90 kW/hac in many states like Orissa and Rajasthan. Further there was positive relationship between farm power availability and yield of food grains over 1951 to 2001.

Data for Bihar, UP and MP were clubbed with recently divided states Jharkhand, Uttranchal and Chattishgarh states, respectively for comparison between 1992 and 2003.

Data have been organized in descending order as per 2003 figures. Percentage of individual state in India is calculated for the respective year.

Growth formula= ((A-B)/B))*100

Where,

A=last year value

B-first year value

Table 2.6: Major State-wise Sale of Tractors in India (1996-1997 to 2000-2001)

State	1996-97	1997-98	1998-99	1999-00	2000-01	CAGR (%)
Andhra Pradesh	14291	11169	10052	16911	17958	5.88
Assam	333	600	450	519	517	11.63
Bihar	7755	10223	13120	13230	18031	23.48
Gujarat	19139	21511	23238	17747	12365	-10.35
Haryana	21332	22711	22361	21100	17978	-4.19
Himachal Pradesh	271	457	499	697	514	17.35
Jammu and Kashmir	427	502	704	662	512	4.64
Karnataka	12000	10174	6822	8245	11801	-0.42
Kerala	919	537	539	778	641	-8.61
Madhya Pradesh	22450	32248	34686	28815	23099	0.72
Maharashtra	17602	15053	16522	18742	16733	-1.26
Orissa	2279	2668	2012	2524	5031	21.89
Punjab	26160	30862	30550	27679	24397	-1.73
Rajasthan	21113	25148	24589	26664	15447	-7.51
Tamil Nadu	11528	10396	7442	9554	10247	-2.90
Uttar Pradesh	38766	50435	60342	69665	68354	15.23
West Bengal	1940	2283	3188	3397	3539	16.22
Export and Others	4464	3668	5135	6252	7661	14.46
Total	222769	250645	262251	273181	254825	3.42

Source: Central Water Commission

There was an overall increase in number of tractors in India across all states during the decade of 1990s with very sharp growth in Orissa, MP and Bihar which was above the national increase of 107%. On the other hand, share of Punjab and Haryana came down during this period (table 2.7). This is despite the fact that the price of tractor, especially higher end HP ones is increasing significantly, jumping from a highest of Rs. 2.3 lakh to a highest of Rs. 3.4 lakh within two years (table 2.8).

Table 2.7: Growth in No. of Tractors in 2003 over 1992.

States/UTs	1992		2003		Growth over 1992
	in '00	%	in '00	%	%
Uttar Pradesh	3466	28.37	7249	28.62	109.15
Rajasthan	1458	11.93	3346	13.21	129.49
Punjab	2130	17.43	3050	12.04	43.19
Madhya Pradesh	901	7.37	2846	11.24	215.87
Haryana	1562	12.78	2054	8.11	31.50
Gujarat	662	5.42	1560	6.16	135.65
Maharashtra	463	3.79	1102	4.35	138.01
Andhra Pradesh	569	4.66	1028	4.06	80.67
Bihar	140	1.15	1025	4.05	632.14
Karnataka	397	3.25	799	3.15	101.26
Tamil Nadu	295	2.41	670	2.65	127.12
West Bengal	65	0.53	184	0.73	183.08
Orissa	23	0.19	169	0.67	634.78
Other states	87	0.71	246	0.97	182.76
India	12218	100.00	25328	100.00	107.30

Table 2.8: Model-wise Number and Approximate Cost of Manufacturing Tractors in India (1999-2000 to 2001-2002)

Model	Horse Power	2001-2002		2000-2001		1999-2000	
		No.	Cost	No.	Cost	No.	Cost
2522	25	1067	Approx.1.65 to 3.40 (Rs. in Lakh)	1410	Approx.1.55 to 3.10 (Rs. in Lakh)	2513	Approx.1.50 to 2.30 (Rs. in Lakh)
3022	30	146		533		1213	
3522	35	5660		7328		8253	
4511	45	213		930		1410	
4922	49	1216		292		-	
5911	58	1450		2901		2946	
7511	75	48		65		-	
Total		9800		13459		16335	

Source: Lok Sabha Unstarred Question No.3787, dated: 08.08.2002.

Further, social category wise, it was mostly landed and upper castes and OBCs which own tractors with SC and ST farming hhs possessing only one tractor per 100 hhs (table 2.9). In terms of land holding, it is mostly the medium, large and small holders who owed tractors (table 2.10). But, here are wide variations across state e.g. Punjab compared with other two study states had tractor ownership even among sub-marginal and marginal landholders (table 2.11). Table 2.12 shows state-wise variations in tractor ownership ranging from 18 in Punjab to almost nil in Orissa and Kerala.

Table 2.9: Farmer category-wise tractor density in India

Farmer Category	No. of tractors per 100 hhs
SC	1
ST	1
OBC	3
Others	5
India	3

Source: NSSO report no. 497.

Table 2.10: Tractor density according to size of holding

Land holding (hacs.)	No. of tractors per 100 hhs
<0.01	0
0.01-0.4	0
0.41-1.00	1
1.01-2.00	3
2.01-4.00	8
4.01-10.00	18
>10.00	38
All classes	3

Source: NSS Report No. 497. 2003.

Table 2.11: state wise and farmer holding wise tractor density in India (tractors/1000 farm hhs)

Farmer land holding category (hacs)	Punjab	Gujarat	Maharashtra	India
<0.01	0	7	0	2
0.01-0.4	2	0	0	2
0.41-1.00	105	8	4	11
1.01-2.00	132	32	7	25
2.01-4.00	471	64	13	75
4.01-10.00	705	101	52	189
>10.00	1178	357	184	375
All classes	179	31	13	29

Source: NSSO report No. 497

Table 2.12: State wise tractor density in India

State	No. of tractors per 100 farm hhs
AP	1.4
Assam	1.3
Bihar	1.6
Chhatisgarh	1.1
Gujarat	3.1
Haryana	10.9
J&K	2.8
Jharkhand	0.7
Karnataka	1.4
Kerala	0.2
MP	4.0
Maharashtra	1.3
Orissa	0.2
Punjab	17.9
Rajasthan	5.6
Tamilnadu	1.3
UP	4.5
WB	0.6
India	2.9

Source: NSSO report no. 497.

Second hand markets for tractors

There are daily, weekly, and fortnightly markets for the sale and purchase of second hand as well as new tractors in various market towns of Punjab where thousands of farmers participate and sell or buy tractors (primary survey). In a state which today has more than 4.6 lakh tractors accounting for ¼ of the total population of tractors in the country with just 2.5% of cultivated area, this phenomenon is both encouraging as well as disturbing. With only about 11.17 lakh operational holdings in the state, it means that every third holding in the state is equipped with a tractor. In some villages, there is a tractor for every five acres of land. Added to this is the fact that more than 70% of the farms are below 10 acres each (GoP, 2005). Moga and Barnala (both district towns) are the largest markets in terms of number of farmers visiting and the number of tractors brought for sale with Talwandi Sabo (in Bathinda district) emerging as the third largest.

There are more than a dozen tractor markets mainly in the cotton belt of the state, which facilitate buyers and sellers of second hand tractors in quick transactions. There are different reasons for the sale of old tractors which relate to the larger agricultural

economy of the state. The non-viability of the tractors due to the small size of the holdings, domestic financial crisis, repayment of bank or other loans, purchase of land, change of model/brand/horse power of the tractor, lack of business for tractors due to their over population and competition, sale and purchase of tractors as a business proposition, and change of occupation are the major reasons for sale of tractors in these markets (Singh and Kolar, 1998). The buyers are satisfied with the operations of these markets as they find a ready market and can liquidate the tractors and other equipment in a short time to meet the exigencies. However, only a small proportion of those who sold tractors, bought another one from the tractor market (primary survey).

The operations of these markets are in the hands of a number of informal groups known as "Mandis" in each market. They are nothing but collectivities of a few individuals (5-15) who operate as commission agents inside as well as outside the market. These groups generally lease in land for the market, outside the town on an annual basis and share this cost among them. This is the major cost. Other costs are working costs for facilities like tents, chairs, etc. About a few hundred tractors in a small market and a few thousand tractors in bigger markets are brought every time (weekly or fortnightly) a market is held, and a few (20-50) are sold every such time. The tractor model and price are displayed on the tractor to facilitate buyer-seller interaction. The commission agents also provide other facilities like space for parking the tractors, and chairs and tents for the farmers. On every transaction, the agents charge Rs. 300-500 up to a transaction of Rs. one lakh and Rs. 600- 1,000 on a transaction of above Rs. one lakh each from the buyer as well as the seller. The payments are made either on the spot or within a week after paying security. The commission agents are responsible for ensuring the payments (primary survey, table 2.13).

Besides the facilitation of business among farmers at one place which lowers search and transaction costs, these markets also generate employment for those who cater to the needs of the people assembled in the market. Further, since these markets supply second hand tractors, small and medium farmers are able to mobilise money to buy these tractors which are low cost and easily available besides being relevant for these classes of farmers. Recently, even the tractor sales agencies have realised the value of

these markets and have started displaying their new models of tractors in these markets so that farmers are made aware of their features and the new product is publicised among the potential buyers.

These markets are totally un-regulated by any government agency, but they function fairly efficiently so far as farmers are concerned. Only in one of the markets, the District Collector has allowed the union of these Mandis to issue licenses (identity cards as agents for tractor sales and purchase) to the members of the mandis. Also, the buyers and sellers are made to pay a red cross fee of Rs. 50 per transaction each (primary survey).

Table 2.13: Profile of Second-hand Tractor Markets in Punjab

Name of market Parameter	Talwandi (Bathinda)	Jhunir (Mansa)	Mour (Mansa)
Frequency of Market	Weekly	Weekly	Weekly
Day of market	Wednesday	Thursday	Friday
No. of facilitators	60	7	12
Major buyers	Farmer, Scrapper, Tractor agent	farmer and tractor agent	farmer nad tractor agent
No. of tractors in market for sale	20 -30	20- 40	15 - 20
Staff at each facilitation centre	6 -7	6 - 7	5 - 6
Major brand for resale	Eicher, Farmtrack	Eicher (90%)	Eicher (90%)
Place of origin of second hand tractors	Punjab, Haryana, Rajsathan	Malwa region only	Malwa region only
Rent of plot used as market place (annual)	Rs. 30,000 to 60,000	-	-
No. of tractors sold per facilitator	6 -7	3 -4	1- 3
Share of second hand tractors in market	79%	99%	100%
Facilitators' cost per mandi day	Rs. 800 to 1000	Rs. 800 to 1000	Rs. 800 to 1000
Facilitator's Commission	1% of sale price	Rs. 300 each from both the parties	depending on competition
Margin for each facilitator (annual)	Rs. 60000 to 100000	no response	no response
Regulation by a committee	yes	no	no
other fees	Rs. 100/tractor given to Red Cross	Rs. 100/tractor given to Red Cross	Rs. 100/tractor given to Red Cross
other businesses of facilitators	agriculture, labour	agriculture, labour	agriculture, labour

Source: Primary survey

On the other hand, power tillers lost during the decade across states with exception some eastern and western states. There was high growth in power tillers in Assam,

West Bengal, Gujarat, Maharashtra, and Karnataka over the decade though total number of power tillers in India came down by 15% and some states like Punjab and Haryana where tractors are a routine agricultural machine, and even MP and Bihar witnessed a decline in number of power tillers (table 2.14).

Table 2.14: Growth in Numbers of Power Tillers in 2003 over 1992

States/UTs	1992		2003		Growth over 1992
	in '00	%	in '00	%	%
Uttar Pradesh	-	-	631	22.59	
Punjab	1460	44.28	353	12.64	-75.82
Karnataka	174	5.28	270	9.67	55.17
Haryana	508	15.41	262	9.38	-48.43
Rajasthan	128	3.88	184	6.59	43.75
West Bengal	88	2.67	179	6.41	103.41
Assam	7	0.21	132	4.73	1785.71
Madhya Pradesh	301	9.13	131	4.69	-56.48
Gujarat	33	1.00	108	3.87	227.27
Tamil Nadu	123	3.73	102	3.65	-17.07
Maharashtra	33	1.00	100	3.58	203.03
Andhra Pradesh	105	3.18	98	3.51	-6.67
Bihar	280	8.49	97	3.47	-65.36
Others	57	1.73	146	5.23	156.14
India	3297	100.00	2793	100.00	-15.29

Among the implements, UP, MP and Rajasthan witnessed major increases in MB plough which were higher than the all India increase of 50%. Similar was the trend in disc harrow with Bihar being the state with maximum increase over the period followed by above said states and Karnataka (tables 2.15 and 2.16). Seed drill was growing much faster everywhere with large increases in TN, Karnataka and AP and MP and the overall number in India going up by 160% during the decade. On the other hand, planters did not show very spectacular increase with only AP taking the lead and many states registering a decline in their numbers (tables 2.17 and 2.18).

Levellers picked up in Punjab, Assam, TN and Orissa with the All India level increase of 48% over the decade. The growth in potato diggers was more clear cut and in line with the changing trend towards high value crops wherein the implement registered a 200% increase with states of Orissa, Bihar, AP, MP and WB registering large increases in their numbers and Punjab –one of the leading states in potato production losing its share and in absolute numbers (tables 2.19-2.20). The trailers grew in line with tractors as it is an essential implement for tractor most f the time (table 2.21).

Table 2.15: Growth in Mould Board Plough in 2003 over 1992

States/UTs	1992		2003		Growth over 1992
	in '00	%	in '00	%	%
Uttar Pradesh	259	5.19	1988	26.56	667.57
Rajasthan	732	14.67	1882	25.14	157.10
Maharashtra	732	14.67	845	11.29	15.44
Madhya Pradesh	173	3.47	570	7.61	229.48
Karnataka	358	7.18	551	7.36	53.91
Punjab	1590	31.87	342	4.57	-78.49
Andhra Pradesh	374	7.50	305	4.07	-18.45
Haryana	339	6.79	223	2.98	-34.22
Gujarat	-	-	208	2.78	
Bihar	-	-	174	2.32	
West Bengal	108	2.16	149	1.99	37.96
Tamil Nadu	87	1.74	143	1.91	64.37
Assam	124	2.49	11	0.15	-91.13
Other states	113	2.26	95	1.27	-15.93
India	4989	100.00	7486	100.00	50.05

Table 2.16: Growth in Number of Disc Harrow in 2003 over 1992

States/UTs	1992		2003		Growth over 1992
	in '00	%	in '00	%	%
Uttar Pradesh	1634	25.31	3032	32.49	85.56
Punjab	1470	22.77	1647	17.65	12.04
Haryana	1272	19.70	1584	16.98	24.53
Rajasthan	632	9.79	1070	11.47	69.30
Karnataka	129	2.00	409	4.38	217.05
Maharashtra	580	8.98	362	3.88	-37.59
Madhya Pradesh	101	1.56	310	3.32	206.93
Gujarat	221	3.42	229	2.45	3.62
Andhra Pradesh	209	3.24	209	2.24	0.00
Tamil Nadu	80	1.24	202	2.16	152.50
Bihar	10	0.15	120	1.29	1100.00
Other states	118	1.83	157	1.68	33.05
India	6456	100.00	9331	100.00	44.53

Table 2.17: Growth in number of Seed cum Fertilizer Drill in 2003 over 1992

States/UTs	1992		2003		Growth over 1992
	in '00	%	in '00	%	%
Punjab	1030	26.44	2164	21.40	110.10
Rajasthan	717	18.40	2093	20.70	191.91
Madhya Pradesh	421	10.81	1735	17.16	312.11
Uttar Pradesh	538	13.81	1057	10.45	96.47
Haryana	766	19.66	983	9.72	28.33
Gujarat	304	7.80	844	8.35	177.63
Maharashtra	-	-	402	3.98	
Karnataka	36	0.92	268	2.65	644.44
Andhra Pradesh	48	1.23	244	2.41	408.33
Tamil Nadu	3	0.08	166	1.64	5433.33
Other states	33	0.85	155	1.53	369.70
India	3896	100.00	10111	100.00	159.52

Table 2.18: Growth in Number of Planters in 2003 over 1992

States/UTs	1992		2003		Growth over 1992
	in '00	%	in '00	%	%
Maharashtra	-	-	249	21.82	
Uttar Pradesh	85	8.84	316	27.70	271.76
Andhra Pradesh	10	1.04	147	12.88	1370.00
Punjab	570	59.25	102	8.94	-82.11
Gujarat	43	4.47	74	6.49	72.09
Karnataka	73	7.59	64	5.61	-12.33
Haryana	91	9.46	34	2.98	-62.64
Rajasthan	48	4.99	29	2.54	-39.58
Other states	42	4.37	126	11.04	200.00
India	962	100.00	1141	100.00	18.61

Table 2.19: Growth in Number of Levelers in 2003 over 1992

States/UTs	1992		2003		Growth over 1992
	in '00	%	in '00	%	%
Punjab	870	14.75	2373	27.05	172.76
Uttar Pradesh	2433	41.24	2459	28.03	1.07
Orissa	323	5.48	628	7.16	94.43
Gujarat	261	4.42	598	6.82	129.12
Rajasthan	376	6.37	537	6.12	42.82
Haryana	765	12.97	504	5.74	-34.12
Maharashtra	-	-	341	3.89	
Karnataka	188	3.19	328	3.74	74.47
Assam	30	0.51	182	2.07	506.67
Andhra Pradesh	156	2.64	162	1.85	3.85
Bihar	-	-	199	2.27	
Tamil Nadu	72	1.22	130	1.48	80.56
Madhya Pradesh	188	3.19	156	1.78	-17.02
West Bengal	137	2.32	39	0.44	-71.53
Other states	100	1.70	138	1.57	38.00
India	5899	100.00	8774	100	48.74

Table 2.20: Growth in Number of Potato diggers in 2003 over 1992

States/UTs	1992		2003		Growth over 1992
	in '00	%	in '00	%	%
Uttar Pradesh	420	43.08	903	30.52	115.00
Madhya Pradesh	9	0.92	682	23.05	7477.78
Bihar	10	1.03	327	11.05	3170.00
Andhra Pradesh	10	1.03	309	10.44	2990.00
Orissa	1	0.10	203	6.86	20200.00
West Bengal	65	6.67	183	6.18	181.54
Punjab	120	12.31	57	1.93	-52.50
Other states	340	34.87	295	9.97	-13.24
India	975	100.00	2959	100.00	203.49

On the harvest side, combine harvesters are still restricted to a few traditional holders of these machines like Punjab, Haryana and UP and some new states like AP, MP and Bihar and Orissa (table 2.22). Overall, they grew 5% with large increases in non-traditional states of AP, J&K, Orissa and MP besides Haryana. Surprisingly, self propelled grew more than tractor operated combine harvesters everywhere. But, threshers grew significantly over the decade with increase of 300% in paddy and multi-crop categories, and wheat threshers declined in importance (table 2.23). Major gains were seen in Rajasthan, UP, MP and WB. In fact, UP accounted for 50% of multi-crop threshers followed by MP with 20%. Maize crop which is emerging as an alternative to many crops reflected its growth through the increase in the number of maize shellers by 90% with major gain in MP, Karnataka and Rajasthan (table 2.24). Expectedly, sugarcane crushers declined in absolute terms over the decade (table 2.25). Reapers grew dramatically and witnessed more than 3000% increase with major increases in MP. Bihar and Rajasthan (table 2.26). One explanation could be the low base of this equipment to begin with in 1992 and the other a gross under-reporting of the same in 1992.

Table 2.21: Growth in Number of Trailers in 2003 over 1992

States/UTs	1992		2003		Growth over 1992
	in '00	%	in '00	%	%
Uttar Pradesh	925	19.59	2786	25.08	201.19
Punjab	-	-	2286	20.58	
Gujarat	482	10.21	1178	10.60	144.40
Rajasthan	953	20.18	987	8.88	3.57
Maharashtra	-	-	819	7.37	
Haryana	818	17.32	599	5.39	-26.77
Madhya Pradesh	726	15.37	564	5.08	-22.31
Orissa	5	0.11	558	5.02	11060.00
Bihar	-	-	391	3.52	
Karnataka	114	2.41	390	3.51	242.11
Andhra Pradesh	437	9.25	224	2.02	-48.74
Tamil Nadu	198	4.19	120	1.08	-39.39
West Bengal	32	0.68	102	0.92	218.75
Other states	32	0.68	106	0.95	231.25
India	4722	100.00	11110	100.00	135.28

Tables 2.27, 2.28 and 2.29 show the state wise shares in various animal operated machines and implements as of 2003**.** Tractor operated sprayers were largely used in Punjab, AP, Maharashtra, Karnataka, Rajasthan and Bihar though Haryana and UP also had some of them (table 2.29). But, overall there were only 1717 such implements in India. Drip was more common in Andhra Pradesh Maharashtra Tamil Nadu Karnataka and Kerala and sprinklers in Rajasthan, AP, MP,Karnataka, Maharashtra Tamilnadu, Haryana and Kerala (table 2.30). The number of diesel pumpsets somewhat stagnated during the 1990s compared with the 1970s and the 1980s. But, electric pumpsets grew sharply during the 1990s to account for almost 2/3rd of all pumpsets from only about half of the total during the 1980s and earlier (fig. 2.2).

Table 2.22: Growth in Number of Combine Harvesters in 2003 over 1992

States/UTs	1992						2003						Growth over 1992		
	TO		SP		Total		TO		SP		Total		TO	SP	Total
	'00	%	'00	%	'00	%	'00	%	'00	%	'00	%	%	%	%
Haryana	58	1.51	25	14.29	83	2.07	47	4.09	2336	75.70	2383	56.27	-18.97	9244.00	2771.08
Uttar Pradesh	-	-	-	-	-	-	305	26.54	49	1.59	354	8.36			
Andhra Pradesh	19	0.49	3	1.71	22	0.55	60	5.22	229	7.42	289	6.82	215.79	7533.33	1213.64
Jammu & Kashmir	1	0.03	3	1.71	4	0.10	93	8.09	108	3.50	201	4.75	9200.00	3500.00	4925.00
Madhya Pradesh	12	0.31	3	1.71	15	0.37	143	12.45	57	1.85	200	4.72	1091.67	1800.00	1233.33
Bihar	-	-	-	-	-	-	162	14.10	37	1.20	199	4.70			
Orissa	4	0.10	1	0.57	5	0.12	132	11.49	46	1.49	178	4.20	3200.00	4500.00	3460.00
Punjab	**30**	**0.78**	**10**	**5.71**	**40**	**1.00**	**56**	**4.87**	**68**	**2.20**	**124**	**2.93**	**86.67**	**580.00**	**210.00**
Nagaland	**3640**	**94.82**	**-**	**-**	**3640**	**90.68**	**-**	**-**	**-**	**-**	**-**	**-**			
Tripura	-	-	116	66.29	116	2.89	-	-	-	-	-	-			
Other states	75	1.95	14	8.00	89	2.22	151	13.14	156	5.06	307	7.25	101.33	1014.29	244.94
India	3839	100.00	175	100.00	4014	100.00	1149	100.00	3086	100.00	4235	100.00	-70.07	1663.43	5.51

Note: TO-Tractor operated, SP-Self Propelled

Table 2.23: Growth in the Number of Threshers in 2003 over 1992

States/UTs	1992						2003						Growth over 1992		
	Wheat		Paddy		Multi-crops		Wheat		Paddy		Multi-		Wheat	Paddy	Multi-crops
	'00	%	'00	%	'00	%	'00	%	'00	%	'00	%	%	%	%
Uttar Pradesh	7951	73.91	139	39.27	100	5.95	2497	34.39	196	12.15	3790	55.65	-68.60	41.01	3690.00
Bihar	-	-	-	-	-	-	1117	15.39	430	26.66	148	2.17			
Madhya Pradesh	685	6.37	26	7.34	457	27.17	1083	14.92	39	2.42	1359	19.96	58.10	50.00	197.37
Rajasthan	388	3.61	26	7.34	22	1.31	827	11.39	113	7.01	350	5.14	113.14	334.62	1490.91
Haryana	1399	13.01	34	9.60	82	4.88	700	9.64	28	1.74	127	1.86	-49.96	-17.65	54.88
Punjab	-	-	-	-	-	-	344	4.74	20	1.24	64	0.94			
Himachal Pradesh	127	1.18	11	3.11	10	0.59	194	2.67	12	0.74	5	0.07	52.76	9.09	-50.00
Gujarat	130	1.21	8	2.26	512	30.44	185	2.55	31	1.92	446	6.55	42.31	287.50	-12.89
Maharashtra	-	-	-	-	470	27.94	171	2.36	42	2.60	405	5.95			-13.83
West Bengal	47	0.44	54	15.25	2	0.12	76	1.05	114	7.07	8	0.12	61.70	111.11	300.00
Nagaland	-	-	-	-	-	-	-	-	468	29.01	-	-			
Other states	30	0.28	56	15.82	27	1.61	66	0.91	120	7.44	108	1.59	120.00	114.29	300.00
India	10757	100.00	354	100.00	1682	100.00	7260	100.00	1613	100.00	6810	100.00	-32.51	355.65	304.88

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Table 2.24: Growth in Number of Maize Shellers in 2003 over 1992

States/UTs	1992		2003		Growth over 1992
	In '00	%	in '00	%	%
Madhya Pradesh	17	2.73	350	29.49	1958.82
Uttar Pradesh	192	30.87	189	15.92	-1.56
Bihar	180	28.94	109	9.18	-39.44
Orissa	-	-	97	8.17	
Himachal Pradesh	35	5.63	85	7.16	142.86
Rajasthan	17	2.73	78	6.57	358.82
Andhra Pradesh	35	5.63	76	6.40	117.14
Gujarat	22	3.54	65	5.48	195.45
Karnataka	8	1.29	60	5.05	650.00
Punjab	50	8.04	29	2.44	-42.00
Haryana	64	10.29	10	0.84	-84.38
Other states	2	0.32	39	3.29	1850.00
India	622	100.00	1187	100.00	90.84

Table 2.25: Growth in the Number of Sugarcane Crushers in 2003 over 1992

States/UTs	1992		2003		Growth over 1992
	in '00	%	in '00	%	%
Uttar Pradesh	695	31.25	741	39.06	6.62
Madhya Pradesh	64	2.88	620	32.68	868.75
Andhra Pradesh	151	6.79	147	7.75	-2.65
Bihar	-	-	107	5.64	
Orissa	11	0.49	58	3.06	427.27
Punjab	640	28.78	50	2.64	-92.19
Maharashtra	67	3.01	48	2.53	-28.36
Tripura	141	6.34	10	0.53	-92.91
Nagaland	323	14.52	-	-	
Other states	132	5.94	116	6.11	-12.12
India	2224	100.00	1897	100.00	-14.70

Table 2.26: Growth in Number of Reapers in 2003 over 1992

States/UTs	1992		2003		Growth over 1992
	in '00	%	in '00	%	%
Madhya Pradesh	9	0.30	62697	61.67	696533.33
Orissa	-	-	36202	35.61	
Tamil Nadu	195	6.44	694	0.68	255.90
West Bengal	149	4.92	588	0.58	294.63
Rajasthan	15	0.50	311	0.31	1973.33
Uttar Pradesh	2364	78.12	292	0.29	-87.65
Bihar	10	0.33	260	0.26	2500.00
Punjab	-	-	211	0.21	
Andhra Pradesh	13	0.43	151	0.15	1061.54
Gujarat	149	4.92	16	0.02	-89.26
Other states	122	4.03	248	0.24	103.28
India	3026	100.00	101670	100.00	3259.88

Table 2.27: State-wise Animal operated implements and machinery in India in 2003

							Part-I	
States/UTs	Cultivator		Wetland puddler		Cart		Ghanis	
	' 00	%	' 00	%	' 00	%	' 00	%
Andhra Pradesh	13193	21.63	5888	16.60	8482	8.40	147	7.60
Uttar Pradesh	11224	18.40	11359	32.03	13580	13.44	201	10.39
Karnataka	10118	16.59	1581	4.46	7608	7.53	165	8.53
Assam	6441	10.56	2640	7.44	497	0.49	25	1.29
Madhya Pradesh	4482	7.35	2901	8.18	14882	14.73	181	9.35
Maharashtra	4180	6.85	1056	2.98	11437	11.32	104	5.37
Bihar	4080	6.69	505	1.42	1702	1.68	70	3.62
Gujarat	2390	3.92	721	2.03	5354	5.30	178	9.20
Rajasthan	2093	3.43	2290	6.46	6029	5.97	35	1.81
Tamil Nadu	610	1.00	551	1.55	1559	1.54	70	3.62
Himachal Pradesh	593	0.97	596	1.68	24	0.02	56	2.89
Orissa	380	0.62	951	2.68	5417	5.36	375	19.38
Haryana	353	0.58	43	0.12	3314	3.28	83	4.29
Uttaranchal	229	0.38	696	1.96	259	0.26	9	0.47
Jammu and Kashmir	160	0.26	1049	2.96	48	0.05	27	1.40
Chhatisgarh	114	0.19	274	0.77	4874	4.83	65	3.36
Jharkhand	108	0.18	1374	3.87	3628	3.59	59	3.05
Punjab	100	0.16	15	0.04	2996	2.97	27	1.40
Manipur	46	0.08	140	0.39	155	0.15	5	0.26
Other states	92	0.15	833	2.35	9169	9.08	53	2.74
India	60986	100	35463	100	101014	100	1935	100

Table 2.28: Growth of Animal operated implements and machinery in 2003 (Nos.)

							Part-II	
States/UTs	**S'cane crusher**		**Disc harrow**		**Seed-fertilizer drill**		**Leveler**	
	' 00	**%**	**' 00**	**%**	**' 00**	**%**	**' 00**	**%**
West Bengal	102	2.35	628	2.37	166	0.33	38641	32.28
Delhi	109	2.51	188	0.71	1344	2.63	12576	10.51
Assam	32	0.74	111	0.42	22	0.04	11869	9.92
Chhatisgarh	127	2.92	474	1.79	265	0.52	9167	7.66
Chandigarh	1931	44.43	4092	15.44	3296	6.46	6434	5.37
Tripura	381	8.77	5090	19.21	8740	17.13	5388	4.50
Jharkhand	194	4.46	9530	35.96	7537	14.77	5320	4.44
Madhya Pradesh	221	5.09	584	2.20	252	0.49	4633	3.87
Mizoram	171	3.93	1685	6.36	11135	21.82	4204	3.51
Uttaranchal	11	0.25	373	1.41	42	0.08	3525	2.94
Lakshadweep	7	0.16	59	0.22	20	0.04	2895	2.42
Orissa	38	0.87	948	3.58	6709	13.15	2737	2.29
Bihar	47	1.08	184	0.69	106	0.21	2302	1.92
Pondicherry	460	10.58	893	3.37	6691	13.11	2252	1.88
Uttar Pradesh	349	8.03	635	2.40	4192	8.21	2039	1.70
Daman and Diu	66	1.52	203	0.77	84	0.16	1550	1.29
Jammu and Kashmir	9	0.21	150	0.57	124	0.24	1440	1.20
Haryana	21	0.48	517	1.95	229	0.45	962	0.80
Arunachal Pradesh	1	0.02	0	0.00	1	0.00	622	0.52
Nagaland	60	1.38	119	0.45	63	0.12	392	0.33
Kerala	4	0.09	13	0.05	1	0.00	264	0.22
Gujarat	0	0.00	0	0.00	1	0.00	141	0.12
Other states	5	0.12	23	0.09	14	0.03	353	0.29
India	4346	100	26499	100	51034	100	119706	100

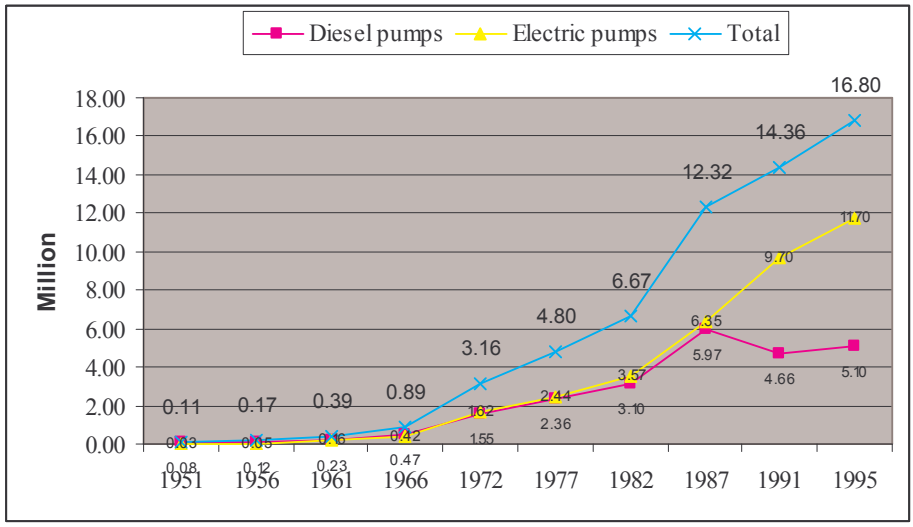
Table 2.29: State-wise Number of Plant Protection equipments in India in 2003

States/UTs	Sprayers/dusters operated by					
	Manual		Power		Tractor	
	‘ 00	%	‘ 00	%	‘ 00	%
Maharashtra	5316	13.21	1606	26.43	112	6.52
Karnataka	4704	11.69	852	14.02	126	7.34
Andhra Pradesh	4545	11.29	1902	31.30	315	18.35
Madhya Pradesh	4263	10.59	312	5.13	104	6.06
Gujarat	4201	10.44	129	2.12	66	3.84
Punjab	2800	6.96	80	1.32	415	24.17
Haryana	2365	5.88	70	1.15	102	5.94
Rajasthan	2183	5.42	69	1.14	155	9.03
Uttar Pradesh	1991	4.95	83	1.37	40	2.33
Chhatisgarh	1421	3.53	46	0.76	15	0.87
Assam	1209	3.00	13	0.21	1	0.06
Orissa	925	2.30	162	2.67	68	3.96
Himachal Pradesh	916	2.28	101	1.66	3	0.17
Bihar	893	2.22	42	0.69	109	6.35
Tamil Nadu	792	1.97	427	7.03	24	1.40
Jharkhand	534	1.33	19	0.31	33	1.92
Kerala	471	1.17	22	0.36	5	0.29
Jammu and Kashmir	361	0.90	121	1.99	12	0.70
Uttaranchal	250	0.62	4	0.07	7	0.41
Other states	106	0.26	16	0.26	5	0.29
India	40246	100	6076	100	1717	100

Table 2.30: State-wise irrigation equipment and water lifting devices in India- 2003

States/UTs	Manual		Animal		Diesel Engine		Electric pump		Drip		Sprinkler	
	' 00	%	' 00	%	' 00	%	' 00	%	' 00	%	' 00	%
Madhya Pradesh	41	0.48	111	4.11	4365	6.03	15424	18.26	215	4.94	701	9.53
Andhra Pradesh	138	1.60	93	3.44	1421	1.96	13705	16.23	591	13.59	354	4.81
Maharashtra	184	2.13	58	2.15	1203	1.66	9667	11.45	962	22.12	414	5.63
Tamil Nadu	81	0.94	67	2.48	2370	3.27	7892	9.34	1100	25.29	427	5.80
Karnataka	33	0.38	34	1.26	1108	1.53	6961	8.24	635	14.60	658	8.95
Rajasthan	26	0.30	358	13.24	8444	11.67	6553	7.76	138	3.17	3084	41.92
Uttar Pradesh	716	8.31	234	8.66	28083	38.80	4874	5.77	39	0.90	85	1.16
Punjab	646	7.49	12	0.44	2533	3.50	4688	5.55	4	0.09	3	0.04
Gujarat	77	0.89	34	1.26	4367	6.03	4683	5.54	118	2.71	342	4.65
Kerala	1107	12.84	239	8.84	295	0.41	3969	4.70	379	8.71	372	5.06
Haryana	639	7.41	63	2.33	2759	3.81	2724	3.23	40	0.92	533	7.25
Chhatisgarh	214	2.48	10	0.37	429	0.59	940	1.11	18	0.41	94	1.28
West Bengal	0	0.00	0	0.00	5683	7.85	742	0.88	0	0.00	0	0.00
Bihar	930	10.79	205	7.58	6283	8.68	621	0.74	35	0.80	13	0.18
Orissa	428	4.97	39	1.44	743	1.03	351	0.42	14	0.32	66	0.90
Jharkhand	2153	24.98	230	8.51	1660	2.29	214	0.25	13	0.30	33	0.45
Jammu and Kashmir	104	1.21	12	0.44	78	0.11	129	0.15	13	0.30	18	0.24
Uttaranchal	206	2.39	8	0.30	435	0.60	107	0.13	3	0.07	6	0.08
Assam	822	9.54	885	32.74	6	0.01	1	0.00	0	0.00	0	0.00
Other states	75	0.87	11	0.41	109	0.15	216	0.26	32	0.74	153	2.08
India	8620	100	2703	100	72374	100	84461	100	4349	100	7356	100

Figure 2.2.: Number of Irrigation Pumps in India from 1951-1995



Note: Data for 1991 and 1995 are collected from Manufacturers Association.
Source: Agricultural Research Data Book, 2001.

To conclude, mechanization across states shows wide variations with some states leading in some types of mechanisation while others in other types. But, tractors seem to lead to other mechanical operations. Further, commercial and high value crops like potato drive mechanisation and use of modern machinery besides irrigation.

Appendix 2.1

Table 2.32: Farm Mechanization Policy of NABARD

Particulars	Year			
	1999-2000	2000-01	2001-02	2002-03
Refinance rate (%) CBs				
First time	70	70	90	90
Second time	40	40	90	N.S.
SCBs	80	80	90	90
SLDBs				
First time	90	90	90	90
Second time	40	40	90	N.S.
RRBs				
First time	80	80	90	90
Second time	40	40	90	N.S.
Down Payment (%)				
First time	15	15	15	As per RBI Instructions
Second time	30	30	30	As per RBI Instructions
Minimum acreage of perennially irrigated land (acres)				
New	8	8	8	8
Secondhand	N.S.	N.S.	N.S.	8
Repayment period (years)	9	9	9	9
Incremental income to be taken for repayment (%)	50	50	50	50
Minimum period for second tractor (years)	3	3	3	3

Note: N.S.= Not specified

SBI FARM MECHANISATION SCHEMES

Purpose

Credit for purchase of farm equipment and machinery for agricultural operations. The scheme covers activities ranging from purchase of tractors and accessories,trailers, power tillers, combine harvesters, power sprayers, dusters, threshers etc.

Who are eligible for Term Loans

Farmers owning mare than minimum acreage of perennially irrigated lands are

eligible (for power tillers 2 acres, for tractors 4 acres for > 35 HP and 6 acres for above 35 HP and for combine 8 acres). Eligibility for purchase of other farm equipment is decided on the income generated by the agri activity.

Loan amount

Upto Rs. 50,000/- 100 % of the cost of the **asset** is provided as loan. Above Rs. 50,000/- upto 85 % of the cost of the asset provided as loan. Quotation for the assets to be purchased have to be submitted. Land records to ascertain cultivation rights title to the property should also be submitted.

Security

Amount of Loan	**Security to be furnished**
upto Rs. 50,000 (other than tractors)	i) Hypothecation of assets financed
Above Rs. 50,000 and upto Rs. 1,00,000 for tractors	i. Hypothecation of assets financed
Above Rs. 50,000 (other than tractors) and Above Rs.1,00,000 for tractors	i. Hypothecation of assets financed ii. Mortgage of land

Repayment of loan will be in quarterly/half yearly / yearly instalments depending on the harvest of the crops or the liquidity created by the agriculture activity undertaken. A maximum period of 9 yrs is allowed.

SBI -TRACTOR PLUS

SBI has entered into tie-up with TAFE Ltd, Mahindra and Mahindra Ltd, Escorts Ltd, SAME Deutz - Farh India Ltd, HMT Ltd, Eicher Tractors, Punjab Tractors Ltd (Swaraj), International Tractors Ltd, Indo Farm Tractors and Motors Ltd , New Holland Tractors Ltd, **L & T John Deere Pvt Ltd** for financing tractors and with VST Tiller and Tracors Ltd, for financing power tillers with following concessionary terms.

a. The companies offer rebate on the price.
b. Companies offer additional service / warranty.
c. SBI finances with a low margin of 10% (amount of contribution from the applicant).

SBM Agri Farm Scheme

Mechanisation of farming has been considered as one of the important inputs in farming, to complete the farm operations on time and to increase production and reduce the drudgery of human labour. With the rapid advancement in agriculture, there has been an increased use of farm machanisation equipments like Tractors and Power Tillers which help us tiding over the labour problem for Agriculture

It has been assisting the farmers for purchase of Tractors / Power tillers etc. However, with a view to enhance our lending under Farm Mechanisation, our Bank has entered into an MOU with the following Tractor manufacturing Companies**:**

a)Escorts
b)HMT Limited
c)TAFE
d)Swaraj
e)New Holland Tractor (Ford)
f)SAME Tractors
g)International Tractors Limited (Sonalika)
h)Eicher Tractors
i)L&T John Deere private Limited
j)Bajaj tempo Limited
k)Mahindra Gujarat Tractor
l) Mahindra and Mahindra Limited
mStandard Combines (P) Ltd
n)Indo Farm Tractors
o)SAS Motors ltd., (Angad Tractors)
p)Preet Tractors (p) Ltd

Power Tiller companies

a) M/S Greaves Cotton Limited

b) M/S Bengal Tools Limited

Norms for financing of Tractors

Acreage

The borrower should possess a minimum of 4 acres of wet land or 6 acres of dry land to ensure viability of the medium term loan to be extended for the purpose. Tractor finance to farmers who are having lesser land holdings than stipulated can also be considered on a case to case basis provided the applicant is having sufficient income from other sources to service the debt

Economic use of Tractor

The tractor should have a minimum of 1000 hrs production work in agri. per year either on own farm or on custom hire or both

Minimum 3 implements should be owned by the beneficiary (either with bank finance or purchased with own funds)

The Tractor financed should have the necessary commercial test report as per BIS code issued by CFMTTI (Central Farm Machinery Training and Testing Institute), Budni, Madhya Pradesh

Margin Money

Down payment in respect of farm mechanization loan for new tractors will be not less than 10% of the investment cost in case of tractors and implements

Rate of interest

10.75% pa irrespective of the limit

Repayment Period

Maximum 9 years

Registration of the tractor

The tractor should be registered with the concerned Regional Transport Authority

Insurance

Comprehensive Insurance cover should be obtained in respect of the assets acquired. Premium for first year will be paid by the concerned Company dealers **Selection of**

Tractors

Bank may consider financing of tractors on the basis of viability of individual proposals but the choice and selection of such tractors may be left to the choice of individual beneficiaries

Security

As per Bank's norms:

(a) Hypothecation of Tractors
(b) Equitable Mortgage of lands

Punjab National Bank has signed Memorandum of Understanding with 12 manufacturers of farm equipments and entered into tie-up arrangements for exclusive concession to the farmers purchasing tractor through loans availed from Punjab National Bank.

Table 2.33: Company wise discount on tractor loans

S..No.	**Tractor Company**	**Amount of discount**	**Address of the Company**
1.	Eicher Tractors	Rs.4000/-	Eicher Tractors, Plot No.1, Sector D, Industrial Area, Mandideep, Distt.Raisen(M.P.) Pin Code 462046
2.	Escorts Limited	Rs.6000/-	Escorts Ltd., 18/4 Mathura Road, Faridabad – 121007
3.	New Holland Tractors (India) Pvt. Ltd.	Rs.4000/-	New Holland Tractors (India) Pvt. Ltd., 52, Okhla Industrial Estate-III, New Delhi 110020
4.	Mahindra & Mahindra Ltd.	Rs.3000/-	Mahindra & Mahindra Ltd., Mahendra Towers, 3rd Floor, Worli, Mumbai 400 018
5.	International Tractors Ltd.	Rs.6000/-	International Tractors Ltd. Sonalika House, 283, AGCR Enclave, Karkar Dooma, Delhi - 110092
6.	Punjab Tractors Limited	Rs.4000/-	Punjab Tractors Limited, Phase Iv, S.A.S. Nagar, District Ropar - 160055
7.	L&T John Deere Pvt. Limited	Rs.7000/-	L&T John Deere Pvt. Limited, Sansaswadi, Taluka-Shirur, District Pune 412208
8.	Indo Farm Equipment Limited	Rs.6000/- to Rs.6500/-	M/s.Indo Farm Equipment Limited S.C.O. 859, N.A.C. Manimajra, Kalka Road, Chandigarh
9.	HMT Ltd. Tractor Business Group	Rs.4000/-	General Marketing Manager (TN), M/s. HMT Ltd. Tractor Business Group, Bharat Yuvak Bhawan, 1, Jai Singh Road, NEW DELHI 110001
10.	Tractors and Farm Equipment Ltd.	Rs.4000/-	Tractors and Farm Equipment Ltd., C-3/6, Ist Floor, Prashant Vihar, New Delhi – 110085
11.	Bajaj Tempo Ltd. (Balwan Tractors)	Rs.7000/-	Bajaj Tempo Ltd., B-12, Kalindi Colony near Maharani Bagh, New Delhi – 110008
12.	SAME DEUTZ-FAHR India (P) Limited	Rs.8000/- Rs.15,000/-	SAME DEUTZ-FAHR India (P) Limited, E-9, Kalindi Colony, Opp. Maharani Bagh, New Delhi – 110065

Bank of India has tied up with SAS Motors for giving cheaper loans to farmers buying the small tractor 'Angad', costing Rs 99,000 only. For small farmers, the initial cost of getting a tractor will come down to less than Rs 18,000 as the rest is being financed by BoI under a new scheme 'BoI-Angad Farm Mechanisation Tractor Scheme'. The scheme, being offered by 174 dealers of SAS Motors and 700 BoI branches across the nation, offers a loan of 85% of the cost (about Rs 81,000) at a

concession rate of 8.5-10.5% for seven to nine years. The 22-HP tractor is almost 33% cheaper than conventional tractors, more fuel-efficient and can be used for 40 crop and soil varieties. Angad tractors, being assembled by SAS Motors, is designed and manufactured by China's Shandong Shifeng Company Ltd.

Indo Farm Equipment Limited — a maiden tractor manufacturing company in Himachal Pradesh has entered into an MoU with Punjab National Bank for financing of its tractors on liberal terms. As a part of understanding, Punjab National Bank will provide loans upto Rs 2 lakh at interest of 10.5% and margin money of only 5%.

Union Bank of India has signed a memorandum of understanding for a tractor financing arrangement with Indo Farm Tractors & Motors Ltd and L&T - John Deere Pvt. Ltd on all India basis. To be eligible for finance under this arrangement, the borrower should have 3 acres of perennially irrigated land whose valuation should not be less than the loan amount applied for. Indo Farm Tractors & Motors Ltd offered discount of Rs 6,000 for tractors up to 45 H.P. and Rs 6,500 for tractors above 45 H.P. L&T - John Deere Pvt. Ltd has offered discount of Rs 4,000.

Chapter 3

Indian Tractor Industry: growth, structure, and dynamics

Introduction

Indian agriculture uses many types of farm machines (table 3.1). But, more significant among them are tractors, tillers, combine harvestors, reapers, and threshers. The Indian tractor market is dominated by low price, no frills, rugged, versatile and low to medium powered tractors. Only 5% Indian farmers possess tractors while 22% use it. The rest 75% still depend on bullocks for farming. And, those who own tractors are rich farmers as can be gauged from this fact: tractors cultivate almost one-third of the country's arable land. But two per cent of farmers own one-third of this land. This means that most farmers possessing tractors are rich and own large land holdings. Second, tractors are available on hire. By 2000, India had about 2.67 million tractors but category wise, about 1.47 million tractors were in the 31-40 HP category which many argue the Indian farmers don't require. What Indian farmers need are small tractors. But, one has to keep in mind that tractors in India are concentrated only in a few States. Tractors have failed to make a headway into the agricultural sector in the country. The main reason is that the price for cheapest tractor available is nearly Rs 2 lakh (refer table 2.8).

Table 3.1: Type of Farm Machinery Industries in India (2000-01)

Equipment	No. of Units
Agricultural tractors	14
Power tillers	7
Agricultural tools and implements	6980
Combines	15
Reapers	45
Tractors parts and accessories of agricultural machinery	546
Earth moving machinery and parts	188
Diesel oil engines	200
Rice processing machinery	300
Dairy and food industries	500
Village craftsmen	1 million

Source: Agricultural Research Data Book, 2001.

This chapter examines the emergence, growth, structure and business strategies of the three new entrants in the Indian tractor industry especially who were small timers and have 'rags to riches' story and others who are still small operators with small tractors (small tractor companies) and three local small tractor manufacturers and markeeters. It makes case studies of three organised sector tractor manufacturers and marketers who were earlier into manufacture and sale of agricultural machines other than tractors and have recently diversified into tractors. It also examines the operations of three small tractor manufacturers who were earlier into diesel engine manufacturing.

The other major players, besides Sonalika, which is traditionally a thresher manufacturer and launched tractors in 1995 are Preet and Standard. Where Standard started making tractors in 2002, Preet entered the market in 2002.

1. International Tractors Limited (ITL)- Sonalika Group

Profile

ITL Group annual turnover is 220 Million US$ (Rs. 1000 crore). Sonalika Group is the fifth largest tractor manufacturer in India. Apart from tractors its product line includes multi-utility vehicles, three wheelers, engines, hydraulic systems , casting , forging, brake System, automotive components manufacturing, and various farm equipments and implements. An average growth rate of 30% makes it one of the fastest growing corporates in India. It also happens to be one of the very few debt free companies in India. It employs about 2500 people. It has accreditations like ISO 9001:2000 and ISO 14001.

ITL was incorporated on October 17, 1995. ITL manufacture various tractors under Sonalika brand ranging from 30-75 HP, and CERES brand ranging from 60-90 HP. These tractors are also exported to various other countries including France, South Africa, Australia, Zimbabwe, Sri Lanka, Canada, Nepal, and Bangladesh etc. It is also the first tractor manufacturer in the country producing 50 and 60 HP tractors fitted with diesel engines manufactured in-house, meeting Bharat II norms of smoke and mass Emission. These engines have been tested and certified by ARAI, Pune and the United States Environmental Norms Agency, Washington DC. These certifications enabled SONALIKA tractors to enter the world market. All the models of tractors and

combine harvesters manufactured are tested and approved by Central Farm Machinery and Tractors Training & Testing Institute, Budni (MP) India, (the Government of India institute authorized for issuing test reports). In 2002-03, SONALIKA tractors received "The Best Quality Award" from the Govt of India.

The company started manufacturing tractors in 1997. Before that, it was into thresher manufacturing since 1969. The design of Sonalika Tractor has been prepared by Central Mechanical Engineering Research Institute (CMERI) (Durgapur)- the premier design institute of the Government of India's Research and Development Department. The institute, also prepared the design of Swaraj Tractor. CMERI transferred technology for Sonalika Tractors for all models ranging from 32-60 HP. The chairman of the company was an employee with the LIC and is at present president of the Tractor Manufacturers Association of India (TMAI). He is also the ambassador of India in Macedonia in East Europe. The company is one of the three enterprises of the group, the other two being Sonalika Agro which makes threshers and combines, and International cars and motors which launched Rhino Jeep in 2006. The other group companies are: International Soft Web Limited, Sonalika Farm Equipments, and Auto Components Industries Corporation

It is one of the fastest growing companies and has already produced 1.7 lakh tractors in 10 years. Since 2006, the company has technical and financial collaboration with Yanmar of Japan and Sonalika has a technical collaboration agreement with world leaders, Renault Agriculture of France in July 2000. As a result of this joint effort, Sonalika has developed the world class Euro-II range at its fully automated plant at Hoshiarpur.

Renault Agriculture is a subsidiary of the Renault Group with 51% stake owned by CLAAS, Germany. Renault Agriculture is the largest tractor manufacturing company in Europe. It produces tractors in the range of 50-250 HP, having worldwide distribution ands sales network. Renault Agriculture-ITL agreement results in the production of Ceres and Solis tractor under Sonalika brand name. With a turnover of more than € 637 billion (2002), Renault is one of the 30 largest companies in the world. Each year Renault produces over two million vehicles and employs over 140,000 people. Renault has alliance with NISSAN to complement the financial and technical strengths bringing in synergic growth. CLAAS is a leading manufacturer of

farming equipment with a global presence. It is the world market leader in forage harvester. Apart from the farming machines, CLAAS also produces hydraulic components and transmissions. CLAAS purchased 51% stake in Renault Agriculture in March 2003. It recorded a turnover of over 1,000 million € in 2005-06.

Production capacity and pricing of tractors

ITL has its own engine and gear manufacturing plants. The brand name which has been extended from threshers is the only brand name for all products including tractors. The company exports over 5% of its total sale to countries like South Africa, U.S., Bangladesh and Nepal where Soanalika is the market leader. Starting with 2770 tractor sales in 1997-98, the sale increased to 26082 in 2004-05 (table 3.2), which is almost 80% of the capacity of 50,000 tractors per year. It has 16 models (30 to 75 HP) of tractors The tractors are priced keeping in mind the cost of production and the competition. The average life of Sonalika tractor is 20 years. 80 % of the components are produced in-house and the rest outsourced. The company has no ancillary units and there are multiple vendors for each item to be sourced. The company provides design and technical know-how to the suppliers with whom it has transaction based linkages. It started making combines in 2000.

Sonalika market

The company which has 11% market share in India in tractors and 18% in Punjab, does not have much market penetration beyond north India, especially in the southern states. The company considers Mahindra as its major competitor. The company also leverages its distribution network for threshers and knowledge of the rural market. 60 % of its market in north India is replacement market ranging from 50 % in UP to 75% in Haryana and 90% in Punjab.

Table 3.2: Production of Sonalika tractors and farm equipment (1996-7-2004-5)

Year	Tractors (Numbers)	Agriculture Machinery (Numbers)
1996-1997	396	5000
1997-1998	2770	7500
1998-1999	6211	12000
1999-2000	8773	18000
2000-2001	13496	24000
2001-2002	17002	32000
2002-2003	16464	17820
2003-2004	20020	16090
2004-2005	26082	

Distribution management

It has a dealer network of 850, out of which 200 are in U.P. alone and 65 stockists and 25 exclusive spare parts stockiest. The major conditions for becoming its tractor dealer include experience in tractor or related business even as salesman or mechanic, Rs. one lakh security and capacity to buy 5-10 tractors on cash basis or bank guarantee. The company provides two week training at its Hoshiarpur office. The dealers are given targets and are supposed to maintain good showroom and one mechanic at least. The dealers are to sell at least 20% of the total tractors sold in the area. The salesman strength depends on the size of the market though one salesman per block is minimum. The company has a school to train drivers and mechanics at Aurangabad where upto 1000 persons can be trained every year.

Promotion

The company does not buyback second hand tractors and does not participate in second hand tractor market to sell, buy or promote its tractor brand. The major media used for advertising and sale promotion are TV, radio, newspapers, pamphlets, hoardings, wall paintings, and trolley painting. The management perceives bright future for the tractor industry and sees a growing market for it. It has tractor finance agreements with all the major banks and company gives Rs. 6,000 discount per tractor for a bank loan. The company focuses on product quality for brand differentiation.

Major aspects of product quality include hydraulic capacity, field speed, road speed, comfort, HP and ergonomical features. There is subsidy of Rs. 30,000 for all tractors below 35 HP. The quality image of the company's brand can be assessed from the fact that when it was launched, the dealers were not willing to take up dealership as the tractor was seen as a jugad-meaning a hotchpotch product. Therefore, it appointed stockists who, in turn, appointed dealers and gave them credit.

Bank linkage

ITL has signed MoUs with various banks all over the country for tractor retail finance, which is giving a special impetus to company. It has resulted in easy availability of loans to farmers coupled with quick disposal of cases. The payment rotations have also become faster from the dealers to the company, which helps cost cutting. It has alliances with the following banks:

Canara Bank
ICICI Bank
Axis Bank
PNB
SBP
Andhra Bank
CBI
Allahabad Bank
SBBJ
SB of Indore
Corporation Bank
Bank of Maharashtra
UBI
OBC and
Centurion Bank of Punjab

Standard Tractors

Standard Tractors is a sibling company of the well-known manufacturing company 'Standard Combines Pvt. Ltd.', which is one of the leading manufacturers of self-propelled and tractor-driven combines (Combine Harvesters) since 1975 and as a company under the companies Act since 1999. The Registered Office of the company is situated at Standard Chowk, Barnala, in Punjab. Standard Tractors was launched on

21 September 2000 at a Kissan Mela (Farmer Fair) at Punjab Agricultural University, Ludhiana. The other products of the group are:

1.Tractor-driven harvester combines: The most popular model is 'TSC 513. Another model is C-412. The company (Standard Combines) is producing around 800 nos. per annum. These are sold within India and exported to South African countries as well.
2.Self-propelled harvester combines: Standard Combines is producing around 500 combines per annum. These are sold within India and also exported.
3.Self-propelled straw reaper: The only model is C-417. The company (Standard Combines) has produced and sold few units and is ready to manufacture more as per demand
4.Tractors: Standard Tractors is now manufacturing 7 models (mentioned earlier), around 5000 nos. per annum. Exporting to South African countries.
5.Three-wheelers/ four-wheelers: Based on three models of 3-wheelers – two passenger carriers ('Standard Leader' and 'Standard NS-38') and one cargo (Standard Sharp), and one model of 4-wheeler (Standard NS-49), Standard Tractors will start production of 100 units per annum per model.
6.Cranes: A model of hydraulic mobile crane (HMC 9000) is under final stage of processing for ARAI approval. We will start its mass production soon, initially 60 cranes per annum.
7.Front-loader and excavator: The Company is producing few machines every year, in response to demand.
8.Electric mini car: A 4-seater 3-wheeled battery-and-motor operated mini car will be produced. It is in the advanced stage of development in Standard Tractors.
9.Scooters and Motorcycles: One scooter model has already been developed and plans for developing a series of motorcycle models are on.

In 'Standard Tractors', tractors are being manufactured in the range of 30, 35, 40, 45, 50, 60, and 75 hp, since 2000, with respective model names: Standard 330, Standard 335, Standard 340, Standard 345, Standard 450, Standard 460, and Standard 475. Engines for all these tractor models, except the last one, are manufactured within the plant as 'Standard Engines', in specific names – SE 335, SE 345, SE 450 and SE 460, respectively. All the above-mentioned models of Standard Engines have shown compliance to the TREM-III emission norms, as have been verified by the ARAI.

Another four models of tractor of 25 hp, 50 hp (a variant), 55 hp and 60 hp range are under final stage of development.

For tractor manufacturing, Standard has collaboration with Zeater of Czechoslovakia for engines and Urasis of Poland which is a licensee of Messey Fergusson. Its production capacity is 10 thousand per annum and sales of the order of 4 to 5 hundred tractors per month. The company focuses on product quality for its marketing. But more recently, accessories, style and look have also become important besides functional utility and tractor is now a multi-functional machine. On the other hand implements are not brand or model specific. The leveraging of the combine brand name- especially tractor driven- has been an important factor in the success of Standard tractors.

Mr. Nachhattar Singh comes of a Sikh Ramgarhia family of Bhari Gotra which hails from a small village named Handiaya of Tehsil Barnala, Distt. Sangrur, in Punjab. His brother Mr. Joginder Singh is the Managing Director of the 'Combine Division' and also serves as the Joint Managing Director of M/S Standard Combines Pvt. Ltd.

There is plenty of ancillirization and sub-contracting in tractor industry. Therefore, though Standard has its own engine plant, 60-70% of its tractor comes from outside suppliers and only 30-40% of value addition is done by Standard. Most of its suppliers are located in Punjab. 10% of the parts which are the used in engine are manufactured by the company itself and balance of 90% are the bought from outside. Engines for all the tractor models, except one, are manufactured within the plant as 'Standard Engines', which have been proved to be Trem-III compliant.

The product range of tractors at standard includes 5 models – 35 HP and 45 HP which are 3 cylinder and 50, 60 and 75 HP which are four cylinder tractors. The company manufactures the tractors in three colures: Red, Blue, Green. The company manufactures 350 tractors each month. The company has 300 suppliers for engine and 400 suppliers for other parts. Eight to ten engines are assembled in each shift. The company manufactures 20 tractors each day. The technical staff of the company is around 200-250 with 4 supervisors. Each tractor has a special Cultivator gear

which is called second high utility. Standard Tractors is now manufacturing 7 models (mentioned earlier), around 5000 tractors per annum.

The company manufactures the tractors in three colures: Red, Blue, and Green. The company manufactures 350 tractors each month. The company has 300 suppliers with engine and 400 suppliers without engine. Eight to ten engines are assembled in each shift. The company manufactures 20 tractors each day. The technical staff of the company is around 200-250 with 4 supervisors. 10% of the parts which are used in engine are manufactured by the company itself and balance of 90% are bought from outside. 60% of the components used in manufacture of the tractors are produced by the company itself. This company is associated with John Deere. All the products are manufactures only in Barnala. Each tractor has a special Cultivator gear which is called second high utility.

Sales and Distribution

So far as standard tractors are concerned, the sales are of the order of 4-5 thousand per year accounting for only 1-2% of the market in India. The company exports only 5% of its total sales whereas the aim is to reach a minimum of 15%.

It has a dealer network of 350 exclusive dealers with major sales coming from Gujarat, MP and Maharashtra. Initially, a dealership was given for Rs. 50,000/- as security and purchase of one tractor by the dealer. Now, the security has been raised to Rs. 1.1 lac and advance tractor purchase to two tractors to acquire a dealership. Most of the times, salesmen and mechanics of competitors were made into dealers which accounted for 40% of total. All of the dealers are exclusive dealers of the company. There is a gradual shift and demand towards higher HP tractors especially more than 35 HP. The company spent about Rs. 2 crore on promotion which accounts for about 1% to 2% of its total turnover. Besides competitive pricing of the tractor, the company also offers higher margins than competitors to gain market share, this was the strategy adopted by Sonalika as well in the beginning. The MRP of the tractor is fixed and there is dealer net price (DNP) at which the tractor is sold to the dealer. Therefore, now the dealer margin per tractor is fixed compared to the early situation of it being a percentage of MRP. The company faces problem of shortage of

mechanics as well as their quality for providing effective after sale service. This is complicated by the high turnover of good mechanics.

The company had adopted a Gorilla strategy of expansion of distribution network by roping in competitor's distributors. There is no captive finance facility.

So far as after sales service is concerned, Sonalika changed the rules of the gain wherein it went in for dealerships without workshops and mechanics and company taking care of the after sales service. This helped the company (Sonalika) to penetrate the market. The standard sales in Punjab are only 15 to 20 per month compared with other States like Haryana where it is 30 to 40 per month. This was largely because of the initial practice of granting dealerships in Punjab on personal grounds than any professional policy.

The company is not able to cater to the demand because is not getting proper technical man- power in combines. The company has its dealers in foreign countries as well. The company itself gives training to the mechanics who are working in the companies service centre. The dealer net price is revised every year by the management. All the products are manufactures only in Barnala.

The company operates two shifts in tractor division. It has besides permanent workers contractual labour employed through the labour contractors. There is plenty of reverse engineering prevalent in the tractor industry and there have been many patent violations with prominent cases of PTL and Sonalika, HMT and Sonalika & Escort and Sonalika. It is basically a high margin low volume business for dealers of small tractor players.

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New tailor- made products

Companies like Mahindra & Mahindra, Punjab Tractors, Eicher Motors and HMT have recently launched new models of tractors suited to specific crop requirements. For example, HMT already has two tractors for orchards (2522 Orchard Special 25 HP with low weight for orchards, wineyards and Kinnows in Punjab which is priced at Rs. 25 lakh; and 3522C coastal special 35 HP for paddy cultivation in AP,

Karnataka and Tamilnadu. It is also about to launch a cotton special tractor of 25 HP soon. Similarly, Punjab Tractors is launching a potato special 25-35 HP tractor in 2008 costing Rs. 3.5-5 lakh. Eicher is also planning to launch an apple and orchard special soon (Sally and Parameswaran, 2007).

Small Tractors

SAS Motors

Angad tractor is 22 HP priced at Rs.1.50 lakh. The company has three manufacturing units and has sold 3,000 units in last one and half years. 95% of Angad's current customers were first-time tractor buyers. Moreover, it has been approved by the NABARD for concessional finance and subsidy. A farmer, on an average, spends Rs 48,000 per annum on two pairs of bullocks for a five-year working life of the animal. The new tractor would replace not only the traditional bullocks and bullock cart but also would offer the farmer various earning options apart from just ploughing the field.

SAS produces Angad of 15-24 HP ranges. The 15 HP engine of the self-propelled Angad 150 Power Tiller can be attached to a rice cultivator or a rotovator and is optimised for use in small and medium sized landholdings. Angad's farm implements portfolio include a Power Tiller, Rotary cultivator and a rural transport vehicle to facilitate connectivity between villages on off-highway Kuccha roads. This machine can also be harnessed for generating electricity for submersible irrigation pumps. The electricity can be generated at less than Rs 4 a unit.

SAS Motors has its 100% owned-manufacturing facility in China and three assembly units in India at Pune, Kolkata and Bhopal. Each of the units at Baramati and Bhopal has a capacity of 200 vehicles per month. SAS Motors has already started assembling centres at Ghaziabad in Uttar Pradesh, Pune in Maharashtra, Cudappah in Andhra Pradesh, and Hoogli in West Bengal. The factory at Ghaziabad has a capacity to produce about 50 tractors a day.

SAS Motors has also introduced Angad rotary cultivator (rotavator) as a standard accessory with the Angad 240 D tractor at a price of Rs 15,000 against the price range of Rs 40,000 - Rs 60,000 for rotavators available in the market currently. The Angad rotary cultivator can perform the functions of a disc harrow and a plough in a single motion. Its design enables it to pulverise only the top layer while protecting the lower layers of the soil. The company is also introducing other farm implements such as rice transplanters, mini combine harvesters, tillers and a range of rural transport vehicles. It is also working on an electric three-wheeler and 35 HP tractors.

SAS imports 85% of the components from China, which is a mass producer of tractors. Components are imported, assembled here and rolled out. This explains the low cost of tractors and better still, costs may come down further once the production increases, by when the company plans to manufacture its own spare parts. It decided to import from China because it is the largest producer of tractors, it produces 100 times more than India. Moreover, China and India have similar conditions in terms of farms, affordability, vast and different geographical areas, terrain, varying soil conditions, remote rural areas etc. The task was to optimise technology for India.

The engine for Angad has been sourced from Laidong, a Chinese company and has a technical collaboration agreement with Schifeng, another Chinese company, which sells 1.2 million agricultural vehicles annually. But, the company had done a complete reverse engineering on these tractors, and Angad is a 100% Indianised product. The engine confirms to the Bharat Stage II emission norms. The 22-HP Angad 240D tractors use a direct injection fuel-efficient horizontal diesel engine with a catalytic converter. A total investment of Rs 70 lakh has been pumped in to the R&D of the tractor.

Sales, Competition and Markets

It has already sold 2,000 such tractors during 2003-04. The company is expected to clock a turnover of Rs. 40 crore in 2006 and has set a target to achieve a 10-fold increase in its turnover of over Rs. 400 crore by 2009. The tractor, christened `Angad', is not only half the price of the cheapest tractor available in the market today, but also

consumes 25% less fuel and has 60% less maintenance costs. It can be repaired by a cycle mechanic and assembled at a tehsil-level garage.

Distribution and promotion

The company plans to set up 2000 "Angad Krishi Seva Kendras" across the country. Angad would set up dealerships at every tehsil in each district of the four states to start with. Workshops will be set up in each village so that an Angad owner need not travel more than 15 km for repairs and maintenance. Andhra Pradesh and West Bengal governments have invited SAS Motors to set up shops. As many as 135 modifications have been made in the Chinese model to suit the needs of Indian farmers. Angad is claimed to be 40% cheaper than tractors of comparable horsepower available in the country and it has 30% lower maintenance costs. The tractor has already been launched in Maharashtra, Gujarat and some parts of Madhya Pradesh and U.P

P. M diesels Pvt. Ltd.

Mr. P.M. Patel who is a founder is now the chairman of the industry. He holds ITI qualifications. Mr. C.P. Patel is a MD of the company who is double graduates holding B.Com. and LLB degrees. The company has only one working shifts. The company's tractor division has a total of 70 people. Out of which, 7 people are technical and the rest are non technical. The management, account and finance, and personnel and administration staff people are common for tractor division as well as for the industry.

It has employed a total of 450 people as shown in the table given below.

Table 3.3: Classification of PM Diesel Employees

Category of staff	Approximate staff strength
Technical	45
Non technical	45
Managerial	23
Casual and others	337
Total	450

Source: company records

Product profile

The company was established in 1963 and it began producing high speed diesel engines. However, looking to the rising demand of mini tractors in the market, it has started manufacturing mini tractors in 2004. The company had collaboration with a German firm "Motor and Fabric Hatz" between 1985 and 1995 for transfer of technical know-how.

The brand name of the company's products is Field Marshal. It has not changed its brand name since inception of the company. It is producing mini tractor model FM 625 DI of 9.5 HP capacity with single cylinder. Besides mini tractors, it is producing diesel pump sets which are largely used for agricultural purposes, especially for groundwater extraction and for surface water lifting. It is also producing bio fertilizers.

The company assembles the mini tractor at its manufacturing plant at Rajkot in Gujarat. Except its diesel engine all other components are bought from the market. The diesel engine costs Rs. 35,000 which accounts for 21% of the mini tractor price. It means the company purchases about 79% tractor components from 20 different SSI units. Of the 20, 50 % are located in Gujarat and the rest 50 % are based outside Gujarat. The company has informal tie-up with these SSIs which manufacture different types of tractor components as per the taste and design of the company. These SSIs are free to sell these components to other market players.

The product got approved by Central Motor Vehicles Rules (CMVR), Automotive Research Association of India (ARAI) and RTO. The production capacity of the company is 500 tractors per year. The cost of a mini tractor of the company is Rs. 1.65 lakh. The company determines the market price of its tractor on the basis of production cost. The state government provides subsidy of Rs 30,000 to assist buyers in purchasing mini tractors. The expected life of the mini tractor is 12 to 15 years.

Sales, competition and market

The annual turnover of the company is about Rs. 70 crore of which, tractor business contributes about Rs. 8 crores. The turnover continuously increased up to 2001 and

thereafter declined till 2005, and after 2005, once again it is showing increasing trend. The major reasons for declining trend were increasing diesel cost and raw material cost, inadequate availability of electricity and non-availability of bank finance. However, product diversification, introduction of petrol start kerosene operated engines and export are responsible for increasing trend after 2005.

The sale of mini tractor is continuously increasing because it is economical and good working product and it has virgin (emerging) market. The company sold 9 tractors in 2004-05, 136 tractors in 2005-06, 386 tractors in 2006-07, and is expected to sell 500 tractors during 2007-08.

The company has diversified its product because it wanted to get the benefit of excise duty as there is no excise duty and taxes on the tractor below 10 HP capacities. The rising demand for mini tractors was another reason for product diversification. So far the Company has made changes in the shape of mini tractor only.

Gujarat is the main market for the company's mini tractors. All its sales are in Gujarat only. But, the company exports its diesel engines to 28 countries worldwide and recently, it got the first order from South Africa for the export of mini tractors and thus, has exported 8 tractors for the first time. The company enjoys global competitiveness in selling diesel engines mainly because of its low cost and fuel efficiency. Export market contributes 20% of its total sale.

It does not import parts or components for manufacturing any of its products. As such there is no major competitor in selling mini tractors because of virgin market. However, Captain can be considered as its major market competitor. The company does not supply its products to MNCs in India. No multinationals are selling mini tractors in India. In fact, there are only three mini tractor manufacturers in India. The company has 100% new buyers. Among these buyers, 70% purchased for the first time and the rest 30% are farmers who were already using or used large size tractors before. The mini tractor is largely used for farm activities.

The company plans to introduce different capacities (15 HP and 20 HP) of mini tractors of different versions to offer a range of choice to farmers of different categories. It is also planning to expand its geographical spread in near future.

Distribution and promotion

The company has 40 dealers in Gujarat and does not have a single dealer outside the Gujarat. Depositing security money, capacity to pay advance payment, selling place (shop/showroom) infrastructure, RTO liaisoning and having mechanics are general requirements of the company to offer dealership.

The company provides one year warranty, during which it provides 4 free services or services up to 600 hours use whichever takes place earlier. The company trains the dealers' mechanics. Dealers provide after sale services to company's customers and dealers bear the service cost. The company does not provide credit facility to its dealers. There is no minimum sale condition for its dealers. The company does not face any problem from dealers/market or farmers.

The company participates in agri-fares within the state only to promote its tractor sale. Field demonstration, radio, news papers, pamphlets and wall paintings are major media for the advertisement and promotion. The expenditure incurs on advertisement and promotion varies from year to year depending on the profit margin.

Captain Tractors Pvt. Ltd.

Captain Tractors, previously known as Asha Exim Pvt. Ltd, was established in 1994 by the farmer brothers Mr. G.T.Patel and Mr.M.T.Patel of Rajkot. They initiated R& D activities in 1994 with the aim of introducing mini version of tractor to bridge the gap between large size tractors and bullock power use, especially targeting small and marginal farmers and they came out with the first indigenous prototype mini tractor model in 1998. However, it was finally introduced in the market for commercial selling in 2001 because of a lengthy industrial licenses procedure and other formal processing and government approvals.

Both the brothers have metric level education. They are the founders who were producing flour mills/flour grinders before entering into the tractor business. Now, Mr. M.T. Patel is the MD and Mr. G.T. Patel is the chairman of the industry. It is a family owned and run industry. The factory works only a single shift geenrally. The company has employed 45 people. Of them, 15 are technical persons, 4 non- technical persons, 10 managers, and the rest 16 casual workers.

Product profile

The brand name of the mini tractor is Captain, which means a leader, both the brothers integrated their engineering skills with agriculture and thus wanted to be a leader in manufacturing mini tractors in India and hence they have chosen Captain as a brand name. The company produces tractor Model No DI 2600 of 9.5 HP with single cylinder. It got CMFTTI – Budni test report in 2001. NABARD approved the product for bank finance in 2002. NABARD has adopted two major lending norms for mini tractors; one, the farmers should have minimum 4 acres of land; and two, the credit period will be only 2-3 years. The product was formally included in the list of Ministry of Agriculture, Government of India as tractor under subsidy.

The product got approved under the Central Motor Vehicle Rules (CMVR), which ensure vehicle performance and safety. The tractor was also approved by Automotive Research Association of India (ARAI) Stage II & ARAI Stage III in 2006 and RTO for its technical (especially emission) and operational aspects respectively. It also got ISO 9001-2000 in 2006.

Besides mini tractors, the company is also producing tractor implements. There are 22 different types of implements being produced at its manufacturing unit which is located at Rajkot in Gujarat. All implements are sold with the Captain brand only. Though the company principally believes that the practice of crop residue burning is creating environmental pollution, it has not thought of producing implement for the solution of crop residue burning.

The company assembles different components to produce the tractor at its manufacturing plant only. It produces 40% parts in-house and purchases 60% parts and components from the market. It tries to use readily available parts and

components with no or little modifications in designing its tractor rather then ordering specific parts and components to fits its design. It has about 40-50 suppliers. It purchases the tractor diesel engine from PM Field Marshal which a competitor and another player in market. The company has informal tie-up with about 10-15 SSI units which produce different components of the tractor according to the specifications and design of the company. Apart from it, the company does not have any other type of collaboration with any other companies for technical or financial support.

The company is continuously making changes in performance, hydraulic design (technological) and appearance to make the product attractive and competitive in the market. It does not provide tractor finance nor has it opened any financial company to assist buyers.

The market price of its tractor is Rs. 2 lakh. The company determines the market price of its tractor based on the production cost and market competition. The state government is providing subsidy of Rs. 30,000 to first time buyers irrespective of farmers' categories and castes. Average expected life of the tractor is 15 years.

When the company produced the first tractor its expected market price was Rs. 65,000. But as and when it moved towards the commercialization for producing mini tractors, the cost gradually increased to Rs. 2 lakh. The formal industrial process increased the market price of mini tractors and widened the gap between introduction of the innovative product and its commercialized sale because of heavy industrial duties and taxes, licenses, and other processing formalities which all together are mainly responsible for added cost. There is no proposal for other types of small tractors with the company.

Sales, competition and markets

Since its establishment, turnover of the company is increasing with increasing sales. The company's tractor is competitive in the market because of its lower price, fuel efficiency, (low fuel consumption) and multiple functional utility. The tractor sales increased from 27 tractors in 2002-03 to 414 tractors in 2006-07 (table 3.4). Today, the turnover of the company is nearly Rs. 4 crore.

Table 3.4: Tractor sales by Captain (2002-03 to 2006-07)

Particulars	2002-03	2003-04	2004-05	2005-06	2006-07
No. of Tractor sold	27	66	162	288	414

The mini tractors are in high demand which outstrips the production. The company started producing one tractor in 4 days and today it has developed the capacity to produce 4 tractors in a day. Overall, it can produce about 600 tractors in a year. Nevertheless, the company does not able to keep pace with the growing market demand.

The company has introduced only one model. It has 90-95% market in Gujarat and only 5-10 % market outside the Gujarat. The company has market distribution network in eight states (Gujarat, Maharashtra, Karnataka, Madhya Pradesh, Chattisgarh, Jharkhand, Orissa and West Bengal). The company is going to launch its mini tractor in Tamil Nadu shortly. Uganda, Mozambique, Lampala and Morocco are four countries where the company has its market distribution network.

In spite of having international market distribution network, the company has not exported its tractors so far nor does it import any parts or components. The company management thinks that it does not have any major competitor in the market because other two companies - PM field marshal and Trishul - have recently entered into the manufacturing of mini tractors and both these companies copied Captain product. The company management does not feel any threat about the global market of mini tractors and it does not supply its products to MNC in India. The company has 100 % new buyers. At present, it does not face any marketing problem.

The company has made a business strategy to increase the production by 20-25% every year for the next five years and would review its sales and market plan at every quarter to make necessary changes and take corrective measures.

Distribution and promotion

The company has about 15-20 dealers in Gujarat and 5-10 dealers outside Gujarat. The company has following terms and conditions for dealership. Not only in India but it has started in marketing operation in African country as stated above.

- Security deposit for minimum two tractors
- Service station facility
- Selling office/showroom
- 2-3 mechanics

The company provides one year warranty period to its customers during which it offers 4 free services up to one year or services up to 600 hours which ever is earlier. Dealers provide after sale services, but the cost of free services is born by the company. The company trains the dealers' mechanics. The company does not provide any credit instead it takes advance payment. On an average, it offers 5% dealer margin. It has policy to appoint one dealer per district. It offers incremental selling incentives to its dealers. The company does not face any problem from farmers, markets and dealers. In fact, its production does not match the rising demand.

The company participates in automotive exhibitions, agri-fares, and local festivals to promote its products. Personal visit to farmers, field demonstration and newspapers are major advertisement media for the company. The company incurs about 10% of its sale on advertisement.

Tables 3.5 and 3.6 present a comparative picture of the marketing strategies and technical specifications of the mini tractors of the two companies respectively.

Future of mini tractor industries

Future of mini tractors is bright because of various reasons such as increasing financial capability of farmers, reducing family size and farm plot size, increased awareness among farmers, and farmers want to shift from bullock driven farming to tractor driven farming to increase the efficiency in agriculture. The mini tractors have the advantage of functional utility and multiple uses over power tillers. The other reason is that farmers also want to minimize draft power use in agriculture. The company management feels that though the power tiller (PT) price is almost at par with its mini tractor price, the mini tractor does not have competition with the power

tiller because power tiller has very limited functional utility. Following are the major reasons why PT being not considered as its competitor:

- PT has no capacity to use all agricultural implements and attachments.
- It is uncomfortable to drive the PT.
- Power tiller is being operated on the pulling process, not on the riding process.
- PT is not useful for harvesting and other post-harvest operations.
- PT is mainly useful for inter-cultivation.
- PT has 3.5 HP which is low capacity for a farm machine.
- PT is petrol-start kerosene consuming machine and its fuel consumption is very high.

Table 3.5: Sales and marketing practices of mini tractor companies in Gujarat

Sr. no.	Marketing practices	Captain Tractors Pvt Ltd.	P. M. DIESELS PVT. LTD.
1	Annual turnover (Rs.)		
	Of the companies	4.0 crore	70 crore
	Of tractor section		8.0 crore
2	Market price of mini tractor	2.0 lakh	1.65 lakh
3	Sales		
	2002-03	27	-
	2003-04	66	-
	2004-05	162	9
	2005-06	288	136
	2006-07	414	386
4	Major domestic market		
	In Gujarat	90-95	100
	Outside Gujarat	5-10	0
5	Export market	No export	Sold 8 tractors in South Africa
6	Major competitors	Up to certain extent - Field marshal	Captain brand
7	Buyers type		
	New buyers	100 %	100% (of which, 30% are buyer had/have large size tractors)
8	Dealers network		
	Within Gujarat	15-20	40
	Outside Gujarat	5-10	0
9	Terms & conditions of dealership	• Security deposit for 2 tractors • Service station facility • 2-3 mechanics • Selling place (office/showroom)	• Security deposit • Advance payment • Mechanics • Selling place (office/showroom) • Liaison with RTO
10	After sale service	• Dealer provides the service • 4 free services up to one year or up to 600 hours use whichever takes place earlier	• Dealer provides the service • One year warranty or free services up to 600 hours use whichever takes place earlier
11	Cost of after sale service	Company bears	Dealers bear
12	Dealer margin	5 % on MRP	Business secret
13	Dealers jurisdiction	One dealer per district	No specification
14	Sale/promotional activities	• Participation in local festivals. Participation in Automotive exhibitions • Participation in agri-fares • News paper • Personal visit of farmers • Demonstration	• Participation in agri-fares • Radio • Pamphlet distribution • News paper • Field demonstration • Wall painting
15	Expenditure on sale/promotional activities as % of total sale	10	Not fixed, varies from year to year depending on the annual profit

Table 3.6: Technical specifications of mini tractor of two companies in Gujarat

Sr. no.	Technical specifications	Captain Tractors	P. M. Diesels
1	**Weight** Without standard ballast	825 kg	825 kg
2	**Dimensions**		
	Length	2440 mm	2430 mm
	Width	1220 mm	1220 mm
	Exhaust height	1670 mm	1850 mm
	Wheel base	1700 mm	1700 mm
	Ground clearance	260 mm	260 mm
	Track width	975 mm (driving wheels)	975 mm (driving wheels)
	Track width	1065 mm (steering wheels)	953 mm (steering wheels)
3	**Engine**		
	Make	FM (HATZ design)	FM (HATZ design)
	Type	Four stroke, direct injection	
	Horse power	11.8 HP (DIN 70020)/ 9.5 HP (CMVR)	11.5 HP (DIN 70020)/ 9.5 HP (CMVR)
	Bore/stroke	85/110 mm	85/110 mm
	No. of cylinders	One	One
	Capacity	625 cc	625 cc
	Engine rated speed	2600 rpm	
	Cooling system	Air-cooled	Air-cooled
	Air cleaner	Oil bath air cleaner with pre cleaner	Oil bath air cleaner with pre cleaner
	Diesel consumption	1.0 Ltr./hour (approx.)	1.5 Ltr./hour (approx.)
4	**Transmission**		
	Clutch	Dry, friction plate	Dry, friction plate
	Gear box	Four forward high/low One reverse/low	Four forward One reverse
	Foot brakes	Internal expanding shoe type mechanical brakes	Internal expanding shoe type mechanical brakes
	Parking brakes	Pawl and ratchet type locking arrangement	Pawl and ratchet type locking arrangement
	Steering	Mechanical worm and peg type	Mechanical worm and peg type
	Minimum turning	With brakes, 2.85 meters	With brakes, 2.85 meters
	Radius	Without brakes, 3.85 meters	Without brakes, 3.85 meters
5	**Hydraulic system**	To operate three point linkage and unload trailer material	To operate three point linkage and unload trailer material
	Drive	From engine through ‘V’ belt	From engine through ‘V’ belt
	Output of hydraulic pump	17.5 liters/min.	17.5 liters/min.
	Transport lock	Provided	Provided
6	**Three point linkage**	To attach various implements like plough, cultivator, harrow with provision lifting and lowering implements	To attach various implements like plough, cultivator, harrow with provision lifting and lowering implements
7	**Trailer**		
	Pay load	1.5 tonne	1.5 tonne
	Trailer size	8 ft x 5 ft x 1 ft (40 cu. Ft)	8 ft x 5 ft x 1 ft (40 cu. Ft)

	Tyre size	6.00 x 16 (8 ply)		6.00 x 16 (8 ply)	
8	**Tyres**				
	Front	5.20 x 14 (8 ply)		5.20 x 14 (8 ply)	
	Rear	8.00 x 18 (4 ply)		8.00 x 18 (4 ply)	
9	**Road speed – kmph**				
	Gears	**Low**	**High**	**Low**	**High**
	1	2.30	4.71	2.30	4.71
	2	3.86	7.93	3.9	7.93
	3	6.21	12.75	6.3	12.75
	4	9.15	18.78	9.3	18.78
	Reverse	1.72	3.53	1.7	3.53
11	**Oil capacities**				
	Diesel tank	16.0 ltr.		16.0 ltr.	
	Engine oil sump	1.6 ltr.		1.7 ltr.	
	Main gear box	1.6 ltr.		1.6 ltr.	
	Reduction gear box	1.75 ltr.		1.00 ltr.	
	Differential	1.2 ltr.		1.2 ltr.	
	Steering box	0.5 ltr.		0.5 ltr.	
	Air cleaner	0.15 ltr.		0.25 ltr.	
	Hydraulic tank	14.0 ltr.		14.0 ltr.	
12	**Electrical system**	12 v, 70 AH battery, solenoid operated self starter,		12 v, 70 AH battery, solenoid operated self starter,	
		12 v 40 A alternator, head lamps, parking light, turning light, hazard light, plough light, brake light horn		12 v 40 A alternator, head lamps, parking light, turning light, hazard light, plough light, brake light horn	
13	**Instruments**	RPM cum hour meter, oil temp meter, battery charging signal, head light/dipper indicator, push button horn		RPM cum hour meter, oil temp meter, battery charging signal, head light/dipper indicator, push button horn	
14	**operations**				
	Plough	2 - furrow		2/3 – piece	
	Cultivator	5 - tine		5 – tine	
	Blade harrow	3 - feet		3 – feet	
	Seed drill	5 - tine		5 – tine	
	Water centrifugal pump	2.5”x 2.5” / 3.0”x 2.5”		2.5”x 2.5”	
	Pesticide sprayer	13 – nozzle		6– nozzle	
	Thresher	Mini		Mini	
	Gen-set	7.5 k.v.a.		5 k.v.a.	
	Transportation	1.5 tonne		1.5 tonne	
	Reaper	1–1.5 acre/hour		-	
	Rotary tiller	2.5 feet (16 tine)		-	

Note: The black grey shadow in the table indicates technical differentiation between two companies.

Chapter 4

Distribution and Marketing of Tractors: Dealer perspectives

We randomly selected 14 dealers from 6 districts of Gujarat and 22 dealers from 10 districts of Punjab under the study. Together, a total of 36 dealers were selected (Table-4.1) from three new companies viz., Indofarm, Sonalika and Standard. Of the total, Indofarm, Sonalika and Standard constituted 11%, 50% and 39% respectively. This chapter examines the dealer level aspects of tractor marketing in terms of sales volumes, sales promotions, purchase considerations of farmers as dealers saw them and company policies fro dealers.

Table 4.1: State, district and company wise distribution of Tractor dealers

State	District	Indofarm	Sonalika	Standard	All	% of total Dealers
Gujarat	Bharuch		1		1	2.78
	Kheda			1	1	2.78
	Surat		1		1	2.78
	Anand		1	1	2	5.56
	Himmatnagar	1	1		2	5.56
	Kachchh	2	3	2	7	19.44
	Sub-total	**3**	**7**	**4**	**14**	**38.89**
Punjab	Jalandhar			1	1	2.78
	Muksar		1		1	2.78
	Nawashahar			1	1	2.78
	Barnala		1	1	2	5.56
	Ludhiana		1	1	2	5.56
	Sangrur		2		2	5.56
	Bhantinda		2	1	3	8.33
	Fatehgarh Saheb		1	2	3	8.33
	Mansa		1	2	3	8.33
	Patiala	1	2	1	4	11.11
	Sub-total	**1**	**11**	**10**	**22**	**61.11**
Total		4 (11.11)	18 (50.00)	14 (38.89)	36	100.00

Figures in brackets show percentage of total sample dealers

Dealer profile

Tractor dealers in Gujarat had higher level of formal education than dealers in Punjab though a higher proportion of dealers in Punjab attained metric level and above school

education than their counterparts in Gujarat. Company wise, Standard dealers had lower level of formal education than Indofarm and Sonalika dealers (Table 4.2). Nearly 50% dealers of Indofarm and Sonalika had graduation and above level of education, but only 21% Standard dealers completed graduation. But standard dealers had more technical level (diploma and ITI) education than other two company dealers. In all, about 8% dealers attained below metric level education, 28% dealers attained metric level education, 8% dealers attained higher secondary level education, 39% dealers attained graduation orabove level education, and 8% dealers attained technical education (diploma or ITI). About 8% dealers did not have any formal education.

Table 4.2: Educational qualification of the dealer by company and state

Educational level	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Nil		2 (11.11)	1 (7.14)	2 (14.29)	1 (4.55)	3 (8.33)
Below metric		1 (5.56)	2 (14.29)	2 (14.29)	1 (4.55)	3 (8.33)
Metric	1 (25.00)	4 (22.22)	5 (35.71)	1 (7.14)	9 (40.91)	10 (27.78)
12^{th} Std	1 (25.00)	1 (5.56)	1 (7.14)	1 (7.14)	2 (9.09)	3 (8.33)
Graduation	2 (50.00)	6 (33.33)	3 (21.43)	5 (35.71)	6 (27.27)	11 (30.56)
Professional degree		3 (16.67)		1 (7.14)	2 (9.09)	3 (8.33)
Diploma		1 (5.56)	1 (7.14)	2 (14.29)		2 (5.56)
ITI			1 (7.14)		1 (4.55)	1 (2.78)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Figures in brackets show percentage of total sample dealers

Further, about 64% Gujarat dealers and 36% Punjab dealers did not have previous experience in the tractor industry. About 21% Gujarat dealers had up to 10 years of previous experience and 14% of its dealers had 21-40 years of previous experience. About 18% Punjab dealers had up to 10 years of previous experience and 11 to 20 years of previous experience each, and 27% between 21 and 40 years of previous experience. About 25 %, 44% and 57% dealers of Indofarm, Sonalika and Standard, respectively did not have previous experience in tractor industry. About 25% Indofarm dealers had less than 5 years of previous experience and 50 % of its dealers had between 11 to 40 years of experience. About 28 % Sonalika dealers had up to 20 years of previous experience and 21 to 40 years of experience each. About 28.5% had up to 20 years of experience and the rest 14% had 21 to 40 years of experience. In all, about 44% dealers did not have any previous experience, 14% dealers had less than 5

years of previous experience, 8% dealers 5 to 10 years of experience, 11 % 11 to 20 years of experience, and 22% dealers had 21-40 years experience (table 4.3).

Table 4.3: State and company wise previous experience of dealers in tractor business

Experience in Years	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
None	1 (25.00)	8 (44.44)	8 (57.14)	9 (64.29)	8 (36.36)	16 (44.44)
< 5	1 (25.00)	1 (5.56)	1 (7.14)	1 (7.14)	2 (9.09)	5 (13.89)
5-10		2 (11.11)	2 (14.29)	2 (14.29)	2 (9.09)	3 (8.33)
11-20	1 (25.00)	2 (11.11)	1 (7.14)		4 (18.18)	4 (11.11)
21-40	1 (25.00)	5 (27.78)	2 (14.29)	2 (14.29)	6 (27.27)	8 (22.22)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Figures in brackets show percentage of total sample dealers

In Gujarat, about 29% dealers did not have any other sources of income, 14% dealers had farm income, 43% farmers had non farm income, and 14% dealers had both farm and non farm sources as other sources of income. In Punjab, about 36% dealers did not have any other sources of income, 41% dealers had farm income, 14% dealers had non farm income, and 9% dealers had both the sources as other sources of income. A higher proportion of Gujarat dealers had their income from non farm sources unlike Punjab dealers who had farm income as other income source. About 75% of Indofarm dealers, 33% of Sonalika dealers and 21% of Standard dealers did not have any other sources of income. About 22% of Sonalika and 50% of Standard dealers had farm income source. About 25% of Indofarm dealers, 39% of Sonalika dealers and only 7% of Standard dealers had non farm income sources. About 6% of Sonalika dealers and 21% of Standard dealers had both farm and non farm income sources. In all, about 33% dealers did not have any other sources of income. Where as about 31% dealers had farm income source, 25% dealers had non farm income sources and 11 % dealers had both farm and non-farm income sources (table 4.4).

Table: 4.4: Distribution of tractor dealers by company and state in terms of other sources of income

Source of income	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
None	3(75.00)	6(33.33)	3(21.43)	4(28.57)	8(36.36)	12(33.33)
Farm		4(22.22)	7(50.00)	2(14.29)	9(40.91)	11(30.56)
Non-Farm*	1(25.00)	7(38.89)	1(7.14)	6(42.86)	3(13.64)	9(25.00)
Both		1(5.56)	3(21.43)	2(14.29)	2(9.09)	4(11.11)
Total	4(100)	18(100)	14(100)	14(100)	22(100)	36(100)

Figures in brackets show percentage of total sample dealers; Note: *Non-farm sources includes a range of business activities such as manufacturing and selling of agricultural implements, running hotel,

construction work, workshop, RTO agent, import-export of ready made garments, scrap wholesaling and Sheller.

As far as dealership experience of present company is concerned, about 29% Gujarat dealers and 9% Punjab dealers had less than one year of dealership experience. About 57% Gujarat dealers and 64% Punjab dealers had 1- 5 years of dealership experience. About 14% Gujarat dealers and 27% Punjab dealers had 6-10 year to dealership experience. About 17% of Sonalika dealers and 21% of Standard dealers had less than one years of dealership experience. All Indofarm dealers had 1-5 years of dealership experience. About 39% of Sonalika dealers and 79% of Standard dealers had 1 to 5 years of dealership experience. About 57% of Sonalika dealers had 6 to 10 years of dealership experience. In all, about 17% dealers had less than one years of dealership experience, maximum numbers of dealers (about 61%) had a short span of dealership experience between 1 to 5 years and about 22% dealers had 6 to 10 years of dealership experience (table 4.5).

But, very small proportion of the dealers had experience of being dealers of any other tractor company. In Gujarat, about 86% dealers did not have dealership experience of other companies, 7% dealers each had 1 to 5 years and more than 5 years of dealership experience of other companies. In Punjab, 64% dealers did not have dealership experience of other companies and 18% dealers each had 1 to 5 years of dealership experience and more than 5 years of dealership experience of other companies. About 50% Indofarm dealers, 67% Sonalika dealers and 86% Standard dealers did not have dealership experience of other companies. About 50% Indofarm dealers and 17% Sonalika dealers had 1 to 5 years of dealership experience of other companies. About 17% Sonalika dealers and 14% Standard dealers had more than 5 years of dealership experience of other companies. In all, majority (about 71%) dealers did not have dealership experience of other companies. However, about 14 % of dealers each had dealership of other companies for less than 5 years and for more than 5 years (table 4.6).

Table: 4.5: State and company wise duration of tractor dealership

Dealership exp. (years)	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
< 1		3(16.67)	3(21.43)	4(28.57)	2(9.09)	6(16.67)
1-5	4(100)	7(38.89)	11(78.57)	8(57.14)	14(63.64)	22(61.11)
6-10		8(57.14)		2(14.29)	6(27.27)	8(22.22)
Total	4(100)	18(100)	14(100)	14(100)	22(100)	36(100)

Figures in brackets show percentage of total sample dealers

Table: 4.6: State and company wise distribution of dealers by experience of dealership of other companies

Dealership exp. (years)	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
None	2(50.00)	12(66.67)	12(85.71)	12(85.71)	14(63.64)	26(72.22)
1-5	2(50.00)	3(16.67)		1(7.14)	4(18.18)	5(13.89)
> 5 (up to 32)		3(16.67)	2(14.29)	1(7.14)	4(18.18)	5(13.89)
Total	4(100)	18(100)	14(100)	14(100)	22(100)	36(100)

Figures in brackets show percentage of total sample dealers. About 28% dealers had prior dealership experience of other companies such as Standard, Hindustan, Massey, Eicher, Pratap, Escort and Swaraj.

Sales and Marketing

About 86% Gujarat dealers and 64% Punjab dealers had one sales outlet each, 7% Gujarat dealers and 27% Punjab dealers had two sales outlets each, and 7% Gujarat dealers, and 9% Punjab dealers had three sales outlets. All Indofarm dealers, 50% Sonalika dealers, and 93% Standard dealers had only one sales outlet. About 33% Sonalika dealers and 7% Standard dealers had two sales outlets. 17% Sonalika dealers had three sales outlets. In all, about 72% dealers possessed one sales outlet, 19% dealers possessed two sales outlets and only 8% dealers possessed three sales outlets (table 4.7).

Table: 4.7: Distribution of dealers by number of sales outlets- company and state-wise

Number of outlets	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
One	4(100)	9(50.00)	13(92.86)	12(85.71)	14(63.64)	26(72.22)
Two		6(33.33)	1(7.14)	1(7.14)	6(27.27)	7(19.44)
Three		3(16.67)		1(7.14)	2(9.09)	3(8.33)
Total	4(100)	18(100)	14(100)	14(100)	22(100)	36(100)

Figures in brackets show percentage of total sample dealers.

About 57% Gujarat dealers and 73% Punjab dealers were selling up to 5 tractors per month. About 29% Gujarat dealers and 27% Punjab dealers were selling 6 to 10 tractors per month. About 7% Gujarat dealers each (one dealer each) were selling 11 to 15 tractors and 16 to 20 tractors per month. About 75 % Indofarm dealers, 44% Sonalika dealers and 93% Standard dealers were selling up to 5 tractors per month. About 25 % Indofarm dealers, 44% Sonalika dealers and 7% Standard dealers were selling 6 to 10 tractors per month. About 11% Sonalika dealers were selling 11 to 20 tractors per month. In all, about 67% dealers were selling up to 5 tractors per month, 28% dealers were selling 6 to 10 tractors per month and the rest 5 % dealers were selling 11 to 20 tractors per month (table 4.8).

About 57% Gujarat dealers and 91% Punjab dealers had a monthly sale up to 5 tractors per outlet. About 36% Gujarat dealers and 9% Punjab dealers had a monthly sale between 6 and 10 tractors per outlet. Only 7% Gujarat dealers had a monthly sale between 16 and 20 tractors per outlet. About 75% Indofarm dealers, 67% Sonalika dealers and 93% Standard dealers had a monthly sale up to 5 tractors per outlet. About 25% Indofarm dealers, 28% Sonalika dealers and 7% Standard dealers had a monthly sale between 6 and 10 tractors per outlet. Only 6% Sonalika dealers had a monthly sale between 16 and 20 tractors per outlet. In all, about 78% dealers had a monthly sale up to 5 tractors per outlet, 19% dealers had a monthly sale between 5 to 10 tractors per outlet, and only 3% dealers had a monthly sale between 16 and 20 tractors per outlet (table 4.9).

Table: 4.8: State and company wise distribution of dealers by monthly sales of tractors

Sale (no. of tractors)	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
≤ 5	3 (75.00)	8 (44.44)	13 (92.86)	8 (57.14)	16 (72.73)	24 (66.67)
6-10	1 (25.00)	8 (44.44)	1 (7.14)	4 (28.57)	6 (27.27)	10 (27.78)
11-15		1 (5.56)		1 (7.14)		1 (2.78)
16-20		1 (5.56)		1 (7.14)		1 (2.78)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Figures in brackets show percentage of total sample dealers.

Table 4.9: State and company wise distribution of dealers by monthly sales of tractors per outlet

Sale (no. of tractors)	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
≤ 5	3 (75.00)	12 (66.67)	13 (92.86)	8 (57.14)	20 (90.91)	28 (77.78)
6-10	1 (25.00)	5 (27.78)	1 (7.14)	5 (35.71)	2 (9.09)	7 (19.44)
11-15	-	-	-	-	-	-
16-20	-	1 (5.56)	-	1 (7.14)	-	1 (2.78)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Figures in brackets show percentage of total sample dealers.

In Gujarat, only 7% dealers did not face any local level market competition as they did not have any other companies' sales outlet in their area of operation. While about 14% Gujarat dealers and 32% Punjab dealers faced competition from 1 to 5 outlets, 36% Gujarat dealers and 55% Punjab dealers faced competition from 6 to 10 outlets, 29% Gujarat dealers and 14% Punjab dealers faced competition from 11 to 15 outlets, and only 14% Gujarat dealers faced competition from more than 15 outlets of other companies in their area of operation. Only about 6% Sonalika dealers did not face any local level market competition. While about 25% Indofarm dealers, 17% Sonalika dealers and 36% Standard dealers faced competition from 1 to 5 outlets of other companies. About 25% Indofarm dealers, 50% Sonalika dealers and 50% Standard dealers faced competition from 6 to 10 outlets of other companies. About 25% Indofarm dealers, 22% Sonalika dealers and 14% Standard dealers faced competition from 11 to 15 outlets of other companies. About 25% Indofarm dealers and 6% Sonalika dealers faced competition from more than 15 outlets of other companies. In all, only 3% dealers did not face market competition, 25% dealers faced competition from 1 to 5 outlets, 47% dealers face competition from 6 to10 outlets, 19% dealers faced competition from 11 to 15 outlets, and only 6% dealers faced competition from more than 15 outlets of other companies in their area of operation (table 4.10).

Table 4.10: State and company wise distribution of dealers by the number of competitors' outlets in the area

Outlets (numbers)	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
0		1 (5.56)		1 (7.14)		1 (2.78)
1-5	1 (25.00)	3 (16.67)	5 (35.71)	2 (14.29)	7 (31.82)	9 (25.00)
6-10	1 (25.00)	9 (50.00)	7 (50.00)	5 (35.71)	12 (54.55)	17 (47.22)
11-15	1 (25.00)	4 (22.22)	2 (14.29)	4 (28.57)	3 (13.64)	7 (19.44)
> 15	1 (25.00)	1 (5.56)		2 (14.29)		2 (5.56)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Figures in brackets show percentage of total sample dealers.

In Gujarat, about 86% dealers offered toolkit, service kit and filter kit and 14% dealers offered other things besides toolkit, service kit and filter kit to farmers when they purchase tractor. Other things include hood, bumper, 20 ltr oil, etc. In Punjab, about 18% dealers offered tool kit and service kit, and the rest 82% dealers offered toolkit, service kit and filter kit to farmers when they purchased tractor. About 29% Standard dealers offered toolkit and service kit; about 75% Indofarm dealers, 94% Sonalika dealers and 71% Standard dealers offered toolkit, service kit and filter kit; and about 25% Indofarm dealers and 6% Sonalika dealers offered tool kit , service kit, filter kit and other things to farmers when they purchase tractor. In all, about 11% dealers offered tool kit and service kit; 83% dealers offered toolkit, service kit and filter kit; and 6% dealers offered toolkit, service kit, filter kit and other things (table 4.11).

Warranty period offered to their customers differed across companies and dealers. All Gujarat dealers provided one year warranty, while 45% Punjab dealers provided one year warranty. In Punjab, 41% dealers provided 1.5 years warranty and 14% gave 2 year warranty. All Indofarm dealers, 56% Sonalika dealers and 71% Standard dealers provided one year warranty. About 33% Sonalika dealers and 21% Standard dealers provided 1.5 years warranty; and 11% Sonalika dealers and 7% standard dealers provided 2 year warranty. In all, about 67% dealers provided one year warranty, 25% 1.5 years warranty and 8% gave two year warranty (table 4.12).

Table 4.11: Company and state-wise distribution of dealers by incentives offered to farmers by dealers at the time of purchase

Dealers provide	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Tool kit and service kit			4(28.57)		4(18.18)	4(11.11)
Tool kit , service kit and filter kit	3(75.00)	17(94.44)	10(71.43)	12(85.71)	18(81.82)	30(83.33)
Tool kit , service kit, filter kit and others*	1(25.00)	1(5.56)		2(14.29)		2(5.56)
Total	4(100)	18(100)	14(100)	14(100)	22(100)	36(100)

Figures in brackets show percentage of total sample dealers.
*Others include hood, bumper, 20 ltr oil, etc.

Table 4.12: Company and state-wise distribution of dealers by after sales services (warranty) offered

Warranty period (years)	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
1	4 (100)	10 (55.56)	10(71.43)	14 (100)	10(45.45)	24(66.67)
1.5		6 (33.33)	3 (21.43)		9 (40.91)	9 (25.00)
2		2 (11.11)	1 (7.14)		3 (13.64)	3 (8.33)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Figures in brackets show percentage of total sample dealers.

A majority of the dealers had invested only upto Rs. 5 lakh in the business as fixed investment with an equal proportion (25% each) investing rs. 5-10 lakh and more than Rs. 10 lakh. And even upto Rs. 1.5 crores. The fixed investment was relatively higher in Gujarat than that in Punjab. Indofarm and Standard dealers had to invest less compared to Sonalika dealers. Sonalika dealers have invested up to Rs. 1.5 crores while Indofarm and Standard dealers have invested up to Rs. 20 lakh (table 4.13). About 14% dealers required more than one lakh rupees working capital. Among them, except one dealer who required Rs. 8 lakh as working capital, all other dealers required Rs. 1-1.5 lakh for working capital. In Gujarat, about 1/3rd dealers had working capital investment of the order of Rs. one lakh or more. Across companies, standard had the lowest working capital requirement (table 4.14).

Table 4.13: State and company wise distribution of dealers by their fixed investment

Investment (lakh rupees)	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
up to 5	2 (50.00)	9 (50.00)	7 (50.00)	4 (28.57)	14 (63.64)	18 (50.00)
5.1-10 .0	1 (25.00)	2 (11.11)	6 (42.86)	5 (35.71)	4 (18.18)	9 (25.00)
> 10.00	1 (25.00)	7 (38.89)	1 (7.14)	5 (35.71)	4 (18.18)	9 (25.00)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Table 4.14: State and company wise distribution of dealers by their working capital investment

Investment (000' rupees)	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Up to 25.0	1 (25.00)	4 (22.22)	10 (71.43)	3 (21.43)	12 (54.55)	15 (41.67)
25.1-50.0	1 (25.00)	5 (27.78)	3 (21.43)	3 (21.43)	6 (27.27)	9 (25.00)
50.1-100.0	1 (25.00)	6 (33.33)		3 (21.43)	4 (18.18)	7 (19.44)
> 100.0	1 (25.00)	3 (16.67)	1 (7.14)	5 (35.71)		5 (13.89)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Buyer consideration in tractor purchase- dealer perceptions

The horsepower of the tractor was the major consideration in purchase of tractor followed by fuel efficiency and after sales service in that order. But, in Punjab, there were other factors like file cooling, number of cylinders, colour & appearance, hydraulic changes, double clutch, powerful lift, special gear, can work with rotovator. N fact, there are special features which are required in a matured market like Punjab. Another major factor which emerged across analysis of companies was market value or resale value of the tractor in the case of Indofarm (table 4.15). what comes out clearly from table 4.16 is that farmers/buyers look for multiple aspects in tractor while making a purchase. Therefore, it is not just horse power but other features as well as resale value which are equally important.

Terms and conditions of dealership

The single most important condition for dealership across companies and states was security money followed by working capital for setting up a show room and manpower to manage it (tables 4.17 and 4.18) though security deposit required both for tractors as well spare parts was not very high (table 4.19and 4.20).

Table 4.15: State and company wise distribution of dealers by buyer considerations in tractor purchase

Customers' requirements	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
HP	4 (100)	17 (97.44)	14 (100)	14 (100)	21 (95.45)	35 (97.22)
Fuel/oil efficiency	4 (100)	14 (77.78)	5 (35.71)	12 (85.71)	11 (50.00)	23 (63.89)
Good service	4 (100)	9 (50.00)	0	9 (64.29)	4 (18.18)	13 (36.11)
Market value	2 (50.00)	4 (22.22)	0	5 (35.71)	1 (4.55)	6 (16.67)
Price	0	1 (5.56)	3 (21.43)	3 (21.43)	1 (4.55)	4 (11.11)
Others	0	8 (44.44)	9 (64.29)	5 (35.71)	12 (54.55)	17 (47.22)

Dealer support by company

About 22% dealers received credit for 15-90 days from the company. Only one dealer received cash credit of Rs. 50 Lakh and one another dealer received credit linked with his bank limit. All other dealers received credit per tractor (table 4.21). About 89% dealers received the service of company's mechanics, especially to solve the big problems. Only 8% dealers were receiving regular visit of company's mechanics either on fortnightly or bi-monthly basis. Only one dealer of Standard company was receiving payment for his foreman from the company. About 89% dealers received training for their mechanics from their respective companies (table 4.22).

Table 4.16: Dealer perception of buyer criteria to buy a tractor

Customers requirements	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
HP and others*	0	3 (16.67)	8 (57.14)	1 (7.14)	10 (45.45)	11 (30.56)
HP, good service and fuel/oil efficiency	2 (50.00)	4 (22.22)	0	3 (21.43)	3 (13.64)	6 (16.67)
HP and fuel/oil efficiency	0	4 (22.22)	1 (7.14)	0	5 (22.73)	5 (13.89)
HP, good service, fuel/oil efficiency and market value	2 (50.00)	1 (5.56)	0	2 (14.29)	1 (4.55)	3 (8.33)
HP, good service, fuel/oil efficiency, Market value and others*	0	0	0	3 (21.43)	0	3 (8.33)
HP, fuel/oil efficiency, price	0	3 (16.67)	0	3 (21.43)	0	3 (8.33)
HP					1 (4.55)	1 (2.78)
HP and good service			3 (21.43)	1 (7.14)		1 (2.78)
HP, fuel/oil efficiency and others*			1 (7.14)	1 (7.14)	1 (4.55)	2 (5.56)
Fuel/oil efficiency, price and others*		1 (5.56)			1 (4.55)	1 (2.78)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

*Others include file cooling, number of cylinders, colour & appearance, hydraulic changes, double clutch, powerful lift, special gear, can work with rotovator. Number of cylinder is a major requirement among other requirements.

Table 4.17: Distribution of dealers by terms of dealership- state and company wise

Requirements	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Security money	4 (100)	16 (88.89)	13 (92.86)	14 (100)	19 (86.36)	33 (91.67)
Show room	3 (75.00)	16 (88.89)	11 (78.57)	10 (71.43)	20 (90.91)	30 (83.33)
Manpower	3 (75.00)	16 (88.89)	7 (50.00)	11 (78.57)	15 (68.18)	26 (72.22)
Experience	0	1 (5.56)	0	0	1 (4.55)	1 (2.78)
Working capital	0	1 (5.56)	0	0	1 (4.55)	1 (2.78)
Spare parts security	0	4 (22.22)	5 (35.71)	2 (14.29)	7 (31.82)	9 (25.00)
Workshop	0	1 (5.56)	1 (7.14)	2 (14.29)	0	2 (5.56)
Advance tractor purchase/payment*	0	1 (5.56)	5 (35.71)	3 (21.43)	3 (13.64)	6 (16.67)

*About 17 % dealers had to purchase two to five tractors in advance.

Table 4.18: Distribution of dealers by requirements to acquire dealership- state and company wise

Requirements	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Security money, show room and manpower	3 (75.00)	9 (50.00)	2 (14.29)	6 (42.86)	8 (36.36)	14 (38.89)
Security money, show room, man power and spare parts security	0	3 (16.67)	1 (7.14)	1 (7.14)	3 (13.64)	4 (11.11)
Security money and show room	0		2 (14.29)		2 (9.09)	2 (5.56)
Security money, show room, man power and advance tractor purchase	0	1 (5.56)	1 (7.14)	1 (7.14)	1 (4.55)	2 (5.56)
Security money and spare parts security	0	1 (5.56)	1 (7.14)	1 (7.14)	1 (4.55)	2 (5.56)
Show room and manpower	0	1 (5.56)	1 (7.14)	1 (7.14)	1 (4.55)	2 (5.56)
Security money	1 (25.00)	0	0	1 (7.14)	0	1 (2.78)
Show room	0	0	1 (7.14)	0	1 (4.55)	1 (2.78)
Security money, show room, man power, spare parts security and advance tractor purchase	0	0	1 (7.14)	0	1 (4.55)	1 (2.78)
Security money, show room, man power and workshop	0	1 (5.56)		1 (7.14)		1 (2.78)
Security money, show room and spare parts security	0	0	1 (7.14)	0	1 (4.55)	1 (2.78)
Security money, show room, spare parts security and advance tractor purchase	0	0	1 (7.14)	0	1 (4.55)	1 (2.78)
Security money and man power	0	1 (5.56)	0	0	1 (4.55)	1 (2.78)
Security money, man power, workshop and advance tractor purchase	0	0	1 (7.14)	1 (7.14)	0	1 (2.78)
Security money and advance tractor purchase	0	0	1 (7.14)	1 (7.14)	0	1 (2.78)
Show room, experience and working capital	0	1 (5.56)	0	0	1 (4.55)	1 (2.78)
All	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Table 4.19: Distribution of dealers by amount of security money paid to acquire dealer ship (state and company wise)

Security money (Rs,. In Lakh))	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
None	0	2 (11.11)	2 (14.29)	1 (7.14)	3 (13.64)	4 (11.11)
Amount not given	0	3 (16.67)	2 (14.29)	2 (14.29)	3 (13.64)	5 (13.89)
Up to 1.0	3 (75.00)	7 (38.89)	8 (57.14)	6 (42.86)	12 (54.55)	18 (50.00)
1.1-3.0	1 (25.00)	4 (22.22)	1 (7.14)	3 (21.43)	3 (13.64)	6 (16.67)
3.1-12.0	0	2 (11.11)	1 (7.14)	2 (14.29)	1 (4.55)	3 (8.33)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Table 4.20: Distribution of dealers by security money paid for spare parts – state and company wise

Security money for spare parts (Rupees)	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
None	4	14	9	12 (85.71)	15 (68.18)	27 (75.00)
50,000	0	1	0	1 (7.14)	0	1 (2.78)
60,000	0	2	5	1 (7.14)	6 (27.27)	7 (19.44)
2 lakhs	0	1	0	0	1 (4.55)	1 (2.78)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Table 4.21: Distribution of dealers by credit facility provided – state and company wise

Credit	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Not received	0	16	12	10 (71.43)	18 (81.82)	28 (77.78)
Received	4	2	2	4 (28.57)	4 (18.18)	8 (22.22)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)
Credit period						
Days	30-90	15-45	15	30-90	15-30	15-90

Table 4.22: Distribution of dealers by type of assistance provided – state and company wise

Assistance/services	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Provide mechanic	4 (100)	17 (94.44)	11 (78.57)	12 (85.71)	20 (90.91)	32 (88.89)
Payment to dealers' mechanics	0	0	1 (7.14)	0	1 (4.55)	1 (2.78)
Training to dealers' mechanics	4 (100)	18 (100)	10 (71.43)	13 (92.86)	19 (86.36)	32 (88.89)
Training period (days)	15	5-10	10-30	5-16	5-30	5-30

Only Indo farm dealers found their terms and conditions somewhat better than the competition in term of dealer credit and no undue pressure to sell. But, dealers mostly found that on various counts, dealer terms and conditions were similar across companies (table 4.23 and 4.24).

Table 4.23: Distribution of dealers by comparative picture of company's dealer terms and conditions vis-à-vis competitors-state and company wise

Dealers T&C	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Better	2 (50.00)	3 (16.67)	2 (14.29)	4 (28.57)	3 (13.64)	7 (19.44)
Common	2 (50.00)	3 (16.67)	1 (7.14)	6 (42.86)	0	6 (16.67)
No difference	0	12 (66.67)	8 (57.14)	2 (14.29)	18 (81.82)	20 (55.56)
Competitive	0	0	2 (14.29)	1 (7.14)	1 (4.55)	2 (5.56)
No response	0	0	1 (7.14)	1 (7.14)	0	1 (2.78)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Table 4.24: Distribution of dealers by reasons for better terms and conditions-state and company wise

Reasons for better T&C	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Company gives credit	1	0	0	1	0	1
No or low pressure	1	1	2	1	3	4
Good service	0	1	0	1	0	1
Company does not take risk	0	1	0	1	0	1
Total	2	3	2	4	3	7

In general, margins were somewhat higher in case of Indofarm and also higher in Gujarat than in Punjab as Gujarat was being penetrated as a new market (table 4.25).

Table 4.25: Distribution of dealers by dealer margin-state and company wise

Dealer Margin (Rs. '000)	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
No response	0	1 (5.56)	1 (7.14)	0	2 (9.09)	2 (5.56)
up to 10.0	0	5 (27.78)	3 (21.43)	0	8 (36.36)	8 (22.22)
10.1-15.0	1 (25.00)	5 (27.78)	2 (14.29)	2 (14.29)	6 (27.27)	8 (22.22)
15.0-20.0	1 (25.00)	1 (5.56)	1 (7.14)	2 (14.29)	1 (4.55)	3 (8.33)
20.1-25.0	0	4 (22.22)	3 (21.43)	5 (35.71)	2 (9.09)	7 (19.44)
25.1-30.0	1 (25.00)	0	2 (14.29)	2 (14.29)	1 (4.55)	3 (8.33)
30.1-35.0	0	2 (11.11)	0	1 (7.14)	1 (4.55)	2 (5.56)
> 35 (up to 100)	1 (25.00)	0	2 (14.29)	2 (14.29)	1 (4.55)	3 (8.33)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

.

Almost 50% dealers reported dealer focused as well as farmer focused schemes across states and companies except Standard (table 4.26 and 4.27). The farmer focused schems were more generally available in Gujarat than in Punjab. Different companies offered different types of incentive schemes to increase tractor sale. Cash discount was the most common incentive scheme offered to dealers; however, Indo-farm and Sonalika offered two wheeler and four wheeler gift, and foreign trip to increase tractor sale. No company offered farmer focused scheme but dealers offered cash discount to their customers.

Table 4.26: Distribution of dealers by dealer focused scheme offered by companies-state and company wise

Scheme offered	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Yes	2 (50.00)	14 (77.78)	1 (7.14)	7 (50.00)	10 (45.45)	17 (47.22)
No	2 (50.00)	4 (22.22)	12 (85.71)	6 (42.86)	12 (54.55)	18 (50.00)
No response			1 (7.14)	1 (7.14)		1 (2.78)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Table 4.27: Distribution of dealers by farmer focused scheme offered by dealers –state and company wise

Scheme offered	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Yes	2 (50.00)	10 (55.56)	4 (28.57)	10 (71.43)	6 (27.27)	16 (44.44)
No	2 (50.00)	8 (44.44)	9 (64.29)	3 (21.43)	16 (72.73)	19 (52.78)
no response	0	0	1 (7.14)	1 (7.14)	0	1 (2.78)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Company wise dealer perspective on company specific unique selling propositions (USPs) of tractor brands

Indofarm: Jeko engine, more length, oil efficiency, 1st rotary pump, Uro type rotary pump, and appearance.

Sonalika: big tray, smokeless, Hi-tech hydraulic, more work, special for rotavator, more height, appearance, colour, oil efficiency, low pollution, eco friendly, pto, two gear for pto, reverse pto gear, double pto, side gear, heavy duty, power, powerful engine, low maintenance, , price, resale value, success with special cultivator, and Uro-3.

Standard: better for combine, second high utility gear, extra gear, reverse gear in top gear possible(good gear box), special cultivator gear, 2nd cultivator gear, low oil consumption, fuel efficient, oil efficiency, 3 term engine, different clutch plate, strong tractor, free chatri, higher height, power steering (full turn in less space), easy for lift, and heavy duty.

A majority of dealers were of the view that tractor is not a status symbol with only 1/3 confirming it as a status symbol. But, across states, in Gujarat, it was considered to be status symbol in some measure as the tractor density is lower than that in Punjab which is densely populated by tractors. Across companies, Sonalika and Standard had somewhat higher perception of being status symbols than that by Indofarm (Table

4.28). So far as perception of dealers about the life span of a tractor was concerned, it was in general perceived to be 5-10 years and more so in Gujarat. Surprisingly, Punjab dealers viewed the tractor to have even a life of 16-20 years. But, in terms of across company analysis, it was more or les same with 50% dealers perceiving it to be 5-10 years (Table 4.29).

Table 4.28: Distribution of dealers by their perception of tractor as a status symbol for farmers-state and company wise

Status symbol	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Yes	2 (50.00)	6 (33.33)	4 (28.57)	6 (42.86)	6 (27.27)	12 (33.33)
No	2 (50.00)	12 (66.67)	10 (71.43)	8 (57.14)	16 (72.73)	24 (66.67)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Promotion of tractors by dealers

The most commonly used promotional tool was demonstration followed by distribution of pamphlets and printed material as personalized promotion and newspapers and magazines as the mass media. Sonalika focused more on demonstrations against other companies (Table 4.30 and 4.31). The promotional expenses were either shared between company and dealer or wholly borne by dealers (Table 4.32).

Table 4.29: Distribution of dealers by their perception of life of tractor - state and company wise

Life (in years)	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
5-10	2 (50.00)	10 (55.56)	8 (57.14)	13 (92.86)	7 (31.82)	20 (55.56)
11-15	0	5 (27.78)	1 (7.14)	0	6 (27.27)	6 (16.67)
16-20	1 (25.00)	2 (11.11)	1 (7.14)	0	4 (18.18)	4 (11.11)
Depends on the farmer	1 (25.00)	1 (5.56)	4 (28.57)	1 (7.14)	5 (22.73)	6 (16.67)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Table 4.30: Distribution of dealers by promotion tools used –state and company wise

Mode of advertisement	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Demonstration*	2 (50.00)	13 (72.22)	6 (42.86)	10 (71.43)	11 (50.00)	21 (58.33)
Distribution of printed literature such as pamphlets and handouts	2 (50.00)	5 (27.78)	4 (28.57)	4 (28.57)	7 (31.82)	11 (30.56)
News papers/Magazines	1 (25.00)	3 (16.67)	2 (14.29)	4 (28.57)	2 (9.09)	6 (16.67)
Wall painting	1 (25.00)			1 (7.14)		1 (2.78)
TV		1 (5.56)		1 (7.14)		1 (2.78)
Fare demonstration		2 (11.11)	4 (28.57)		6 (27.27)	6 (16.67)
Others **		3 (16.67)	4 (28.57)	4 (28.57)	3 (13.64)	7 (19.44)

* There are different methods of demonstration such as farm demo, stall demo, and village show.

** Other methods include personal contact, spread of information through local mechanics, free trial, stall, and road show.

Table 4.31: Distribution of dealers by advertisement strategy used-state and company wise

Mode of advertisement	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
None	1 (25.00)	1 (5.56)	3 (21.43)	2 (14.29)	3 (13.64)	5 (13.89)
Demonstration and distribution of printed literature	1 (25.00)	2 (11.11)	1 (7.14)	1 (7.14)	3 (13.64)	4 (11.11)
Demonstration	1 (25.00)	6 (33.33)	2 (14.29)	3 (21.43)	6 (27.27)	9 (25.00)
Distribution of printed literature	0	1 (5.56)	0	0	1 (4.55)	1 (2.78)
Fare demonstration	0	2 (11.11)	1 (7.14)	0	3 (13.64)	3 (8.33)
News papers/Magazines	0		1 (7.14)	0	1 (4.55)	1 (2.78)
Demonstration, distribution of printed literature, and others	0	1 (5.56)	1 (7.14)	1 (7.14)	1 (4.55)	2 (5.56)
Demonstration, distribution of printed literature and news papers/magazines	0	1 (5.56)	0	1 (7.14)	0	1 (2.78)
Demonstration and Others	0	2 (11.11)	1 (7.14)	3 (21.43)	0	3 (8.33)
Demonstration and News papers/magazines	0	1 (5.56)	1 (7.14)	1 (7.14)	1 (4.55)	2 (5.56)
Distribution of printed literature, News papers/magazines, and wall painting	1 (25.00)	0	0	1 (7.14)	0	1 (2.78)
Distribution of printed literature and Fare demonstration	0	0	1 (7.14)	0	1 (4.55)	1 (2.78)
Distribution of printed literature, Fare demonstration and others	0	0	1 (7.14)	0	1 (4.55)	1 (2.78)
TV and News papers/Magazines	0	1 (5.56)	0	1 (7.14)	0	1 (2.78)
Fare demonstration and others	0	0	1 (7.14)	0	1 (4.55)	1 (2.78)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Table 4.32: Distribution of dealers by source of advertisement funds- state and company wise

Bearer of adv. Exp	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Dealers	1 (25.00)	5 (27.78)	8 (57.14)	4 (28.57)	10 (45.45)	14 (38.89)
Dealer and company on 50:50 basis	2 (50.00)	10 (55.56)	1 (7.14)	4 (28.57)	9 (40.91)	13 (36.11)
Disproportionately shared by dealer and company	0	0	3 (21.43)	2 (14.29)	1 (4.55)	3 (8.33)
None	1 (25.00)	3 (16.67)	2 (14.29)	4 (28.57)	2 (9.09)	6 (16.67)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Interestingly, the dealers were of the view that advertisements influenced farmer behaviour significantly. This was true in both the states and across all the three companies (table 4.33).

Table 4.33: Distribution of dealers by influence of advertisement on farmer behaviour-state and company wise

Influence	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Yes	4 (100)	12 (66.67)	10 (71.43)	10 (71.43)	16 (72.73)	26 (72.22)
No	0	6 (33.33)	4 (28.57)	4 (28.57)	6 (27.27)	10 (27.78)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

About 25% dealers said that advertisement influences sale by 20 to 50%.

Financial tie-up and costs involved

All the dealers except 5% had single or multiple bank tie up for tractor loans arranged by the respective companies. But, SBI emerged as the single largest bank for such tie ups due to its overwhelming presence in the rural areas (Table 4.34). Majority of the dealers spent within Rs. 5,000 for arranging a tractor loan for the farmer (table 4.35). 2/3 of the dealers had bank limit for working capital and more so in Gujarat (table 4.36)

Table 4.34: Distribution of dealers by formal tie-up with banks-state and company wise

Tie-up banks	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
SBI	-	12 (66.67)	10 (71.43)	1 (7.14)	21 (95.45)	22 (61.11)
Dena Bank	-	-	1 (7.14)	1 (7.14)	-	1 (2.78)
SBI, BoB	-	2 (11.11)	-	2 (14.29)	-	2 (5.56)
SBI, BoB, Dena Bank	-	-	1 (7.14)	1 (7.14)	-	1 (2.78)
All banks	3 (75.00)	4 (22.22)	1 (7.14)	8 (57.14)	-	8 (22.22)
None	1 (25.00)	-	1 (7.14)	1 (7.14)	1 (4.55)	2 (5.56)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Table 4.35: Distribution of dealers by indirect/direct cost for arranging loan for tractor-company and state-wise

Cost in Rs.	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Up to 5000	1 (25.00)	9 (50.00)	9 (64.29)	6 (42.86)	13 (59.09)	19 (52.78)
5001-10000	3 (75.00)	4 (22.22)	0	6 (42.86)	1 (4.55)	7 (19.44)
None	0	5 (27.78)	5 (35.71)	2 (14.29)	8 (36.36)	10 (27.78)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Table 4.36: Distribution of dealers by bank finance limit of dealer-state and company wise

Bank limit (Rs. In Lakh)	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Up to 20	1 (25.00)	3 (16.67)	4 (28.57)	2 (14.29)	6 (27.27)	8 (22.22)
21-40	0	4 (22.22)	0	1 (7.14)	3 (13.64)	4 (11.11)
41-60	1 (25.00)	5 (27.78)	0	5 (35.71)	1 (4.55)	6 (16.67)
61-70	0	2 (11.11)	0	2 (14.29)	0	2 (5.56)
No specific limit	1 (25.00)	1 (5.56)	2 (14.29)	1 (7.14)	3 (13.64)	4 (11.11)
None	1 (25.00)	3 (16.67)	8 (57.14)	3 (21.43)	9 (40.91)	12 (33.33)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Major dealer problems

Though a large proportion of the dealers especially in Gujarat did not experience any major problem, the common problems in dealership from the company side included late supply of tractors in season and those from farmer buyer side were payment and finance problems especially when banks were involved in financing (table 4.37).

Table 4.37: Distribution of dealers by business problems –state and company wise

Problem	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
None	3 (75.00)	8 (44.44)	5 (35.71)	9 (64.29)	7 (31.82)	16 (44.44)
Payment problem (market side problem)	1 (25.00)	2 (11.11)	3 (21.43)	2 (14.29)	4 (18.18)	6 (16.67)
Payment and finance problems (market side problem)	0	1 (5.56)	2 (14.29)	0	3 (13.64)	3 (8.33)
Late delivery in season (company side problem)	0	4 (22.22)	0	1 (7.14)	3 (13.64)	4 (11.11)
Companies do not take care of dealers (company side problem)	0	1 (5.56)	1 (7.14)	1 (7.14)	1 (4.55)	2 (5.56)
No market promotion by company (company side problem)	0	0	1 (7.14)	1 (7.14)	0	1 (2.78)
Payment problem (market side problem) and Late delivery in season (company side problem)	0	2 (11.11)	2 (14.29)	0	4 (18.18)	4 (11.11)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Table 4.38: Distribution of dealers by problems faced in dealership-state and company wise

Major problems	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
Customers are coming for exchange purchase	0	18 (100)	9 (64.29)	9 (64.29)	18 (81.82)	27 (75.00)
No fixed price from the company	0	0	1 (7.14)	0	1 (4.55)	1 (2.78)
Payment needs to be made to the company before the sale of the tractor	0	0	1 (7.14)	0	1 (4.55)	1 (2.78)
High price of tractor and no finance from the company	0	0	1 (7.14)	0	1 (4.55)	1 (2.78)
No problems	4 (100)	0	2 (14.29)	5 (35.71)	1 (4.55)	6 (16.67)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

Table 4.39: Distribution of dealers by their perception of extent of exchange purchase in tractors-state and company wise

Consumer (%)	Company			State		All
	Indofarm	Sonalika	Standard	Gujarat	Punjab	
	No. of dealers					
40-50	0	4 (22.22)	3 (21.43)	3 (21.43)	4 (18.18)	7 (19.44)
51-60	0	2 (11.11)	2 (14.29)	0	4 (18.18)	4 (11.11)
61-70	0	1 (5.56)	3 (21.43)	0	4 (18.18)	4 (11.11)
71-80	0	5 (27.78)	1 (7.14)	4 (28.57)	2 (9.09)	6 (16.67)
81-90	0	2 (11.11)	0	2 (14.29)	0	2 (5.56)
> 90	0	4 (22.22)	0	0	4 (18.18)	4 (11.11)
None	4 (100)	0	5 (35.71)	5 (35.71)	4 (18.18)	9 (25.00)
Total	4 (100)	18 (100)	14 (100)	14 (100)	22 (100)	36 (100)

About 3/4th of the dealers across states (2/3rd in Gujarat and >80% in Punjab) reported exchange sale of tractors to the extent of atleast 40% and going up as high as more than 90% in some cases. Exchange sale was higher in Punjab than Gujarat and across companies, it was Sonalika which had high exchange sales followed by Standard and almost on exchange sales in case of Indofarm (table 4.39).

In sum, most of the dealers were literate and some had technical qualifications and long experience in product or related line with 22% as many as more than 21 years each. One-third had no other income and another 1/3 were involved in farm business as well. But, present dealerships were not very old as the tractor companies had been recent start ups in the study cases. Most dealers operated only one outlet each and sold five or less tractors per month each. The level of competition was severe with three-fourth of them facing 6 or more other distributors of same or other company. The companies mostly provided dealer credit for a few weeks and almost all of the dealers received mechanic support from companies. Dealers perceived that HP and fuel efficiency were major considerations in farmer purchase decision. Mostly dealers were appointed on security money, show room facility and manpower for sales and service. Timely delivery of tractors by companies and repayment by farmers were major dealer concerns. Exchange purchase (against old tractor) was very common in tractor purchase especially in Punjab.

Chapter 5
Purchase and Use of Tractors

Tractor is an important and costly machine for the farmer. Therefore, a farmer spends considerable time and effort before purchasing a tractor and making use of this machine. Over the years, tractors have become a major source of farm power in agricultural sector. The availability of easy credit and wide network of tractor markets has resulted in high tractor density resulting in saturation in some states like Haryana and Punjab. On the other hand, overall level of mechanization remains low especially in rainfed areas. Viable market for tractors depends on rationale purchase and rationale use of tractors. Therefore, it is equally important to understand farmer purchase ad use practices for tractors in India. This chapter reviews previous studies on the issue of tractor purchase and use and examines the profile and resourcefulness of the tractor owners, their decision to purchase the tractors and mechanism to make its use viable. It goes on to examine the usage of the tractor for various purposes including custom hiring.

5.1. Purchase and use of tractors-A review

There have been only a few studies on the purchase and use of tractors in the recent years, that too largely by NABARD due to its interest in refinancing tractors.

The farm mechanization policy of NABARD states that a borrower should have a minimum 8 acres of perennial irrigated land for availing a tractor loan. This size of landholding is considered viable for the optimal use of a tractor. An ex-post evaluation study of tractor finance in Mehsana and Rajkot district in Gujarat which covered 21 and 26 tractor owners in Mehsana and Rajkot districts, respectively and 10 tractor hirers and 5 bullock users from each of the district, observed that the average size of landholding was 14.1, 12.3 and 10.8 acres for tractor owners, tractor hirers and bullock users, respectively in Mehsana and 26.2, 23.0 and 12.7 acres respectively for the same categories of farmers in Rajkot. Cropping intensity of tractor owners was 13% higher than tractor hirers and 24% higher than bullock owners in Mehsana and 3% higher than tractor hirers and 8% higher than bullock owners in Rajkot. 60%,

25%, 10% and 5% farmers reported that shortage of labour and higher labour cost, multiple uses of the tractors, increasing cropping intensity, and deep ploughing respectively were the reasons for purchasing tractors (NABARD, 1992). As per the set NABARD's guideline, the beneficiary was to contribute a down payment of 15% of the total investment cost of the first tractor and 30% of the second tractor. NABARD had stipulated that banks were to ensure that at least 50% of the total amount required for repayment of loan installment and interest thereon will come from the incremental income derived out of the beneficiaries' farms and the entire loan was required to be paid by the beneficiary within nine years. Though Massey Fergusson (MF) and FORD were the most popular brands among the sample beneficiaries, there was a spatial variation in brand preference. MF was the most popular brand in Mehsana and FORD was the most popular brand in Rajkot. In both district together, nearly 45% farmers purchased MF brand tractors and 25.5% farmers purchased FORD brand tractors, 17% farmers purchased International/M&M brand tractors and the rest 12.7% farmers purchased other branded (HMT, Escorts, and Kirloskar) tractors. About 66% farmers purchased tractors having HP between 31 and 40, and 32% farmers purchased tractors having HP between 41 and 50. It indicates that farmers were interested in higher HP tractors. It was reported that higher HP tractors were used for running compressors for digging wells which provided additional custom service. Thus, decision about purchase of a tractor with given HP and make of the tractor was influenced by various considerations such as topography, nature of work, nature of custom services etc. (NABARD, 1992).

As per NABARD guidelines, besides requirement of ownership of 8 acres of perennially irrigated area for the borrower, the banks were also to ensure that the tractor is used for a minimum of 1000 hrs of productive work in agriculture per annum on own farm and on account of custom services. NABARD (1992) reveals that against the norm, the actual annual usage worked out to be 938 hours in Mehsana (93%) and 754 hours in Rajkot (about 75%). In Mehsana, annual use of tractor was 51.1% on own farm and 48.9% for custom hiring services. Agricultural and non-agricultural/transportation uses contributed 46.6% and 53.45% of the total annual use respectively. In Rajkot, annual use of tractor was 80.6% on own farm and 19.4% for customer service. Agricultural and non agricultural/transportation uses contributed 43.9% and 56.1% of the total annual use respectively.

NABARD study (1992) worked out per tractor operation and maintenance(O&M) cost to be Rs. 22,166 in Mehsana and Rs. 19,340 in Rajkot. Fuel (diesel and lubricants) constituted about 48.3% of the total O&M coast, followed by repair and maintenance cost (33.5%), and driver's charges and other costs (18.2%) in Mehsana. The percentage for each of the disaggregated O&M cost components was 45.6, 35.6 and 18.8 in Rajkot. Another NABARD (2005) study worked out per tractor overall O&M cost to be Rs. 49,529 and Rs. 37,734 for new tractors and Rs. 34,659 and Rs. 30,156 for second hand tractors in Kaithal and Faridabad districts of Haryana respectively. Annual maintenance and repair expenses worked out to be Rs.6,605 (13.3%) and Rs.6,285 (16.7%) for new tractors and Rs. 8,154 (23.5%) and Rs.7,628 (25.3%) for second hand tractors in Kaithal and Faridabad districts respectively. Fuel and lubricants expenses were Rs. 41,865 (84.5%) and Rs. 30,573 (81.0%) for new tractors and Rs. 25,194 (72.7%) and Rs. 20,943 (69.4%) for second hand tractors in Kaithal and Faridabad districts respectively. The insurance and other miscellaneous expenditure was Rs. 1,059 (2.1%) and Rs. 876 (2.3%) for new tractors and Rs. 1,311 (3.8%) and 1,585 (5.3%) for second hand tractors in the two districts respectively.

Impact of tractorisation on yield and net income

NABARD (1992) study shows that crop yield was higher for tractor owners over tractor hirers and bullock owners in both the districts. Tractor owners in Mehsana got 27.4% higher tobacco yield, 28.4% higher cotton yield, 19.3% higher castor yield, 9.5% higher wheat yield and 11.1% higher mustard yield over tractor hirers; and got 38.6% higher tobacco yield, 43.3% higher cotton yield, 69.4% higher castor yield, 17.2% higher wheat yield and 53.8% higher mustard yield over bullock owners. Tractor owners in Rajkot got 12.7% higher groundnut yield, 38.1% higher cotton yield, 14.5% higher bajra yield, 15.8% higher wheat yield and 25.0% higher mustard yield over tractor hirers; and got 18.3% higher groundnut yield, 61.1% higher cotton yield, 26.0% higher bajra yield, 36.3% higher wheat yield and 42.9% higher mustard yield over bullock owners. Except groundnut and bajra, all were irrigated crops.

The per acre net incremental income of tractor owners over tractor hirers was Rs. 1,367 and Rs. 212 for irrigated and unirrigated area, respectively and that is of tractor

owners over bullock users was Rs. 2,820 and Rs. 414 for irrigated and unirrigated area, respectively, and of tractor hirers over bullock users was Rs.1,452 and Rs. 202 for irrigated and unirrigated area respectively in Mehsana. The per acre net incremental income of tractor owners over tractor hirers was Rs. 1,217 and Rs. 766 for irrigated and unirrigated area respectively and that of tractor owners over bullock users was Rs. 1,943 and Rs. 864 for irrigated and unirrigated area respectively, and of tractor hirers over bullock users was Rs. 1,452 and Rs. 202 for irrigated and unirrigated area respectively in Rajkot. NABARD (2005) worked out per acre net incremental income to be Rs. 4,152 with family labour and Rs. 4,698 without family labour for new tractors and Rs. 9,138 with family labour and Rs. 10,366 without family labour for second hand tractors in Kaithal and Rs. 4,780 with family labour and Rs.4, 653 without family labour for new tractors and Rs. 8,404 with family labour and Rs. 9,464 without family labour for second hand tractors in Faridabad of Haryana. The summary of this study is given in table 5.1 below:

Table 5.1: Minimum area required for financially viable investment in tractor

Particulars	Mehsana		Rajkot	
	Tractor owner replacing tractor hiring	Tractor owner replacing bullock power	Tractor owner replacing tractor hiring	Tractor owner replacing bullock power
Minimum land holding for financial viability (15%)	10.1	4.5	22.9	16.0
Required incremental income from own farm and custom service	26,634	26,634	27,136	27,136
Income from custom services	17,029	17,029	5,796	5,796
Required stabilized income from farm business	9,605	9,605	21,340	21,340
Incremental income per acre	877	2,123	931	1,336

Source: NABARD, 1992

In Haryana, the average size of owned holding of tractor owners in Haryana across three zones (1, 2 and 3) was found to be 22.18 acres, 14.91 acres and 49.71 acres

against 12.92 acres, 7.91 acres and 26.83 acres of the non-tractor owning farmers respectively in 1992-93. Tractor farms augmented the holding size further by leasing in 2.89 acres of land against marginal leasing by non-tractor owning farmers in zone 1, 7.36 acres against 5.16 acres in zone 2 and 8.07 acres against 0.65 acres in zone 3. Further, education levels did not differ across owners and non-owners, tractor purchase was result of migration of male members, insistence on purchase by younger generation, need for land improvement and self-employment through custom hiring. 42% of the owners has purchased tractors second time with perceived age of the tractor being 7 years. The HP of the tractor was dependent on size of holding and soil conditions. Tractor was mainly used for crop production related activities (90%) that too a few crops like wheat, paddy and mustard, and for ploughing, irrigation and threshing. The annual usage varied from 633-768 hours across zones with 70-90% being for crop production alone. Custom hiring was only for 56 (9%), 86 (12%) and 170 (24%) hours of on farm usage across zones and mainly for ploughing and threshing. Further, tractor and non-tractor farms had no difference in cropping pattern or labour use on farms per cropped acre. But, tractor farms had higher cropping intensity and higher crop yields than non-tractor farms. The minimum land needed for viable tractor use was found to be 15.15, 7.92 and 18.93 acres across three zones to generate a rate of return of 15% (NABARD, 1994).

A recent study in Haryana covering 34 and 40 tractor owners in Kaithal and Faridabad districts, and 10 second hand tractor owners and 10 non-tractor owners from each of the districts showed that the implementing banks have broadly adhered to the land holding requirement during the implementation period as the average owned land worked out to be about 19 and 14 acres in Kaithal and Faridabad districts respectively against 6.56 acres and 5.85 acres of the control farmers in the above respective districts . The second hand tractor owners possessed 3.50 acres and 3.16 acres of own land in the above districts respectively. The operational land holding in both the districts increased after acquisition of the new tractor. The post-tractor net cultivated holdings were 23.62 and 18.06 acres in Kaithal and Faridabad districts respectively. It was also seen that the purchase of tractor has enabled the owners to cultivate more land due to leasing-in of land. The leased-in area increased from 2.41 acres to 5.00 acres in Kaithal district and from 3.30 acres to 5.08 acres in Faridabad district. Similarly, for farmers possessing second hand tractors, the total operational holding as

well as leased in land increased. The proportion of farmers cultivating more than 20 acres of land increased from 9% to 22% after the purchase of new tractor. Similarly, the proportion of farmers cultivating 10-20 acres of land went up from 20% to 30% after purchase of second hand tractor. The minimum land holding cultivated by the borrowers was 6 acres in Faridabad district and 5 acres in Kaithal district. However, later on, the PCARDBs and SBI were financing tractors to borrowers having minimum land holding of 5 and 4 acres respectively (NABARD (2005).

Further, during the last 4-5 years, there has been decline in the sale of tractors. The sale of tractors in Haryana state declined from 19,980 units in 1999-2000 to 14,403 units in 2001-02. The declining pattern of tractor financing observed in the banks was influenced by the presence of private players in the field. Mahindra was directly financing tractors by pledging just 1 -2 acres of land. Similarly, UTI bank was offering tractor loans for 3 acre holders. The financing of tractors at such low land holdings was vitiating the atmosphere by putting the poor farmers under indebtedness. This, if goes unchecked, could put the entire system out of rails and add to the Non-Performing Assets (NPAs) of the financing institutions in the years to come (NABARD, 2005).

All the sample farmers had 100% area under irrigation in Haryana. Source-wise irrigation revealed that 85% of the area was irrigated by tubewells (TWs) and the remaining 15% with canals in both the districts taken together. Among the districts, the share of TWs was higher in Faridabad (89%) and lower in Kaithal (82%). All secondhand tractor owners who had less than 10 acres of land owned, on an average, 0.20 and 0.30 TWs in Kaithal and Faridabad in Haryana respectively. Also, less than 10 acres land holding new tractor owners had 1.25 TWs, 20-30 acres landholding new tractor owners had 1.33 TWs, greater than 20 acres land holding new tractor owners had 2.83 TWs in Kaithal. In Faridabad, all above mentioned land holding category new tractor owners had 1.00, 1.5 and 2.33 TWs respectively. Overall, new tractor owners in Kaithal had 1.8 TWs and new tractor owners in Faridabad had 1.52 TWs. New tractor owners of both the district together had average 1.65 TWs and secondhand tractor owners together had 0.25 TWs. Non tractor owners had average 0.60 TWs with 0.50 TWs in Kaithal and 0.70 TWs in Faridabad.

In Kaithal district of Haryana, the cropping intensity increased by about 10% on both new as well as second hand tractor farms after the acquisition of tractor. In case of Faridabad, the cropping intensity increased by 9% in case of new tractors and 6% in case of second hand tractors. The increase, though not large, was significant. PCARDBs and RRB fixed yearly installments while commercial banks fixed half yearly installments in Haryana. The rate of interest charged from borrowers by all agencies on loans up to Rs. 2 lakh varied from 9.50% to 14.50% whereas for loans above Rs.2 lakh, the rate of interest was in the range of 10% to 17%. The loans were secured by the first mortgage of land of the borrowers and hypothecation of the tractor financed. The value of the land was determined according to rates available in revenue records and loan amount was fixed as 75% of the assessed value of land. The average mortgage was 5.50 acres and 4.63 acres in Kaithal and Faridabad districts respectively. The average down payment of tractor borrowers was 18% of the total outlay (NABARD, 2005).

The farm mechanization policy envisaged that the share of tractors above 50 hp should not exceed 5% of the total allocations The study showed that of the 74 sample tractor owners, only 2.7% borrowers purchased tractors above 50 hp. Among new tractors (loanees), about 40.5 % purchased tractors of hp less than 35 and another 56.8% went for tractors between 35 and 50 hp. Among secondhand tractors, there was no case above 50 hp. Based on the field interaction, it is reported in the study that the tractors below 35 hp are sufficient to carry farm operations. Tractors above 35 hp are generally required to be used in land leveling, land shaping, and with reaper and harvester combine (NABARD, 2005).

Of the total 74 borrowers in Haryana, 65 (88%) had purchased tractor to replace their previous/ old tractor with a new one. This clearly indicates the emergence of a strong replacement market for tractors. The minimum stipulated period for repurchase of a tractor is 3 years. Of the 65 replacements cases, only 9 per cent borrowers sold the earlier tractors before 3 years, thus, violating the minimum stipulated period norm of 3 years. About 37% replacements were due to excessive repair requirements and 35% were due to considerations of change in hp. It is also pertinent to note that 14% of replacements were on account of status symbol. Remaining 14% were due to reasons like family division, accidents, social obligations, etc. (NABARD, 2005).

This NABARD study found that about 32% new tractor owners used tractors between 201 and 400 hrs., 24% new tractor owners used tractors in the range of 101-200 hrs., 23% new tractor owners used tractors up to 100 hrs., 16% new tractor owners used tractor in the range of 401-600 hrs. and the rest of the new tractor owners used tractors for more than 600 hrs annually in Haryana. About 30%, 40% and another 30% secondhand tractor owning farmers had up to 100hrs, 101-200 hrs, 201-400 hrs of annual tractor use. The study worked out the actual annual usage for new tractor farms to be 495 hrs (49.5%) in Kaithal and 351 hrs (35%) in Faridabad of Haryana. The total use in both the districts together was 416 hours (42%) for new tractors and 238 hours (24%) for secondhand tractors. The total use of 416 hrs for new tractors consisted of 327 hours (78.6%) of own farm work and 89 hours (21.4%) of custom work. For second hand tractor farms, the total use was 238 hours which includes 119 hours (50%) of own farm work and 119 hours (50%) of custom work. Out of the total use of tractors on own farms, the maximum use was on land preparation and inter-culture (40-45%) on tractor farms. This was followed by haulage (26-31%) and marketing operations (16-20%) (NABARD, 2005).

2.2.Tractor purchase and usage in Punjab

Farmer Profile:

The results are based on a sample survey of 23 farmers in Mansa district of Punjab where farmers from all blocks of the district were part of the sample survey. Among the sampled farmers, 65% were owners of Sonalika and 35% of Standard brand of tractors. These farmers were either with no formal education (44%) or only upto 10^{th} std. (43%). Only four percent were graduates and 8% higher secondary literate (table 5.2). The landholdings of these growers were by and large medium or large with average owned holding being 11.15 acres and average operational holding being 12.38 acres. Small and very large farmers did not lease in land. It was medium and large farmers who leased in some land to augment their own holdings (table 5.3). All the landholders had all of their land irrigated. So far as source of irrigation was concerned, almost 83% of the tractor owners had their fields irrigated by tubewell and the remaining reported conjuctive use of canal and tubewell water (table 5.4). All of

them had atleast one tubewell each with 47.83% having two each and 135 each even three and four tubewells each with maximum number being 7 in case of two farmers. 91% of the farmers had electrified tubewells (67 tubewells) and the rest diesel run tubewells (7 in number). Most of the area was under traditional crops of wheat, paddy and cotton and 72% under HYVs (table 5.5).

Table 5.2: Distribution of sample tractor farmers by Educational qualifications

Educational level	No of farmers	% of farmers
No education	10	43.48
Up to 7th Std.	3	13.04
8-10 Std.	7	30.43
11-12 Std.	2	8.70
Graduates	1	4.35
Total	23	100.00

Table 5.3: Distribution of farmers according to their operational landholding

Land holding category (Land in ha.) Parameters	2.00-4.00	4.01-10.00	10.01-25.00	> 25	All
Number of farmers	5	8	7	3	23
% of farmers	21.74	34.78	30.43	13.04	100.00
Own land	18.0 (3.60)	55.2 (6.90)	75.6 (10.80)	107.6 (35.87)	256.4 (11.15)
Leased in land	0	7.2 (0.90)	21.2 (3.03)	0	28.4 (1.23)
Operational land	18.0 (3.60)	62.4 (7.80)	96.8 (13.83)	107.6 (35.87)	284.8 (12.38)

Note: Figures in bracket indicate average land holding

Table 5.4: Land holding category wise tubewell ownership pattern among tractor owners

Land in ha. / Tube wells	2.00-4.00	4.01-10.00	10.01-25.00	> 25	Total	% of farmers
	No. of farmers					
One	1	-	-	-	1	4.35
Two	4	5	1	1	11	47.83
Three	-	2	1	-	3	13.04
Four	-	1	2	-	3	13.04
Five	-	-	2	-	2	8.70
Six	-	-	-	1	1	4.35
Seven	-	-	1	1	2	8.70
Total	5	8	7	3	23	100.00

Table 5.5: Land holding category-wise cropping pattern of tractor owning farmers

Land in ha. / Particulars	2.00-4.00	4.01-10.00	10.01-25.00	> 25	All
Total cultivated land	18	62.4	96.8	107.6	284.8
Area under traditional crops	18 (100.00)	62.4 (100.00)	93.2 (96.28)	107.6 (100.00)	281.2 (98.74)
Area under non- traditional crops	0	0	3.6 (3.72)	0	3.6 (1.26)
Area under high yielding	18 (100.00)	48.4 (77.56)	70.4 (72.73)	68 (63.20)	204.8 (71.91)

Note: Figures in brackets indicate percentage of cultivated land

Purchase pattern

Almost 83% of the sample farmers had purchased new tractors and the rest second hand tractors. Requirement for farming was the only reason for buying tractor. Major consideration in purchase of the tractor were oil efficiency, horse power, strength, price and life of the tractor in that order across both brands i.e. Sonalika and Standard (table 5.6). The purchase price of the tractor varied from 1.25 lakh in 1999 to 3.71 in 2006 with an average of 3.339 across years of purchase. Between the two brands, Sonalika was costlier by a few thousand rupees. But, most of the farmers (75%) had bought them for Rs. 3-4 lakh each (table 5.7 and 5.8).

Most of the farmers (78%) had bought 50 hp tractors with the next highest (13%) being 60 hp showing a clear preference for higher hp tractors (table 5.9). Most of the new tractors were bought from dealer and about 17% from other farmers, second hand market or directly from the company as the company was locally located (table 5.10). Farmers did not face any problem while purchasing a tractor from the companies/dealers. Dealers gave cash discount of Rs 3000-6000 to about 17% farmers.

Sources of credit and terms

About 2/3rd of the farmers had bought tractors on cash basis with the rest buying on credit from banks (table 5.11). Nationalized banks were the single source of credit for all credit taking farmers. The installments varied from 10 to as many as 18 in total and 5-9 per year (table 5.12 and 5.13). Margin money needed was about Rs. 80,000 on an average with most of tem paying Rs.30,000- 1,00,000 each depending on the year of

purchase (table 5.14). Shortage of required amount of money was the reason for talking credit for all the farmers. The land mortgaged varied from 1.6 hac to as much as 3.2 hacs (table 5.15).

Table 5.6: Distribution of tractor owners by considerations in the purchase of tractor (multiple responses)

Parameters	Sonalika	Standard	Total	% farmers
	No of farmers			
Oil efficiency	13	8	21	91.30
Power	7	6	13	56.52
Solid (Strength)	4	1	5	21.74
Price	2	1	3	13.04
Low pollution	3	0	3	13.04
Life	1	2	3	13.04
Low repair cost	2	0	2	8.70
Quality	2	0	2	8.70
Appearance	1	0	1	4.35
Gear setting	1	0	1	4.35
Can do all works	1	0	1	4.35
Resale value	0	1	1	4.35
Company's goodwill	0	1	1	4.35
Heavy duty	1	0	1	4.35

Table 5.7: Distribution of tractor owners by purchase price of tractor (by year/model)

Model Year	No. of farmers	% of farmers	Avg. price/tractor
1999	1	4.35	1.25
2000	1	4.35	3.15
2001	4	17.39	3.16
2002	1	4.35	3.40
2003	3	13.04	3.17
2004	4	17.39	3.40
2005	6	26.09	3.87
2006	3	13.04	3.71
Average	23		3.39

Table 5.8: Brand wise distribution of tractor owners by tractor purchase price

Purchase price (Lakh rupees) / Particulars	1.0-2.0	2.01-3.0	3.01-4.0	4.01-5.0	Avg. price /tractor
	No of farmers				
Sonalika	1	2	10	2	3.42
Standard	0	1	7	0	3.32
All	1 (4.35)	3 (13.04)	17 (73.91)	2 (8.70)	3.39

Note: Figures in brackets indicate percentage of total sample farmers Replacement of

Table 5.9: Distribution of tractor owners by Capacity (HP) and brand of tractor

Capacity (HP)	Sonalika	Standard	Total	% of farmers
	No of farmers			
39	0	1	1	4.35
50	12	6	18	78.26
60	2	1	3	13.04
75	1	0	1	4.35

Table 5.10: Distribution of tractor owners by source of purchase of tractor

Source	Sonalika	Standard	Total	% of farmers
	No of farmers			
Dealer	12	6	18	78.26
Other farmer	2	0	2	8.70
Secondhand tractor market	1	1	2	8.70
Company	0	1	1	4.35

Table 5.11: Distribution of tractor buyers by source of funds for purchase of tractor

Source	Sonalika	Standard	Total	% of farmers
	No of farmers			
Cash	9	6	15	65.22
Credit	6	2	8	34.78

Table 5.12: Distribution of tractor buyers by number of credit installments

No of installments	No of farmers	% credit taking of farmers
Ten	2	25.0
Fourteen	4	50.0
Sixteen	1	12.5
Eighteen	1	12.5
Total	8	100.00

Table 5.13: Distribution of tractor owners by frequency of installments/year

Installment period (years)	No of farmers	% credit taking of farmers
Five	2	25.0
Seven	4	50.0
Eight	1	12.5
Nine	1	12.5
Total	8	100.00

Table 5.14: Distribution of tractor buyers by margin money paid for tractor loan

Margin money (‘000 Rs.)	No of farmers	% credit taking of farmers
30-33	2	25.0
60	2	25.0
100	2	25.0
190	1	12.5
No response	1	12.5
Total	8	100.00

Table 5.15: Distribution of farmers by nature and amount of securities paid to obtain tractor loan

Land mortgage (ha.)	No of farmers	% credit taking of farmers
1.6	1	12.5
2	3	37.5
2.4	2	25.0
3.2	2	25.0
Total	8	100.0

Brand preference

A large majority of the farmers perceived Swaraj to be the popular brand in their area, followed by Sonalika (22%)- one of the studied brands (table 5.16). The traditional market players like Ford and HMT did not figure very well. But, still the sample farmers preferred Sonalika nd Standard due to reasons of trial experience, and dealer pressure besides brand value (table 5.17).

Table 5.16: Distribution of tractor owners by perception of popular brand

Brand/model	No of farmers	% farmers
Swaraj 855	16	69.57
Sonalika	5	21.74
Ford	1	4.35
HMT	1	4.35
Total	23	100.00

Table 5.17: Distribution of buyers by reasons for preference for given brand

Reasons	Sonalika	Standard	Total	% farmers
	No. of farmers			
Brand	8	0	8	34.78
Brand and trial	3	0	3	13.04
Dealer pressure	0	3	3	13.04
Brand and advise of other farmers	2	0	1	8.70
Brand and company's goodwill	1	0	1	4.35
Brand and demonstration	0	1	1	4.35
Brand and low repair cost	1	0	1	4.35
Brand, nearby company, special gear	0	1	1	4.35
Brand and relationship with MD	0	1	1	4.35
Only for trial	0	1	1	4.35
Social pressure (relatives)	0	1	2	4.35
Total	15	8	23	100.00

Usage and replacement of tractor

Most common use of tractors was 401-600 hours per annum with 30% farmers reporting that. The next major group was the one which used it between 1001-1500 hours per annum which is more than the minimum use of tractor for viability. Further,

Kharif had moré tractor usage than Rabi largely due to paddy cultivation. But, still, on an average, the tractor was used only for 751 hours which is much below the NABARD norm for viable use of the machine. It was surprising that about 9% farmers used it for less than 200 hours and another 13% less than 400 hours altogether during the year (table 5.18).

Table 5.18: Use pattern of tractors

Uses in hours / Particulars	≤ 100	101-200	201-300	301-400	401-500	501-600	601-650	Total
Kharif								
No of farmers	4	3	4	1	6	4	1	23 (355.39)
% farmers	17.39	13.04	17.39	4.35	26.09	17.39	4.35	100.00
Rabi								
No of farmers	5	4	6	3	2	3	-	23 (295.00)
% farmers	21.74	17.39	26.09	13.04	8.70	13.04	-	100.00
Other uses								
No of farmers	9	2	1	1	1	-	-	14 (165.71)
% farmers	64.29	14.29	7.14	7.14	7.14	-	-	100.00
Total								
Category of use hours	≤ 200	201-400	401-600	601-800	801-1000	1001-1200	1201-1500	Total
No of farmers	2	3	7	2	2	3	4	23 (751.26)
% farmers	8.70	13.04	30.43	8.70	8.70	13.04	17.39	100.00

Note: Figures in brackets indicate average hours of tractor use in respective season.

Interestingly, across farmers, 94% of the usage was for on-farm purposes with minimum being 80% and maximum 100%. Only 5.9% for off farm work which ranged from 0-20% across farmers (tables 5.19 and 5.20). As far as off-farm tractor use is concerned, household related works and land leveling were major uses. About 22% farmers did not get enough work, 48% farmer got enough work and 4.35% farmers used tractor only for their own work. A tractor was used for an average of 5.2 hours per day for 176 days in a year. Most frequent use was for 3-4 hours followed by 4-5 hours (tables 5.21 and 5.22).

Table 5.19: On-farm uses of tractors

Uses (%) / Parameters	80	90	95	100	Avg. 94.13
No of farmers	3	6	3	11	23
% farmers	13.04	26.09	13.04	47.83	100.00

Table 5.20: Off-farm uses of tractors

Uses (%) Parameters	0	5	10	20	Avg. 5.87
No of farmers	11	3	6	3	23
% farmers	47.83	13.04	26.09	13.04	100.00

Table 5.21: Per day use of tractor

Per day use (hrs/day)	No of farmers	% farmers
3.00-4.00	9	39.13
4.01-5.00	7	30.43
5.01-6.00	1	4.35
6.01-7.00	2	8.70
7.01-8.00	1	4.35
10.00-11.00	3	13.04
Avg. = 5.20	23	100.00

Table 5.22: Annual use of tractor

Tractor use (days)	No of farmers	% farmers
≤ 60	6	26.09
61-120	5	21.74
121-180	2	8.70
181-240	4	17.39
241-300	2	8.70
301-365	4	17.39
Avg. = 176.30	23	100.00

Life of tractor and replacement

The average life of a tractor was reported to be 10 years with most frequent period being 10-15 years and 5-9 years. Sonalika users reported a little higher life for this tractor compared with the standard owners (table 5.23). The life of a tractor could also be judged from the data on replacement of the tractor by the owner. It was seen that during the last 15 years, a major chunk (40%) of the farmers hade replaced only one tractor and another $1/6^{th}$ each 2 or 3 tractors (table 5.24). But, majority of the owners were of the view that replacement depends on the condition of the tractor and requirement of the work to be performed (table 5.25).

Table 5.23: Average life of tractor

Life period (years)	Sonalika	Standard	Total	% farmers
	No of farmers			
5-9	4	4	8	36.36
10-15	9	4	13	59.09
16-20	1	-	1	4.55
Avg. life = 10.09	14	8	22	100.00

Note: One farmer responded that the life of tractor depends on maintenance.

Table 5.24: Number of tractors replaced during the last 15 years

Replacement time	Sonalika	Standard	Total	% of farmers
	No of farmers			
One	6	3	9	39.13
Two	3	1	4	17.39
Three	3	1	4	17.39
Four	1	1	2	8.70
Five	1	0	1	4.35
Seven	1	0	1	4.35
Ten	0	2	2	8.70
Total	15	8	23	100.00

Table 5.25: Frequency of replacement of the tractor

Period of change	Sonalika	Standard	Total	% farmers
	No of farmers			
Depends on condition	8	5	13	56.52
Depends on work	1	-	1	4.35
Depends on condition and work	5	2	7	30.43
Depends on work and need for HP	-	1	1	4.35
After 16 seasons	1	-	1	4.35
Total	15	8	23	56.52

Major costs of operation and maintenance

The average annual cost of the tractor worked out to be Rs. 41348 for fuel and Rs. 4809 for repairs. The modal value of the fuel cost was Rs. 25,000-50,000 and 2-3 thousand for repair cost (tables 5.26 and 5.27). Added to the operations and repair cost was depreciation cost which amounted to Rs. 89348 with more common figure being Rs. 75000-1,00000 for more than 1/3 of the owners (table 5.28).

Table 5.26: Major cost of tractor operation (Fuel cost)

Fuel cost (Rs)	No of farmers	% farmers
≤ 25,000	5	21.74
25,001-50,000	14	60.87
50,001-75,000	2	8.70
75,001-100,000	1	4.35
100,000-150,000	1	4.35
Avg. = 41,348	23	100.00

Table 5.27: Major cost of operation of tractor (Repair cost/annum)

Cost (Rs.)	No of farmers	% farmers
≤ 2,000	2	9.09
2,001-3,000	12	54.55
3,001-4,000	0	0.00
4,001-6,000	5	22.73
≥ 10,000	3	13.64
Avg. cost = 4,809	22	100.00

Table 5.28: Depreciation cost of tractor

Depreciation cost (Rs)	No of farmers	% farmers
≤ 25,000	1	4.35
25,001-50,000	6	26.09
50,001-75,000	3	13.04
75,001-100,000	8	34.78
100,001-150,000	4	17.39
150,000-200,000	1	4.35
Avg. = Rs. 89,348	23	100.00

Major problems faced

Though about 40% farmers did not report any major problem in purchase and usage of tractors, more frequent problem for many others was poor quality of spare parts followed by other problems which included main seal leak, high price of spar parts, leaking in zian, high noise, slow lift, low flexibility, starting trouble, not powerful on load, and slip problem (table 5.29).

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Table 5.29: Major problems faced by tractor owners

Problems	Sonalika	Standard	Total	% farmers
	No. of farmers			
No problems	6	3	9	39.13
Poor quality of spare parts	6	0	6	26.09
High fuel consumption	1	1	2	8.70
Higher repair cost	1	0	1	4.35
Non-availability of spare parts	0	1	1	4.35
Other problems*	4	3	7	30.43

The above analysis of tractor purchase and use shows that still dealers were major determinants of tractor purchase as most of the owners bought the tractors from dealers. Surprisingly, bank loan component in purchase had come down to just 1/3 at least in the study area (Punjab) which is revealing. Further, no owner had landholding less than two hectares which shows that marginal and small farmers still have not found the machine relevant or affordable. But, gross underutilization even among medium and large farmers is an issue which is worrying and compromises not only the viability of the machine but also of the farming activity.

Chapter 6

Combine Harvester Companies: profile and business strategies

This chapter provides a profile of and business strategies of the major organised sector combine makers based on individual interviews and of the small informal combine makers based on a survey of 16 of them in the above said towns of Punjab.

Organised Sector Manufacturers

A. Sonalika Agro: Sonalika Combines

Sonalika Agro Industries Corporation started manufacturing multi-crop threshers in 1971 and has been leader in thresher sales in India. Now, its product range include, stuffed cutter, rotavator, self propelled combine harvester, tractor propelled combine harvesters, straw reaper, multi crop thresher, both tractor or engine/electric motor model, paddy thresher, maize Sheller cum dehuskers, back hoe and loader, harvesting attachments, reapers, potato planters, potato diggers, seed cum fertilizers drills, and diesel engines groundnut thresher and non tipping and hydraulic trailers besides, ploughs, disks, cultivators, ridgers, seed cum fertilizer drillers, maize and potato planters, mowers and shrub master and levelers.. Market share in farm equipments is 80% in India. It also makes diesel engine engines and generator sets ranging from 3.5-25 HP. The company also produces about 15,000 threshers which was 35,000 threshers every year up to 1997. 80% of its threshers are tractor driven and 20% motor driven. Ten years agro, it was 20% tractor driven and 80% motor driven. It has two models in tractor driven and one in self propelled combine. Threshers range from 2-50 HP. Its Haramba which ranges from 35-50 HP has a chopping system which no other thresher has and it is mostly used for wheat. It makes about 100 combines every year and the total turnover is about Rs. 170 crore. It started producing combines in2000. The unit works in one shift and for 9 months.

It has about 50 technical workers and 10 managerial cadre. Though its production has comedown but turnover has increased due to the change in the product profile. For example, engine driven to tractor driven threshers. The products have also change in terms of models, HP and functional utility. Whereas 100% combines are sold on

credit, 80% of the threshers are sold on cash. Threshers are very price competitive. Most of the thresher is produced and assembled in-house where as most of the combine components are bought from outside within Punjab. The company got into tractors to leverage it combines and threshers brand.

Major markets of the company for combines and threshers are outside Punjab. It can manufacture 200 threshers per day and 50% of its threshers are multi crop, 50% of the threshers sales and 100% of the self propelled combine sales are replacement sales. Sonalika combines are also fitted on HMT, Mahindra and Mahindra and new Holland tractors.

It has 800 dealers for threshers, mostly outside Punjab and all combines are sold at the factor itself. The company makes advance based sales of threshers to the dealers and takes security deposit and bank guarantees. It has one year warrantee for its products. The company uses only pamphlets and hoardings and focuses on price advantage instead of promotion. The combine business is a low volume low margin business. The state agro industries corporation buys 10% of its total threshers sales.

One of the dealers was of the view that being a new brand, Sonalika sales were not very good. The brand was perceived to have low quality and low resale value. The company was not providing any support to dealers and there were too many dealers in an area leading to low sales and lack of viability. A thresher cost varies from 20-80,000 depend on the capacity. There has been shortage of threshers in the season and dealers were not able to get supplies despite advance orders, but company provided free access to all the dealers to the factory to see for themselves the supply situation.

Combine harvester

Sonalika also manufactures Tractor Driven Combine Harvester both with and without the front cabin. It can be operated with tractors ranging 50 H.P and above. These are fitted with power steering for convenient drive.
Its main components are cutter bar, main threshing drum, guide drum, straw walkers, grain storage tank, elevators, sieves, blower, worms and outer pipe for shifting grains from storage tank to tractor trolley. Variety of crops, like wheat, paddy, sunflower,

soyabeans, mustard, etc are cut & threshed by this machine by making simple adjustments. Wheat/paddy drums, wheat/paddy/mustard concaves, gap between drum and concave - all can be adjusted conveniently, depending upon type and quality of crop, with the help of lever system, mounted just close to the driver's seat. This harvester can cut the crop about 75mm above the ground, simultaneously cleaning and collecting the grains in storage tank of combine. The remnant straw is thrown out by straw walkers in the field. The cutting capacity is approximately three acre/hour for wheat crop and 2.5 acre/hour for paddy, etc..

It also manufactures the following implements:

Mutli-crop threshers

SONALIKA" Multi-crop Threshers are capable of running with Electric Motor as well as Diesel Engine and are compatible with tractor from 2 HP to 40 HP. These threshers are suitable for threshing crops like wheat, maize, sorghum, grains, sunflower, ragi, millets, mustard & pulses etc. Different variants available for these threshers are - self-feeding chute, double blower, double speed, etc.

Automatic cutter (haramba)

SONALIKA" The Cutter Model Threshers are driven by tractor more than 25 HP. These threshers are provided with P.T.O. arrangement and have choppers (2 or 3 optional). Crop is fed by the conveyor without pushing into the thresher. Before threshing, the crop is cut into small pieces by choppers and then threshed by the threshing drum. It is capable of threshing moist crop also. Thus with less fuel consumption and minimum load to tractor, higher output can be achieved. Gearbox is provided to reverse the crop feed if the machine gets choked. DOUBLE SPEED CUTTER MODEL (HARAMBA THRESHER) has a special fan for fast cleaning whose speed can be increased as per requirement.

Paddy thresher

"SONALIKA" Paddy thresher consists of worm type threshing cylinder, Oscillating box, winnowing and cleaning attachment, feeding chute etc. The body is made of high quality steel and sheets to withstand maximum wear and tear. These threshers can be

operated both with motor and diesel engine tractors. During threshing the paddy crop's straw is separated from grain by worm type cylinder. The straw is thrown out from the machine with the help of blower. Other impurities like dust/dirt are thrown out through other outlet. Extra blower is provided for cleaning of grains, which clears the left-over impurities. PADDY THRESHER is also available with the straw walkers. In these threshers, straw is thrown back by straw walkers

Seed-cum-fertiliser drill

SONALIKA manufactures seed cum fertilizer drill machine having 8 to 13 types suiting variable customer's requirements. One of these models consists of machine having single top box for seed and fertilizer mixed together. In another model top box has two separate compartments for seeds and fertilizer. This drill machine can be used to plant variety of crops including wheat maize, millets and pulses etc. It can be operated with minimum 25 H.P Tractor.

Potato planter

There are two types of potato planter:

(1) Automatic (2) Semi-Automatic

With its particular setting, it automatically places potato seeds at proper depth, from plant to plant and row to row .It can be operated with any tractor ranging above of 25 HP. It has large capacity seed hopper to carry potato seeds for 300 meter long sowing strips with single filling. Planting capacity of the two row planter is 3 to 5 acre/day while that of the four row planter is 5 to 8 acres/day.

Reaper

Tractor Driven reaper is fitted to the front side of tractors and is operated by tractor P.T.O and tractor hydraulic lift system. This is used for reaping various crops like wheat, paddy, soyabeans, pulses, millets etc. It has blades having sharp edges, which cut the crop, and places it on one side in a line. It can be driven by tractors ranging 25 H.P and above. Its reaping capacity is approximately 10 to 15 Acres/Hour. Its 7 feet

wide cutters can cut the crop about 50mm above the ground. It is also successful on unleveled land.

Straw Reaper Tractor Driven Straw reaper manufactured by Sonalika is used for cutting stub ends of wheat crop left in the fields after cutting by Combine Harvester, which simultaneously cuts these remnants into small pieces to make straw (chaff) which is be used as cattle feed. Its outer pipe is attached to tractor trolley covered with net to collect the chaff. It can make 10 to 15 trolleys of straw per day. It also collects and cuts the straw thrown out by combine in the field. At the same time it collects the grains left in the field while cutting with combine and store them in the tray mounted at its bottom having the capacity of about 40 kg. It can cut stub ends 50 mm above ground level and make straw of different sizes with the help of adjustable concave as per requirement of customer. It can be operated with minimum 45 HP tractor. Its main components are cutter bar, main drum, guide drum, blower, outer pipe, oscillating sieve, etc..

B. Preet Agro Industries Ltd.-Preet Combines

In 1980, when the nation was needed one type of machine which could harvest & thresh the crop simultaneously to reduce the losses of farmers, Hari Singh, Managing Director was working on a machine for the same along with his tractor mechanic work. After three years, he established a small scale unit of Harvesting Reapers, Threshers, Agricultural parts**.** Later his brother named Gurcharan Singh, Director joined him 1985 & they made Tractor Driven Combines in 1986.

Preet Combine Harvesters harvests wheat and rice in the northern and central region of India and Pakistan. Preet track combine harvests rice in the coastal area of India. Preet is one of the India's leading manufacturers of agricultural tractors and combine harvesters. One in five harvester machines sold in India is produced by Preet Agro Industries Pvt Ltd Nabha. Preet is market leader in self propelled harvesters in India.

Preet originated from a small workshop in Mandaur village in district Patiala in 1978.The founder of Preet Mr. Hari Singh developed a small combine harvester in 1980. Later on his two brothers Mr. Gurcharan Singh and Mr. Prem Singh joined him.

In 1988, Tractor mounted Combine Harvester was developed. In 1989**,** Mr Hari Singh developed a successful self propelled combine harvester. In 1990, Tractor driven reaper was launched.

1996 Preet Agro Industries Private Limited came into existence and Combine Harvester was approved by CFMTTI, Budni (A Govt. of India testing authority). In 2000-01, new models i.e. PREET-989, PREET-849, PREET-749, PREET-649 (Tractor driven) Combine harvesters in various ranges were developed and tested at CFMTTI, Budni Maize and Regional Centre Hissar. The more recent models include : PREET -987 mutli crop, PREET - 649 tractor operated, PREET - 949 track type, and PREET - 987 maize special which was introduced for the first first time in India. Maize Harvester plucks the cobs of the maize and separates the grains. It is very easy to grow maize and requires less water but difficult to harvest the crop. In 2002, Preet introduced low cost fuel efficient tractors in the range of 35HP to 70HP.

The Brand name of the company is the nick name of the son of the owner and it is the same brand name for all the products of the company. It was producing about 50 tractor driven combines each costing about Rs. 3 lakh which has been stopped now. It produces about 300 self propelled combines every year which makes it one the largest manufacturers of these Rs. 10 lakh machine. It has the capacity to produce 700 such machine every year.

At Sonalika,70% of the combine is produced in-house. It imports some of the combine components from Italy, Germany and Belgium. Most the combines are sold within Punjab with 70% being replacement sales. They give the guarantee and warrantee of the season an each combine.

C. Standard Combines and Tractors- Standard Combine

The Standard Group of Companies, created and guided by Mr. Nachhattar Singh, is well-known in India for its products and services provided to the farmers interested in mechanized cultivation and transportation. The parent company ‘Standard Combines Pvt. Ltd.’ started its business from a low level. Because of its qualitative products and after-sale service policies, it has now become a leader among the agricultural machinery manufacturers. It has been the market leader in manufacturing and selling

Tractor Driven Combine Harvester in India for last two decades. The Standard Group of Companies is now giving stiff competition to the tractor manufacturers because of its fine quality tractors. The company is manufacturing engines for its tractors, and now also opening a separate 'Engine Division' to manufacture and sell pollution-free diesel engines to the prospective Indian and foreign customers. It is also making earth-moving vehicles (front-end loaders and excavators; cranes; etc.) and now making foray into the heavily competitive 2-wheelers and 3-wheelers segments of automotives.

The company was founded b Mr. Nachhattar Singh Ramgarhia who is the Managing Director now and founder of Standard Tractors; and also the founder and Chairman of the Board of Directors of the parent company 'Standard Combines Pvt. Ltd.', which is a leading manufacturer of self-propelled and tractor-driven combines in India since 1975. Mr. Nachhattar Singh comes of a Sikh Ramgarhia (carpender caste) family of Bhari Gotra which hails from a small village named Handiaya of Tehsil Barnala, Distt. Barnala (earlier Sangrur) in Punjab. His brother Mr. Joginder Singh is the Managing Director of the 'Combine Division' and also serves as the Joint Managing Director of M/S Standard Combines Pvt. Ltd.

The Standard Combines Pvt. Ltd. (Combine Division) not only supplies its prime product 'combines' to the farmers and farms all over India, but also exports the product to South African countries. The tractor-driven combine-harvester model 'TSC-513', designed and developed by Mr. Singh, has turned to be the most popular model among the Indian farmers. Other products of this company (Combine Division) include straw reaper, front-end loader and excavator, etc.

Besides the Tractor division and the Combine Division, The Standard Group is opening a new venture – the Engine Division, wherein primarily two models of engines will be manufactured, with an initial target of 300 engines per month for each of the two models for sale. Under his initiative an effort is underway to make collaboration with the famous Polish company "EKO Diesels" for manufacturing the basic Perkins engines in joint venture.

The tractor drive combine of standard was designed by the owner himself. Now the company is in to tractors, cranes and three wheelers and two wheelers vehicles.

Standard Combines is producing around 500 nos. per annum. These are sold within India and also exported. The most popular model is 'TSC 513. Another model is C-412. The company (Standard Combines) is producing around 800 nos. per annum. These are sold within India and exported to South African countries as well.

Reapers: The only model is C-417. The company (Standard Combines) has produced and sold few units and is ready to manufacture more as per demand

Table 6.1**: Sales of Standard Combines in and outside Punjab during 1997-2005.**

Year	In Punjab	Outside Punjab
1997	500	12
1998	1200	12
1999	-	17
2000	-	141
2001	-	211
2002	-	270
2003	-	300
2004	-	400
2005	70	415

The total sales of combines in India are of the order of 7-10 thousand per year with Preet selling of 2 to 3 hundred in self propelled category and the leader. Punjab accounts per only 10% of the combine harvester sales with 90% being outside Punjab specially Tamilnadu, AP, Karnataka, MP and UP. In India there are 35 thousand combines now with 10 thousand being self propelled and 25 thousand being tractor driven. Out of this Punjab accounts for 10 to 12 thousand. A combine harvester has life of 8 to 10 years. Whereas the market in other States is totally new, almost 50% of the market for combines in Punjab is replacement market. The combines are used for harvesting many crops. Standard estimates its market share to 60% now.

The company has turnover of more than Rs. 200 crore with 50 professional staff and 150 in marketing besides technical and unskilled staff in the three units of the company.

The company is not having any special supplier. The company buys the engines of the combines from Ashoka Leyland. The company exports 70-80 combines in an year.

The company is also having its dealers in foreign countries. The dealer net price is revised every year by the agreement of management. The company is not able to cater to the demand because is not getting proper technical man- power in combine. The company itself gives the training to the mechanics who are working in the companies service centre.

All workers in the workshop are fully technical out of which 25% on regular basis and 75% are contract workers. . There is only one shift of working. The whole workshop is divided in 12 shops and each shop is having its own supervisor. The company manufactures 6 combine per day. There are four models of the combine which the company manufactures out of which two models are self-propelled.

The combines plant assembles 6 machines in a day which needs 80 workers and that is the production capacity most of these are tractor driven combines. All the combines are made according to the tractor model on which they are to be fit. Even, John Deere combines are assembled by standard to fit on John Deere tractors. Therefore, all machines are custom made for different tractors, brands and models. The combine division has 550 workers of which 25% are technical regular workers and 75% on contract basis. There are 12 supervisory and 8 managerial staff in the plant. The company buys Ashok Leyland Engine for self propelled combines. There are 40 workers for testing and painting of the machines. Due to the technical staff shortage, the single shift operation is extended with the help of overtime payment. The company exports 70 to 80 machines every year. The whole workshop is divided in 12 shops and each shop is having its own supervisor. The company is not having any special supplier. There is only one shift of working. There are four models of the combines which the company manufactures out of which two models are self-propelled

Product range in Standard Combines

1.Tractor-driven harvester combines: The most popular model is ‘TSC 513. Another model is C-412.
2.Self-propelled harvester combines: Standard Combines is producing around 500 nos. per annum. These are sold within India and also exported.

3.Self-propelled straw reaper: The only model is C-417. The company (Standard Combines) has produced and sold few units and is ready to manufacture more as per demand

There are four models of combines produced by the company i.e. self propelled (C514, C412 and SP660) and tractor driven i.e. THC573. Standard Combines is producing around 500 nos. per annum. These are sold within India and also exported. The most popular model is 'TSC 513. Another model is C-412. The company (Standard Combines) is producing around 800 nos. per annum. These are sold within India and exported to South African countries as well.

All John Deere dealers are standard combine dealers also. Though the company competes with John Deere's tractors, it supplies combines for their tractors under an Agreement. The standard tractor dealers are separate from combine dealers and number 300. Thus, only about 5% combines are sold through standard tractor dealers. Most of the combine sales take place through John Deere dealers. Most of the combine producers have similar dealer arrangement with tractor companies.

MRP-DNP is the dealer margin which is fixed per tractor or per combine. For tractors it is of the order of Rs. 50,000/- On the other hand, all combine manufacturers agree on a DNP every year for each model and this is adhered to by 5-6 major players.

To take care of the crop residue burning issue, the company has launched forge harvester to make manure and a rotaveter. The company does not provide any dealer project but gives a cash discount of Rs. 3000-5000 per tractor per cash purchased by the dealer. NABARD gives 25% subsidy on the purchase of combines through Bank loan.

Small scale combine manufacturers

A sample survey of 16 combine and other machinery manufacturers revealed that founders of 50% of these companies were under matriculates with some being totally unlettered. On the other hand, managing directors of only 25% of the firms were under matric in their education (table 6.1).

Table 6.1: Distribution of small scale combine makers by education level

Educational level	Founder of companies		MD of companies	
	No.	%	No.	%
Nil	3	18.75	-	-
Under 5th	1	6.25	-	-
Under metric	4	25.00	4	25.00
Above metric	8	50.00	12	75.00
Total	16	100.00	16	100.00

Almost 44% of them started before 1990 and all before 2000. What 1980s seemed to be the period of spurt as more than 50% originated during this decade (table 6.2). By now, almost all of them were into combine making with majority into multiple products including combine harvesters which included reapers as well (table 6.3).

Table 6.2: Distribution of small combine companies by year of origin

Years	No. of companies	% of companies
1970-75	1	6.25
1975-80	1	6.25
1980 -85	5	31.25
1985-90	4	25.00
1990-95	2	12.50
1995-2000	3	18.75
Total	16	100.00

Table 6.3: Distribution of companies by type of main implements manufactured

Make	No. of companies	% of companies
SP Combine	1	6.25
Reaper	2	12.5
Thresher/Reaper	1	6.25
SP/ TD Combine	1	6.25
SP Combine / Reaper	6	37.5
SP /TD Combine / Reaper	5	31.25
Total	16	100.00

A large majority of firms (75%) were in the turnover category of Rs. 0.5-10 crore and only one <50 lakh and two above 20 crore (table 6.4). Overtime, 1/3 had gained in turnover, 1/3rd stagnated and about ¼ lost (table 6.5).

Table 6.4: Distribution of combine companies by annual turnover

Turn over (Rs./annum) Parameters	< 50 lakhs	50 lakhs-1 crore	1-5 crores	5-10 crores	10-20 crores	> 20 crores
No. of companies	1	5	3	4	1	2
% of companies	6.25	31.25	18.75	25.00	6.25	12.50

Table 6.5: Distribution of combine companies by trends in turnover overtime

Turn over Parameters	Increase	Decrease	Stagnate
No. of companies	6	4	6
% of companies	37.50	25.00	37.50

The technical employees varied from less than 10 in case of 5 firms and more than 20 in case of 43.75% firms with the rest with technical workers ranging from 10-20 (table 6.6). 81.25% of firm ran for only one shift a day with only 18.75% going for two shifts a day. Almost half of them had > 20 technical, > 40 non-technical and 1-2 managerial employees and 1-5 other employees. But, still, majority of them has less than 50 employees each (table 6.7-6.11).

Table 6.7: Distribution of Companies by Number of Technical Employees

Employee Parameters	< 10	10-20	> 20
No. of companies	5	4	7
% of companies	31.25	25.00	43.75

Table 6.8: Distribution of Companies by Number of Non technical Employees

Employee Parameters	< 20	20-40	> 40
No. of companies	6	2	8
% of companies	37.50	12.50	50.00

Table 6.9: **Distribution of Companies by Number of Managerial Employees**

Employee Parameters	None	1-2	3-4
No. of companies	6	9	1
% of companies	37.5	56.25	6.25

Table 6.10: **Distribution of Companies by Number of Other Employees**

Employee Parameters	1-5	5-10	10-15
No. of companies	10	4	2
% of companies	62.5	25	12.5

Table 6.11: Distribution of Companies by Total Number of Employees

Employee Parameters	< 50	50-100	> 100
No. of companies	9	5	2
% of companies	56.25	31.25	12.50

Only two companies had employed casual employees. Each one of them employed 10 casual employees.

Interestingly, 43.75% firms had the founder's name as brand name and another 18.75% their sub-caste as the brand name of the company. An equal number (18.75%) each were named after the city of origin or country and the religious leader/founder (table 6.12).

Table 6.12: Distribution of combine companies by reason for given brand name

Reasons Parameters	Founder's name	Country/city name	Religions leader's name	Sub-caste of owner
No. of companies	7	3	3	3
% of companies	43.75	18.75	18.75	18.75

The production capacity was equally divided between self-propelled and tractor driven combines and both cases with more than 50 combines per annum. More than 2/3 of them were still making reapers and another 12% threshers though most of them had started with threshers (table 6.13).

Most of these companies did not have any dealer network as combines were made to order and bought and sold at the premises of these units. 50% of them who were selling outside Punjab had as many as 6 or more dealers outside Punjab (table 6.14). Only one firm had dealer system within Punjab with about half a dozen dealers.

Table 6.13: Distribution of combine companies by annual production capacity

Product	Capacity (no. of machines) → Particulars¬	< 10	10-20	20-30	30-40	40-50	> 50
SP	No. of companies	3	-	2	-	-	9
	% of companies	18.75	-	12.5	-	-	56.25
TD	No. of companies	-	-	-	-	-	9
	% of companies	-	-	-	-	-	56.25
Reaper	No. of companies	1	1	-	-	-	11
	% of companies	6.25	6.25	-	-	-	68.75
Thresher	No. of companies	-	-	-	-	-	2
	% of companies	-	-	-	-	-	12.5

Table 6.14: Distribution of combine companies by companies' dealer net work

Location	Numbers → Particulars¬	None	1-2	3-4	5-6	> 6
In Punjab	No. of companies	15	-	-	1	-
	% of companies	93.75	-	-	6.25	-
Outside Punjab	No. of companies	3	2	3		8
	% of companies	18.75	12.5	18.75	0	50.00

So far as pricing was concerned, the prices of SP ranged between Rs. 9-11 lakh and that of tracor driven between Rs. 4-4.5 lakh each (table 6.15). The price was based on cost or cost and market competition, by and large (table 6.16).

Table 6.15: Distribution of combine companies by price of implements

Product	Type	Price (Rs lakh)	No of companies	% of companies
Combine	SP	9-11	13	81.25
	TD	4-4.5	6	37.50
Reaper		1-1.15	7	43.75
Thresher		0.60	2	12.50
Rotavator		0.65	1	6.25

Table 6.16: Distribution of combine companies by product price determining factors

Factors Parameters	Cost	Market competition	Cost and market competition	Cost and material
No. of companies	7	1	7	1
% of companies	43.75	6.25	43.75	6.25

The companies were selling less than 10 combines to as many as more than 50 combines per year with a large proportion (44%) selling more than 50 each. There were either very small players or very large players with very few in between (table 6.17). Their sales had stagnated or decreased over time as reflected in turnover as well

(table 6.18). Major reasons for declining or stagnant sales included higher product availability, variation in market, intention to remain small, full capacity use of existing plant, and sales only in Punjab. Only three companies (18.75%) exported combines to Zambia, Pakistan, and Sri Lanka, while only one company (6.25%) exported Reaper to Pakistan. Companies did not face any market competition. No company supplied its products to MNCs. Only one company had sale-purchase collaboration with Mahindra.

Table 6.17: Distribution of combine companies by total sales in 2006-07

Sale (Numbers) Particulars	Product	< 10	10-20	20-30	30-40	40-50	> 50
No. of companies	Combine	3	1	-	1	1	7
% of companies		18.75	6.25	-	6.25	6.25	43.75
No. of companies	Reaper	2	-	-	-	7	5
% of companies		12.50	-	-	-	43.75	31.25
No. of companies	Thresher	-	-	-	-	-	2
% of companies		-	-	-	-	-	12.5

Table 6.18: Distribution of Companies by Sales overtime

Sale Parameters	Increase	Decrease	Stagnate
No. of companies	5	5	6
% of companies	31.25	31.25	37.5

Major reasons for entering this business line included new demand including from existing customers, import problems, new technology, and specialization (6.19).

Table 6.19: Distribution of combine companies by main reasons for entering combine business

Reasons	No of companies	% of companies
Demand	8	50
Shifting from import to domestic production	1	6.25
Good relationship with farmers	1	6.25
New imported technology	1	6.25
Specialization in combine	1	6.25

Though companies were located in Punjab, most of them did undertake product assembly outside their place of location or even outside state as it was a bulky product their market was outside Punjab in states like UP, AP, MP, Maharashtra, Bihar and Haryana (tables 6.20). Most of them did not have any ancillary units to supply components and they procured from the market all their component suppliers. Only three companies had ancillary units. No company is importing any parts (table 6.21).

Almost half of them found that 50% of the market was replacement market (table 6.22).

Table 6.20: Distribution of companies by place of product assembling

Place of product assembling	No of companies	% of companies
In Punjab	4	25.00
Outside Punjab	12	75.00
Total	16	100.00

Table 6.21: Distribution of Companies by major markets outside Punjab

Major markets	No. of companies	% of companies
UP	11	68.75
Haryana	7	43.75
Andhra	7	43.75
Maharashtra	5	31.25
MP	4	25.00
Bihar	4	25.00
Tamilnadu	2	12.50
Rajasthan	1	6.25
Gujarat	1	6.25
None	1	6.25

Table 6.22: Distribution of Companies by type of buyers

Buyers / Parameters	≤ 50 %	> 50%	< 50 %	≥ 50%
	New buyers		Replacement buyers	
No. of companies	7	9	9	7
% of companies	43.75	56.25	56.25	73.75

With change in demand and competition, all of them floated new models and improved functional utility of the product including horsepower since it was a machine with long life ranging from 10-20 years though some farmers also replaced it with 5-10 years (tables 6.23 and 6.24).

Table 6.23: Distribution of companies by major changes in combine harvester

Type of changes / Parameters	HP	Functional utility	Modal/ shape	Any other
No. of companies	13	12	16	9
% of companies	81.25	75.00	100.00	56.25

Table 6.24: Distribution of Companies by perceived Life of Combine harvesters

Product life (in years) / Parameters	5-10	10-15	15-20
No. of companies	4	7	5
% of companies	25	43.75	31.25

Distribution and Promotion

One company emphasized a security deposit of 10 lakh to offer a dealership and one another company offered dealership to a dealer who held tractor dealership. Companies normally give up to one year or two season's warranty. Except the warranty they do not provide any other after sale services. About 93 % companies train their mechanics. About 80% companies finance after sale service and 12.5% companies share the cost of after sale service with their dealers. No company offers credit to their dealers. Minimum sale condition for dealer varies from company to company. For example, a company has set the target of 10 combine sale per month and another company has set the target of 50 combine sale per year.

Newspapers and pamphlets were major media used for advertising of the brands. The advertising expenses varied from as little as Rs. 10,000 to a high of Rs. 20,000 or higher per annum (tables 6.25 and 6.26).

Table 6.25: Distribution of Companies by use of media for advertisement

Media Particulars	Newspaper	Pamphlet	Other
No. of companies	9	9	5
% of companies	56.25	56.25	31.25

Table 6.26: Distribution of Companies by amount of expenditure of advertising

Expenditure (Rs.) Particulars	< 10,000	10,000-20,000	> 20,000	None
No. of companies	5	0	7	4
% of companies	31.25	0	43.75	25

Major problems and future of combine harvesters

Though a significant majority (69%) did not report any major problems, the other 31% pointed to various, mostly market related, problems like farmer level problems, nature of market in terms of demand and dealer level problems (table 6.27). But, a majority of them were upbeat about the future of the combine business with only a few (25-30%) perceiving it to be dark or stagnating (table 6.28).

Table 6.27: Distribution of Companies by major problems faced by them

Problems / Parameters	Market	Dealer	Farmer	None
No. of companies	3	2	4	11
% of companies	18.75	12.50	25.00	68.75

Table 6.28: Distribution of Companies by perception of future of Combine industry

Future / Particulars	Bright	Dark	Stagnate	Variation
No. of companies	9	4	1	2
% of companies	56.25	25.00	6.25	12.50

Chapter 7

Purchase and Use of Combine Harvesters: A Farmer level perspective

This chapter examines the profile of combine owners and the use of the machine in terms of its utlilisation, viability and impact on local economy and farmers. It is based on a sample survey of 42 combine owners in Punjab (26), Maharashtra (9) and Gujarat (table 7.1). Where as Punjab is known for intensive and extensive use of combine for quite some time now and was the pioneer state in manufacturing and using the machine due to its cropping pattern dominated by wheat –paddy for which the machine was originally intended, the other two states are more recent markets for this machine and are agriculturally important with modest levels of agricultural development. Therefore, this chapter makes a comparative analysis of the farmer level information and issues across three states so far as combine harvester purchase and use are concerned.

So far as the level of literacy of combine owners is concerned, 1/3 of them were illiterate with more than 53% being so in Punjab. Comparatively, the literacy levels were much better in Gujarat and Maharashtra with 28% and 88% being above matric literate (table 7.2). Farmers from Maharashtra had the highest education level. 55.55 percent had graduation or technical diplomas. Also, 33.33% had higher secondary education and all the farmers had education up to atleast metric level. Contrary to this, farmers in Punjab were mostly uneducated. Only 15.4% had higher secondary education (rest all having education level below it). Farmers in Gujarat showed a middle level of education pattern with education of most of them being between standard 7^{th} and 12^{th}. Even in Tamilnadu, most of the owners were either illiterate or literate upto the 10th standard. On the other hand, hirers were better educated (no illiterate at all). Most of the owners and hirers were owners of tractors. (NABARD, 2005a).

Table 7.1: Distribution of Sample Combine harvester owners by State

State	District	Block	No of farmers	% of farmers
Gujarat	Ahmedabad, Surat	Ahmedabad	7	16.7
Maharashtra	Nandurbar	Nandurbar, Shahada	9	21.4
Punjab	Mansa	Mansa, Jhunir, Sardulgrah, Bhikhi	26	61.9
Total			42	100.00

In Gujarat, 42.9% farmers had landholding between 10 ha and 25 ha and another 42.9% had landholding above 25 ha. No landholding was below 4 ha. In Maharashtra, 55.5% farmers had landholding 10 hectares or above. Also, 22.2% farmers had landholding below 2ha. In Punjab, 34.5% farmers had landholding between 4 ha and 10 ha, 38.5% between 10 ha and 25 ha and another 11.5% had landholding above 25ha. No landholding was below 4 ha. In all, more than 50% farmers had landholding 10 hectares or above across states. Similar percentage in Gujarat was 85.72%.

Table 7.2: State-wise educational qualifications of Combine owning farmers

Educational level	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
No education	0	0	0	0	14	53.8	14	33.3
Can read and write	0	0	0	0	1	3.8	1	2.4
Up to 7th Std.	3	42.9	0	0	6	23.1	9	21.4
8-10 Std./Metric	2	28.6	1	11.1	1	3.8	4	9.5
Higher Secondary Education (11-12 Std.)	1	14.3	3	33.3	4	15.4	8	19.0
Graduate and above	1	14.3	3	33.3	0	0	4	9.5
Diploma/technical	0	0	2	22.2	0	0	2	4.8
Total	7	100.0	9	100.0	26	100.0	42	100.0

The combine owners were large land holders in Gujarat with average size of operations holding being 23 acres and owned holding being 19 acres compared with 14 and 9 acres in Maharashtra and 15 and 13 acres in Punjab. In Gujarat, no combine owner was smallholder or even medium holder (<10 acres) while in Maharashtra and Punjab there were some small, medium land holder and even landless persons in Maharshtra had combines (Table 7.3). A Gujarat farmer holding 40 hectares of land possessed two combines one each of Swaraj and Mahindra. A recent study (NABARD, 2005) of 10 combine owners and 20 hirers in Tiruvallur and Salem

districts (in 2000-01, these two districts had the second and the third highest financing of this machine in the state) of Tamilandu, the state which had 1913 tractor operated, 3322 self propelled and 4285 multi crop combine harvestors (totaling 9520 in 1998) showed that they had 22 acres of landholding on an average and used the machine mainly for paddy harvesting. Whereas owners were mostly in the range of 10-20 and 20-30 acres, hirers were smaller holders with less than 10 or 10-20 acres each (NABARD, 2005a).

Whereas 6% and 16% land was unirrigated in Gujarat and Maharashtra, in Punjab 100% land of the combine owners was irrigated (table 7.4). Further, almost all of the land owned by farmers was under cultivation. Percentage of irrigated land of the total cultivated land was very high in all the three states (100% in Punjab and more than 90% in both Gujarat and Maharashtra). Though Punjab' combine owners had only tubewell based irrigation, farmers in Gujarat and Maharashtra also depended on wells, lift irrigation, and canals to irrigate their lands with some having no source of irrigation at all. (table 7.5). Further, these owner farmers had multiple tubewells for irrigation (table 7.6) and mostly run by electricity with only two farmers in Maharashtra not owning any device for irrigation and one farmer in Punjab using only diesel engine for irrigation (table 7.7). Majority of farmers in all the three states had less than or three water extraction devices. However, majority of the bigger farmers (land holding over 25 ha) had 5 or 6 water extraction devices. Most of the area of these farmers was under traditional crops with significant area in Maharashtra and Gujarat only being under non-traditional crops but not in Punjab (table 7.8). Tradition crops in Punjab are wheat, paddy and cotton. In Gujarat and Maharashtra, they are maize, sugarcane, sorghum (jowar), wheat, paddy and pulses. Non traditional crops are potato and other than wheat and paddy in Punjab while they are Soya bean, fruits and vegetables in Gujarat and Maharashtra.

Table 7.3:Distribution of combine owners by landholding pattern across states

Land holding category (LHC in ha) Parameters	Landless	< 2 ha	2.00-4.00	4.01-10.00	10.01-25.00	> 25 (up to 60)	Total
Gujarat							
Number of farmers	0	0	0	1	3	3	7
% of farmers	0	0	0	14.3	42.9	42.9	100.0
Own land (ha)	0	0	0	10 (10.0)	56.0 (18.7)	70.4 (23.5)	136.4 (19.5)
Leased in land (ha)	0	0	0	0	0	22.0 (7.3)	22.0 (3.1)
Leased out land (ha)	0	0	0	0	0	0	0
Operational land (ha)	0	0	0	10 (10.0)	56.0 (18.7)	92.4 (30.8)	158.4 (22.6)
Maharashtra							
Number of farmers	1	1	0	2	3	2	9
% of farmers	11.1	11.1	0	22.2	33.3	22.2	100.0
Own land (ha)	0	1.2 (1.2)	0	16 (8.0)	25.2 (8.4)	36.0 (18.0)	78.4 (8.7)
Leased in land (ha)	0	0	0	0	23.2 (7.7)	20.0 (10.0)	43.2 (4.8)
Leased out land (ha)	0	0	0	0	0	0.0	0.0
Operational land (ha)	0	1.2 (1.2)	0	16 (8.0)	48.4 (16.1)	56.0 (28.0)	121.6 (13.5)
Punjab							
Number of farmers	0	0	4	9	10	3	26
% of farmers	0	0	15.4	34.6	38.5	11.5	100.0
Own land (ha)	0	0	7.6 (1.9)	59.2 (6.6)	143.6 (14.4)	138.0 (46.0)	348.4 (13.4)
Leased in land (ha)	0	0	2 (0.5)	10.4 (1.2)	29.6 (3.0)	0.0	42.0 (1.6)
Leased out land (ha)	0	0	0	2.0 (0.2)	0.0	0.0	2.0 (0.1)
Operational land (ha)	0	0	9.6 (2.4)	67.6 (7.5)	173.2 (17.3)	138.0 (46.0)	388.4 (14.9)
All							
Number of farmers	1	1	4	12	16	8	42
% of farmers	2.4	2.4	9.5	28.6	38.1	19.0	100.0
Own land (ha)	0	1.2 (1.2)	7.6 (1.9)	85.2 (7.1)	224.8 (14.1)	244.4 (30.6)	563.2 (13.4)
Leased in land (ha)	0	0	2 (0.5)	10.4 (0.9)	52.8 (3.3)	42 (5.3)	107.2 (2.6)
Leased out land (ha)	0	0	0	2.0 (0.2)	0.0	0	2.0 (0.0)
Operational land (ha)	0	1.2 (1.2)	9.6 (2.4)	93.6 (7.8)	277.6 (17.4)	286.4 (35.8)	668.4 (15.9)

Note: Figures in brackets indicate average land

Table 7.4:State wise distribution of combine owners by cultivated land and irrigated land

Land holding category (LHC in ha) Parameters	< 2 ha	2.00-4.00	4.01-10.00	10.01-25.00	> 25 (up to 60)	Total
Gujarat						
Irrigated land (ha)	0	0	10.0 (10.0)	56.0 (18.7)	82.4 (27.5)	148.4 (21.2)
Unirrigated land (ha)	0	0	0	0	10.0 (3.3)	10.0 (1.4)
Cultivated land (ha)	0	0	10.0 (10.0)	56.0 (18.7)	92.4 (30.8)	158.4 (22.6)
Non cultivated land (ha)	0	0	0	0	0.0	0.0
Maharashtra						
Irrigated land (ha)	0	0	16.0 (8.0)	38.4 (12.8)	48.0 (24.0)	102.4 (11.4)
Unirrigated land (ha)	1.2 (1.2)	0	0	10.0 (3.3)	8.0 (4.0)	19.2 (2.1)
Cultivated land (ha)	1.2 (1.2)	0	16.0 (8.0)	48.4 (16.1)	54.8 (27.4)	120.4 (13.4)
Non cultivated land (ha)	0	0	0	0	1.2 (0.6)	1.2 (0.1)
Punjab						
Irrigated land (ha)	0	9.6 (2.4)	67.6 (7.5)	173.2 (17.3)	138.0 (46.0)	388.4 (14.9)
Unirrigated land (ha)	0	0	0	0	0	0.0
Cultivated land (ha)	0	9.6 (2.4)	67.6 (7.5)	173.2 (17.3)	138.0 (46.0)	388.4 (14.9)
Non cultivated land (ha)	0	0	0	0	0	0.0
All						
Irrigated land (ha)	0	9.6 (2.4)	93.6 (7.8)	267.6 (16.7)	268.4 (33.6)	639.2 (15.2)
Unirrigated land (ha)	1.2 (1.2)	0	0	10.0 (0.6)	18.0 (2.3)	29.2(0.7)
Cultivated land (ha)	1.2 (1.2)	9.6 (2.4)	93.6 (7.8)	277.6 (17.4)	285.2 (35.7)	668.4 (15.9)
Non cultivated land (ha)	0	0	0	0.0	1.2 (0.2)	1.2 (0.1)

Note: Figures in brackets indicate average land

Table 7.5: Distribution of combine owners by sources of irrigation for farming across states

Sources	Gujarat		Maharashtra		Punjab		All	
	No. of farmers	% of farmers	No. of farmers	% of farmers	No. of farmers	% of farmers	No. of farmers	% of farmers
No irrigation source	0	0.0	2	22.2	0	0	2	4.8
Bore/Tube well	2	28.6	5	55.6	26	100	33	78.6
Well	0	0.0	2	22.2	0	0	2	4.8
Canal and Tube well	3	42.9	0	0.0	0	0	3	7.1
River lift, well, and bore well	2	28.6	0	0.0	0	0	2	4.8
Total	7	100.0	9	100.0	26	100	42	100.0

Table 7.6: State-wise distribution of combine owners by source of energy for irrigation

Source of energy	Gujarat		Maharashtra		Punjab		All	
	No. of water extraction devices	%	No. of water extraction devices	%	No. of water extraction devices	%	No. of water extraction devices	%
Electricity	19	100.0	22	100.0	72	90	113	93.4
Diesel	0	0	0	0	1	1.25	1	0.8
Diesel and electricity	0	0	0	0	7	8.75	7	5.8
Total	19	100.0	22	100.0	80	100	121	100.0

Table 7.7:Distribution of combine owners by ownership of water extraction devices across states

LHC (ha) Well/Tubewells/Riverlift	< 2.0		2.0-4.0		4.01-10.0		10.01-25.0		> 25 (up to 60)		Total	
Gujarat	No. farmers	% farmers	No farmers	% farmers	No farmers	% farmers	No farmers	% farmers	No farmers	% farmers	No farmers	% farmers
One	0	0	0	0	1	100.0	1	33.3	1	33.3	3	42.9
Two	0	0	0	0	0	0	1	33.3	0	0	1	14.3
Three	0	0	0	0	0	0	0	0	0	0	1	14.3
Four	0	0	0	0	0	0	0	0	0	0	0	0.0
Five	0	0	0	0	0	0	1	33.3	0	0	1	14.3
Six	0	0	0	0	0	0	0	0	1	33.3	1	14.3
Total	0	0	0	0	1	100.0	3	100.0	3	100.0	7	100.0
Maharashtra												
None	2	100.0	0	0	0	0	0	0	0	0	2	22.2
One	0	0	0	0	0	0	0	0	0	0	1	11.1
Two	0	0	0	0	2	100.0	1	33.3	0	0	3	33.3
Four	0	0	0	0	0	0	0	0	0	0	1	11.1
Five	0	0	0	0	0	0	0	0	1	50.0	1	11.1
Six	0	0	0	0	0	0	0	0	1	50.0	1	11.1
Total	2	100.0	0	0	2	100.0	3	100.0	2	100.0	9	100.0
Punjab												
One	0	0	3	75.0	1	11.1	0	0	0	0	4	15.4
Two	0	0	1	25.0	3	33.3	1	10.0	1	33.3	6	23.1
Three	0	0	0	0	2	22.2	6	60.0	0	0	8	30.8
Four	0	0	0	0	0	0.0	0	0	1	0	1	3.8
Five	0	0	0	0	2	22.2	3	0	1	33.3	6	23.1
Six	0	0	0	0	1	11.1	0	0	0	0	1	3.8
Total	0	0	4	100.0	9	100.0	10	100.0	3	100	26	100.0
All												
None	2	100.0	0	0	0	0	0	0	0	0	2	4.8
One	0	0	3	75.0	2	16.7	2	12.5	1	12.5	8	19.0
Two	0	0	1	25.0	5	41.7	3	18.8	1	12.5	10	23.8
Three	0	0	0	0	2	16.7	6	37.5	1	12.5	9	21.4
Four	0	0	0	0	0	0.0	1	6.3	1	12.5	2	4.8
Five	0	0	0	0	2	16.7	4	25.0	2	25.0	8	19.0
Six	0	0	0	0	1	8.3	0	0.0	2	25.0	3	7.1
Total	2	100.0	4	100.0	12	100.0	16	100.0	8	100.0	42	100.0

Table 7.8:State-wise cropping pattern of combine owners

LHC (ha) / Particulars	< 2.00	2.00-4.00	4.01-10.00	10.01-25.00	> 25	Total
Gujarat						
Total cultivated land (ha)	0	0	10	56	92.4	158.4
Area under traditional crops (ha)	0	0	10 (100.0)	54 (96.4)	88.8 (96.1)	152.8 (96.5)
Area under non-traditional crops (ha)	0	0	0	2 (3.6)	3.6 (3.9)	5.6 (3.5)
Area under high yielding varieties (ha)	0	0	10 (100.0)	41 (73.2)	74 (80.1)	125.0 (78.9)
Maharashtra						
Total cultivated land (ha)	1.2	0	16	48.4	56	121.6
Area under traditional crops (ha)	1.2 (100.0)	0	14 (87.5)	45.2 (93.4)	42 (75.0)	102.4 (84.2)
Area under non-traditional crops (ha)	0	0	2 (12.5)	3.2 (6.6)	14 (25.0)	19.2 (15.8)
Area under high yielding varieties (ha)	1.2 (100.0)	0	16 (100.0)	48.4 (100.0)	56 (100.0)	121.6 (100.0)
Punjab						
Total cultivated land (ha)	0	9.6	67.6	173.2	138	388.4
Area under traditional crops (ha)	0	9.6 (100.0)	67.6 (100.0)	173.2 (100.0)	138 (100.0)	388.4 (100.0)
Area under non-traditional crops (ha)	0	0	0	2 (1.2)	8 (5.8)	10 (2.6)
Area under high yielding varieties (ha)	0	9.6 (100.0)	41.2 (60.9)	112 (64.7)	96 (69.6)	258.8 (66.6)
All						
Total cultivated land (ha)	1.2	9.6	93.6	277.6	286.4	668.4
Area under traditional crops (ha)	1.2 (100.0)	9.6 (100.0)	91.6 (97.9)	272.4 (98.1)	268.8 (93.9)	643.6 (96.3)
Area under non-traditional crops (ha)	0	0	2 (2.1)	7.2 (2.6)	25.6 (8.9)	34.8 (5.2)
Area under high yielding varieties (ha)	1.2 (100.0)	9.6 (100.0)	67.2 (71.8)	201.4 (72.6)	226 (78.9)	505.4 (75.6)

Note: Figures in brackets indicate percentage of cultivated land. Tradition crops in Punjab are wheat, paddy and cotton. In Gujarat and Maharashtra, they are maize, sugarcane, sorghum (jowar), wheat, paddy and pulses. Non traditional crops are potato and other than wheat and paddy in Punjab while they are soyabean, fruits and vegetables in Gujarat and Maharashtra.

Combine ownership and use

In Maharashtra, both types of combines were equally preferred [TD:SP = 55:45]. Punjab and Gujarat had huge majority of tractor driven combines over self propelled. Reasons for preferring

a self Propelled combine included high work efficiency, followed by multi crop use, low maintenance and long life. This version was mostly preferred by large farmers for whom efficiency of farm operations was essential to reap economies of scale. On the other hand, tractor driven was driven by tractor's use in other field operations. It was, therefore, logically preferred by farmers with low land holdings. Other important factors were low price, low fuel and labour cost and suitable for less land area required for harvesting. 70% of the farmers in Gujarat and 80% of the farmers in Punjab used combines of a capacity of 50-60 HP. This ratio does not hold for Maharashtra where almost 45% of the farmers use combines of capacity 105-110 HP. The capacity of combines was higher in Maharashtra due to predominant use of these machines for custom hiring there.

The distribution of second hand and new combines was around 65:35 in Gujarat, 55:45 in Maharashtra and 40:60 in Punjab. (Overall, the ratio was 45:55). The tendency to buy new combines was found highest in Punjab. So far as brand wise ownership of combines was concerned, in Gujarat, there was no clear market leader. However, Sonalika and John Deere were ahead of Farmtrack and Standard. In Maharashtra, there were only two players, Swaraj and John Deere with almost equal market share. In Punjab, Standard was the market leader with only one competitor (and that too, non significant) in the form of Preet. Overall, Standard was the market leader with a total market share of 59.5%, followed by John Deere (16.7%) and Swaraj (9.5%) in that order (tables 7.9 and 7.10). In Maharashtra, Standard, John Deere and Swaraj were considered popular brands.

Reasons for purchase of a particular brand

In Punjab, popular brand image played a very important role in the purchase decision with 100% farmers factoring this in their purchase decision. Goodwill, experience of other farmers and resale value came next with almost the same proportion of farmers giving importance to each of these factors (around 20%). On the other hand, in Gujarat, dealer advice (57.2%) and popular brand image (42.9%) influenced the purchase decision of a majority of farmers. Maharashtra farmers went by popular brand image (33.3%) and good experience of other farmers (44.4%), though other factors also had an influence in case of 77.7% farmers. Other factors included

affordable price, clearance, low maintenance, power steering, high work efficiency, local dealer, easy availability of spare parts, relationships with company, easy for use/driving, fine cutter, pressure of relatives, and dealing (tables 7.11 and 7.12).

Table 7.9: Distribution of combine owners by type of combine owned- state and farm category wise

LHC (ha) Particulars	Landless		< 2.00		2.00-4.00		4.01-10.00		10.01-25.00		> 25		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Gujarat														
TD	0		0		0		1		3		2		6	
SP	0		0		0		0		0		1		1	
Total	0		0		0		1	14.3	3.0	42.9	3.0	42.9	7	100.0
Maharashtra														
TD	0		0		0		2		2.0		1.0		5	
SP	1		1		0		0		1		1		4	
Total	1	11.1	1	11.1	0		2	22.2	3	33.3	2	22.2	9	100.0
Punjab														
TD	0		0		4		9.0		8.0		3.0		24	
SP	0		0		0		0.0		2.0				2	
Total	0		0		4	15.4	9	34.6	10	38.5	3	11.5	26	100.0
All														
TD	0		0		4		12.0		13.0		6.0		35	
SP	1		1		0		0.0		3.0		2.0		7	
Total	1	2.4	1	2.4	4	9.5	12.0	28.6	16.0	38.1	8.0	19.0	42	100.0

Table 7.10:Distribution of combine owners by number of combines possessed-state and farmer category-wise

LHC (ha) Particulars	Landless	< 2.00	2.00-4.00	4.01-10.00	10.01-25.00	> 25	Total
Gujarat							
Old and secondhand	0	0	0	1	2	2	5
New brand	0	0	0	0	1	2	3
Total	0	0	0	1	3	4	8
Maharashtra							
Old and secondhand	1	0	0	0	3	2	6
New brand	0	2	0	2	1		5
Total	1	2	0	2	4	2	11
Punjab							
Old and secondhand	0	0	2	6	2	0	10
New brand	0	0	2	3	8	3	16
Total	0	0	4	9	10	3	26
All							
Old and secondhand	1		2	7	7	4	21
New brand		2	2	5	10	5	24
Total	1	2	4	12	17	9	45

Note: A Gujarat farmer holding 40 hectares of land and two Maharashtra farmers (each of them) holding 1.2 ha and 24 ha land respectively possessed two combines each.

Table 7.11: Distribution of combine owners by brands of combines owned- state and farmer category wise

Brand	Gujarat		Maharashtra		Punjab		All	
	No. of farmers	% of farmers	No. of farmers	% of farmers	No. of farmers	% of farmers	No. of farmers	% of farmers
Standard	1	14.3	0	0.0	24	92.3	25	59.5
John deer with Standard	2	28.6	5	55.5	0	0	7	16.7
Sonalika	2	28.6	0	0.0	0	0.0	2	4.8
Preet	0	0.0	0	0.0	2	7.7	2	4.8
Farmtrack	1	14.3	0	0.0	0	0.0	1	2.4
Swaraj	0	0.0	4	44.4	0	0.0	4	9.5
Swaraj & Maindrda	1	14.3	0	0.0	0	0.0	1	2.4
Total	7	100.0	9	100.0	26	100.0	42	100.0

Table 7.12: Distribution of combine owners across states by major reasons for preference of a particular brand/model (Multiple responses)

Reasons	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Popular Brand/Brand image	3	42.9	3	33.3	26	100.0	32	76.2
Good experience of other farmers	0	0.0	4	44.4	6	23.1	10	23.8
Dealer's advise	4	57.1	0	0.0	0	0.0	4	9.5
Good will	0	0.0	0	0.0	5	19.2	5	11.9
Resale value	0	0.0	0	0.0	6	23.1	6	14.3
Quality and strength	1	14.3	1	11.1	1	3.8	3	7.1
Others*	0	0.0	7	77.8	6	23.1	13	31.0

Note: *Others include affordable price, clearance, low maintenance, power steering, high work efficiency, local dealer, easy availability of spare parts, relationships with company, easy for use/driving, fine cutter, pressure of relatives, and dealing

A recent study (NABARD, 2005a) showed that wheel version was more common (60%, and all Escorts model where as 85% Standard model) as it cost less (only Rs. 7.62 lakh against Rs.13.95 lakh). The minimum land required for loan was 6 acres and availability of atleast 500 hac of wheat and 300 hac. of paddy in wheat-paddy zone for custom hiring for viability of the machine,

considering density of machines in an area. Majority of the owners had bought it for custom hiring purposes and for the first time only (50%) or as additional one (40%). Most of the owners (80%) had tractors owned by them. The machines were bought on bank loan with 25% down payment in case of commercial banks and 10% in case of co-operative banks with rate of interest varying from 14.25-15.75% per annum and repayment period from 5.7 years in either annual or 6-monthly installments. But, banks obtained security of loans upto 3-6 times of the loan amount in terms of mortgage of land and other assets. The track version was used only for 45 hours (less than 5%) on own farm and hired for 900 hours in a year. Compared with this, wheel version was used on own farms for 43 (4%) hours and custom hired for 1080 hours in a year. Wheel version was more commonly hired (60%) as it was cheaper (Rs. 900 per acres) compare with track version @ Rs. 1100 per acre as the operations cost per annum was higher for self propelled @ 709 compared with 500 for wheel version. Thus, total use was 945 hours and 1123 hours in track and wheel version on an average. The average O& M cost of the track version (self-propelled) was higher 6.7 lakh compared with the wheel version (tractor mounted, 5.61 lakh). Thus, net income from custom hiring was higher for wheel version (Rs. 4.11 lakh) compared with Track version (3.2 lakh) and incremental income from own farm use a little lower (Rs. 70072 against Rs. 74169 for track version). The combines of the two types (track and wheel) replaced 27810 and 33150 man days respectively (NABARD, 2005a).

Preference for type of combine

Tractor mounted version was preferred over self propelled version almost in all states due to its lower cost, use of tractor for other purposes, low fuel consumption, and lower maintenance (table 7.13). Where as in Punjab, combine harvestors have been bought by farmers since the early 1990s and only very few during the last few years for the first time, in Gujarat and Maharashtra, it is phenomenon of only last 2-3 years (table 7.14). Since the eighties, farmers in Punjab have taken to combines in a big way, so much so that these machines harvest roughly three-fourths of the wheat and paddy grown in Punjab. In terms of prices, John Deere and Farm Track were the costliest and the local brands i.e. Swaraj and Standard the cheapest among all (Table 7.15). So far as capacity of combine harvestors was concerned, in Gujarat and Punjab, where in many cases, combines were used mainly for own work, the capacity was smaller in terms of HP of

machine as against Maharashtra where very large capacity machines like above 100 HP were more common as they were primarily used for custom hiring. But, in general, most common HP was 55 HP and 60 HP followed by 50 HP (table 7.16).

Table 7.13: State-wise distribution of combine owners by reasons for preferring a specific type of combine

Reasons	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Self Propelled (SP)								
High work efficiency	1	14.3	0	0.0	0	0.0	1	2.4
High work efficiency and multi crop use	0	0.0	1	11.1	0	0.0	1	2.4
Low maintenance, high work efficiency and multi crop use	0	0.0	1	11.1	0	0.0	1	2.4
Long life	0	0.0	1	11.1	0	0.0	1	2.4
For experiment	0	0.0	1	11.1	0	0.0	1	2.4
No need of tractor	0	0.0	0	0.0	2	7.7	2	4.8
Tractor Driven (TD)								
Tractor is useful in other field operation and low fuel consumption	3	42.9	1	11.1	0	0.0	4	9.5
Tractor is useful in other field operation	0	0.0	2	22.2	2	7.7	4	9.5
Tractor is useful in other field operation and less land for harvesting	0	0.0	0	0.0	1	3.8	1	2.4
Low fuel consumption	1	14.3	0	0.0	0	0.0	1	2.4
Low fuel consumption and Low maintenance	0	0.0	1	11.1	0	0.0	1	2.4
Low fuel consumption and new technology	0	0.0	1	11.1	0	0.0	1	2.4
Tractor is useful in other field operation and low price	0	0.0	0	0.0	19	73.1	19	45.2
Tractor is useful in other field operation , low price and less labour requirements	0	0.0	0	0.0	1	3.8	1	2.4
Others*	2	28.6	0	0.0	1	3.8	3	7.1
Total	7	100.0	9	100.0	26	100.0	42	100.0

* Others include easy to repair, no delivery of SP in local areas, and shortage of fund

Table 7.14: State-wise distribution of combine owners by the year of combine purchase

Year	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
1990	0	0	0	0	1	3.8	1	2.4
1996	0	0	0	0	2	7.7	2	4.8
1997	0	0	0	0	1	3.8	1	2.4
1998	0	0	0	0	2	7.7	2	4.8
1999	0	0	0	0	1	3.8	1	2.4
2000	0	0	0	0	4	15.4	4	9.5
2001	0	0	0	0	2	7.7	2	4.8
2002	0	0	0	0	5	19.2	5	11.9
2003	0	0	0	0	4	15.4	4	9.5
2005	2	28.6	7	77.8	2	7.7	11	26.2
2006	2	28.6	2	22.2	2	7.7	6	14.3
2007	3	42.9	0	0	0	0.0	3	7.1
All years	7	100	9	100	26	100.0	42	100.0

Table 7.15: Brand wise distribution of combine owners by the purchase price of combine

Model Year	Standard			John deer and Standard			Sonalika			Preet			Farm track			Swaraj			All		
	No.	%	Rs. Lakh	No.	%	Rs. Lakh	No.	%	Rs. Lakh	No.	%	Rs. Lakh	No.	%	Rs. Lakh	No.	%	Rs. Lakh	No.	%	Rs. Lakh
1990	1	4.0	2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2.4	2.0
1996	2	8.0	2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4.8	2.0
1997	1	4.0	3.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2.4	3.0
1998	2	8.0	2.51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4.8	2.51
1999	1	4.0	2.15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2.4	2.15
2000	3	12.0	1.82	0	0	0	0	0	0	1	50	9.15	0	0	0	0	0	0	4	9.5	3.65
2001	2	8.0	2.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4.8	2.28
2002	5	20.0	2.63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	11.9	2.63
2003	4	16.0	2.66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	9.5	2.66
2005	2	8.0	4.23	6	85.7	10.47	0	0	0	0	0	0	1	100	10.5	2	40	7.93	11	26.2	8.87
2006	2	8.0	7.18	1	14.3	9.75	0	0	0	1	50	9.40	0	0	0	2	40	7.75	6	14.3	8.17
2007	0	0.0	0	0	0.0	0	2	100	11.11	0	0	0	0	0	0	1	20	10.42	3	7.1	10.88
Total	25	100.0	0	7	100	0	2	100	0	2	100	0	1	100	0	5	0	0	42	100.0	

Table 7.16: State-wise distribution of combine owners by the capacity of combines purchased

Capacity (HP)	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
50	0	0.0	1	11.1	5	19.2	6	14.3
55	1	14.3	4	44.4	8	30.8	13	31.0
60	4	57.1	0	0.0	8	30.8	12	28.6
70	1	14.3	0	0.0	0	0.0	1	2.4
75	0	0.0	0	0.0	2	7.7	2	4.8
105	1	14.3	2	22.2	0	0.0	3	7.1
110	0	0.0	2	22.2	2	7.7	4	9.5
No response	0	0.0	0	0.0	1	3.8	1	2.4
Total	7	100.0	9	100.0	26	100.0	42	100.0

Purchase pattern in combines across states

In Gujarat, 100% farmers purchased from the dealers showing high degree of dealer influence on the purchase behaviour as discussed earlier. In Maharashtra, dealers (45%), other farmers in case of second hand purchase (22%), and company (11%) were major sources of purchase in that order. Punjab had purchases directly from the company premises (61.5%) and other farmers only (38.5%) (table 7.17).

The cash purchase ratio was highest in Punjab followed by Maharashtra and then Gujarat. The sales in Gujarat were dependent on the credit rates available while those in Punjab were largely driven by the cropping season and the urgent/latent need of the farmer. The overall ratio of cash to credit sales was 50:50 (table 7.18).

The major source of credit in Gujarat and Punjab was government bank loans with their share being 83.33% and 100% respectively in the total credit given to farmers for the purchase of combines. In Maharashtra however, the proportion of government bank credit was restricted to only 16.67% while the rest was company (33.3%) and cooperative society (50%) financed (table 7.19).

In Gujarat and Punjab, almost 100% farmers took credit for duration between 5 to 10 years (this being towards 10 in Gujarat and towards 5 in Punjab). In Maharashtra, 83.33% farmers took loans for a period of 3 years or less. 100% farmers in Gujarat preferred to pay installments in 6 months and above. 100% farmers in Maharashtra preferred to pay installments in 6 months and below. As per the sample, 100% farmers in Punjab paid half yearly installments.In Gujarat and Maharashtra, the margin money requirement was Rs.100,000 or above for almost 100% of the farmers. In Punjab, most of the farmers had margin money requirement of less than Rs.1,00,000. Hypothecation of combine was taken by the lending agency in almost all cases in Punjab and 83.3% in Gujarat and Maharashtra. Alternatively, mortgage of land/property was another security against combine harvestor loan. The major reason for taking loan was the shortage of funds across all states followed by ease to get loan and low interest rates (tales 7.20 to 7.25).

Table 7.17: State-wise distribution of combine owners by place of purchase of combine

Source	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Dealer	7	100	4	44.4	0	0.0	11	26.2
Other farmers	0	0	2	22.2	10	38.5	12	28.6
Company	0	0	2	22.2	16	61.5	18	42.9
Shop keeper	0	0	1	11.1	0	0.0	1	2.4
Total	7	100	9	100.0	26	100.0	42	100.0

Table 7.18: State-wise distribution of combine owners by terms of purchase of combine

Purchase in	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Cash	1	14.3	3	33.3	17	65.4	21	50
Credit	6	85.7	6	66.7	9	34.6	21	50
Total	7	100	9	100.0	26	100.0	42	100.0

Table 7.19: State-wise distribution of combine owners by sources of credit for purchase of combine

Source of credit	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Govt. banks	5	83.3	1	16.7	9.0	100.0	15.0	71.4
Company finance	1	16.7	2	33.3	0.0	0.0	3.0	14.3
Credit coop soc/bank	0	0.0	3	50.0	0.0	0.0	3.0	14.3
Total	6	100.0	6	100.0	9.0	100.0	21.0	100.0

Table 7.20: State-wise distribution of combine owners by duration of credit period for combine

Duration (years)	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Not fixed	0	0.0	2	33.3	0	0.0	2	9.5
3	1	16.7	3	50.0	0	0.0	4	19.0
5	0	0.0	0	0.0	5	55.6	5	23.8
6	0	0.0	0	0.0	1	11.1	1	4.8
7	1	16.7	1	16.7	0	0.0	2	9.5
9	2	33.3	0	0.0	2	22.2	4	19.0
10	1	16.7	0	0.0	1	11.1	2	9.5
No response	1	16.7	0	0.0	0	0.0	1	4.8
Total	6	100.0	6	100.0	9	100.0	210	100.0

Table 7.21: State-wise distribution of combine owners by nature of installments for combine credit

No of installments	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Not fixed	0	0.0	2	33.3	0	0.0	2	9.5
Monthly	0	0.0	1	16.7	0	0.0	1	4.8
Quarterly	0	0.0	2	33.3	0	0.0	2	9.5
Half yearly	3	50.0	1	16.7	9	100.0	13	61.9
Annually	2	33.3	0	0.0	0	0.0	2	9.5
No response	1	16.7	0	0.0	0	0.0	1	4.8
Total	6	100.0	6	100.0	9	100.0	21	100.0

Table 7.22: State-wise distribution of combine owners by margin money required for availing of combine credit

Margin money ('000 Rs.)	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
None	1	16.7	0	0.0	1	11.1	2	9.5
Up to 50	0	0.0	0	0.0	2	22.2	2	9.5
51-75	0	0.0	0	0.0	4	44.4	4	19.0
76-100	0	0.0	0	0.0	1	11.1	1	4.8
101-200	3	50.0	2	33.3	0	0.0	5	23.8
201-300	1	16.7	2	33.3	1	11.1	4	19.0
> 300	0	0.0	2	33.3	0	0.0	2	9.5
No response	1	16.7	0	0.0	0	0.0	1	4.8
Total	6	100.0	6	100.0	9	100.0	21	100.0

Table 7.23: State-wise distribution of combine owners by reasons for taking credit for combine purchase

Reasons	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Shortage of fund	5	83.3	3	50.0	9	100.0	17	81.0
Shortage of fund and low interest rate	1	16.7	0	0.0	0	0.0	1	4.8
Easy to get loan	0	0.0	1	16.7	0	0.0	1	4.8
Shortage of fund and Easy to get loan	0	0.0	1	16.7	0	0.0	1	4.8
Shortage of fund and cash credit	0	0.0	1	16.7	0	0.0	1	4.8
Total	6	100.0	6	100.0	9	100.0	21	100.0

Table 7.24: State-wise distribution of combine owners by type of security to avail of loan for combine purchase

Types of securities	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Land mortgage	1	16.7	0	0.0	0	0.0	1	4.8
Mortgage of property	0	0.0	1	16.7	0	0.0	1	4.8
Hypothecation of combine	0	0.0	1	16.7	0	0.0	1	4.8
Land mortgage and Hypothecation of combine	5	83.3	4	66.7	9	100.0	18	85.7
Total	6	100.0	6	100.0	9	100.0	21	100.0

Table 7.25: State-wise distribution of combine owners by area of land mortgage required for combine credit

Area (acre)	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Land mortgage not required	0	0.0	2	33.3	0	0.0	2	9.5
Up to 5	1	16.7	0.0	0.0	1.0	11.1	2	9.5
6-10	1	16.7	2.0	33.3	7.0	77.8	10	47.6
11-15	1	16.7	2.0	33.3	0.0	0.0	3	14.3
16-20	0	0.0	0.0	0.0	1.0	11.1	1	4.8
21-25	0	0.0	0.0	0.0	0.0	0.0	0	0.0
26-30	2	33.3	0.0	0.0	0.0	0.0	2	9.5
No response	1	16.7	0.0	0.0	0.0	0.0	1	4.8
Total	6	100.0	6.0	100.0	9.0	100.0	21	100.0

The rate of purchase of accessories of same brand was zero in Punjab. 100% farmers resorted to buying non-branded accessories, perhaps due to their low cost. In Maharashtra the rate was 66.67%. In Gujarat, 28.6% farmers did not buy accessories of the same brand. The profit margins on accessories are higher in such machinery than the machinery itself. Hence, the profits which a company would be making in these states would be low (except for Maharashtra). Reasons for non-purchase of the same brand accessories were second hand purchases and high cost of original accessories (table7.26).

Apart from Maharashtra, where economic consideration was the major reason to buy a combine, the prime reason was farming in Gujarat and Punjab. This might be due to the high land and labour costs in Maharashtra as compared to Gujarat and Punjab. Brand name and low repair and maintenance cost formed the major chunk of decision making in Gujarat and Maharashtra. However, in Punjab, the prime considerations were cleaning and the material of the combine. Some other factors considered were work efficiency, easy to operate, power steering, engineering and technology, low fuel consumption, multi crop use, low man power requirements, no crack, long life, shafts, cross, facilities, combine barma, roller, quality of parts, belt, bearing, should be all material of one company, heavy, and resale value (table 7.27 and 7.28).

Although by a very low percentage of farmers, the major problem faced was of late delivery and late fittings. Only 10% farmers received incentives on the purchase of combine. In majority of cases and across all states, the life of combines was found out to be between 6 to 10 years. Also, around 70% of the farmers had not changed their combines across all states taken together once purchased (table 7.29 to 7.33).

Table 7.26: State-wise distribution of combine owners by the purchase of accessories of the same brand as combine

Purchased accessories	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Yes	2	28.6	6	66.7	0	0.0	8	19.0
No	3	42.9	3	33.3	26	100.0	32	76.2
No response	2	28.6	0	0.0	0	0.0	2	4.8
Total	7	100.0	9	100.0	26	100.0	42	100.0

Table 7.27: State-wise distribution of combine owners by reasons for purchase of combine

Reasons	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Farming	4	57.1	1	11.1	26	100.0	31.0	73.8
Economic consideration and farming	3	42.9	2	22.2	0	0.0	5.0	11.9
Economic consideration	0	0.0	5	55.6	0	0.0	5	11.9
Economic consideration and labour problem	0	0.0	1	11.1	0	0.0	1	2.4
Total	7	100.0	9	100.0	26	100.0	42	100.0

Table 7.28: State-wise distribution of combine owners by factors in combine purchase (Multiple responses)

Factors	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Clearing	0	0.0	2	22.2	21	80.8	23	54.8
Solid/material	0	0.0	1	11.1	13	50.0	14	33.3
Brand name	3	42.9	4	44.4	1	3.8	8	19.0
Low R&M	3	42.9	2	22.2	2	7.7	7	16.7
Price	0	0.0	0	0.0	3	11.5	3	7.1
Good will	1	14.3	0	0.0	2	7.7	3	7.1
Others*	1	14.3	6	66.7	11	42.3	18	42.9

* Others include work efficiency, easy to operate, power steering, engineering and technology, low fuel consumption, multi crop use, low man power requirements, no crack, long life, shafts, cross, facilities, combine barma, roller, quality of parts, belt, bearing, should be all material of one company, heavy, and resale value

Table 7.29: State-wise distribution of combine owners by main problem faced by farmers at the time of purchase

Problems	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
No problems	6	85.7	8.0	88.9	25.0	96.2	39	92.9
Late delivery and late fittings	1	14.3	1	11.1	1.0	3.8	3	7.1
Total	7	100.0	9	100.0	26.0	100.0	42	100.0

Table 7.30: State-wise distribution of combine owners by incentives for farmers to purchase combine

Incentives*	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Yes	1	14.3	0	0	3	11.5	4	9.5
No	6	85.7	9	100.0	23	88.5	38	90.5
Total	7	100.0	9	100.0	26	100.0	42	100.0

*Three farmers received cash discount of Rs. 10,000 each and one farmer received a tractor coupon.

Table 7.31: State-wise distribution of combine owners by average life of combine

Life (years)	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
≤ 5	2	28.6	1	11.1	3	11.5	6	14.3
6-10	1	14.3	5	55.6	19	73.1	25	59.5
11-15	0	0.0	0	0.0	3	11.5	3	7.1
16-20	0	0.0	0	0.0	1	3.8	1	2.4
Can't say	1	14.3	0	0.0	0	0.0	1	2.4
Depend on maintenance	0	0.0	3	33.3	0	0.0	3	7.1
No response	3	42.9	0	0.0	0	0.0	3	7.1
Total	7	100.0	9	100.0	26	100.0	42	100.0

Table 7.32: State-wise distribution of combine owners by frequency of combine replacement

Frequency of change	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Depends on condition	0	0.0	0	0.0	5	19.2	5	11.9
Depends on work	0	0.0	0	0.0	1	3.8	1	2.4
Depends on repair and maintenance	0	0.0	1	11.1	2	7.7	3	7.1
Depends on new modifications	0	0.0	0	0.0	1	3.8	1	2.4
No change	3	42.9	8	88.9	17	65.4	28	66.7
No response	4	57.1	0	0.0	0	0.0	4	9.5
Total	7	100.0	9	100.0	26	100.0	42	100.0

Table 7.33: State-wise distribution of combine owners by number of combines replaced by farmers in the last 15 years

Replacement time	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
No replacement	7	100	9	100	17	65.4	33	78.6
One	0	0	0	0	5	19.2	5	11.9
Three	0	0	0	0	2	7.7	2	4.8
Four	0	0	0	0	1	3.8	1	2.4
Six	0	0	0	0	1	3.8	1	2.4
Total	7	100	9	100	26	100.0	42	100.0

Use of Combine harvester and rental

Average hours of combine usage was the highest in the Rabi season across all three states. It was followed by Kharif in Punjab and Maharashtra while by summer season in Gujarat. Per day use of combines was between 8 and 12 hours in Punjab and Gujarat. In Maharashtra, per day usage was on the lower side. In Gujarat and Punjab, the usage was lower than that in Maharashtra. The weighted average usage in the number of days per year for the three states is given in table 7.34:

Table 7.34: State-wise annual average usage of combine harvestors by owner farmers

State	Annual combine usage in hours
Gujarat	55.5
Maharashtra	90.75
Punjab	50.65

Appendix 7.1 Tables 7.35 to 7.38 give season, crop-wise and per day use of combines across states. More than 50% of this custom combine hiring was from within the home state itself. Annually, combine was used for 41-55 days in general by one-third of owners, 26-40 hours by 16% farmers and 56-70 hours by 19% farmers. It was used for higher number of days (>70 days by 88% owners) in Maharashtra due to custom hiring practice and lesser number of combines in the region so far (Appendix 7.1 table 7.39). Hiring of combines was prevalent in Gujarat and Maharashtra. Around 45% farmers in Gujarat and 80% farmers of Maharashtra hired out combines for more than 90% of their usage (Appendix 7.1 tables 7.40-7.43).

The main costs in custom hiring for the owner are diesel and labour. A combine working for an hour consumes seven litres of diesel. A driver is paid a flat Rs 9,000 for the season plus an incentive of Rs 9 per acre. And, he covers 25-30 acres daily (HBL, 2007).

Fuel Cost: the fuel costs are higher in Gujarat and Maharashtra. The average annual expenditure in these states is above one lakh rupees. On the contrary, more than 90% of farmers in Punjab spend less than 75000 per year (Appendix 7.1 table 7.44).

Repair and maintenance cost: Same as fuel cost – higher in Gujarat and Maharashtra than in Punjab.

Depreciation cost: Highest in Gujarat followed by Maharashtra and then Punjab.

Major problems farmers face in combine operations in various states (table 7.54):

Gujarat: The prime problems included operating difficulties, low fuel efficiency, frequent breakdown of parts, and the like[2].

Maharashtra: Major problems were poor after sales service and lack of availability of spare parts.

Punjab: Prime concerns were non availability of spare parts, high repair costs and some other problems (footnote).

A case study of combine hiring customer

Mr. Yadav Govind Chaudhry is a residence of Dhruvkheda village of Shahada block of Nandurbar district in Maharashtra. He is a big farmer and holds 80 acres of own cultivable land. All his land is irrigated. He hires combine for Wheat, Mung and Soyabean. He prefers to hire tractor mounted combine because of high-tech technology and very good crop cleanliness. According to him, time savings, timely work, work efficiency, finishing, and taking full precaution of field operations are the major reasons for hiring combine instead of labour. He pays a flat rate of Rs 500 per acre for any of the above mentioned crops. According to him, the labour cost of harvesting one acre of Mung is Rs 1200, and of Wheat Rs. 1500. Labour are not ready to harvest soyabean. However, wheat harvesting with combine is not profitable because farmers lose fodder worth Rs 3000 per acre. But going by the current labour market conditions in agriculture, use of combine harvester will be increasing year after year.

Combines and labour displacement

A recent study reports that cost of using combines for harvesting wheat was much lower (Rs. 450-500 per acre) than manual harvesting (Rs. 1250 per acre) leading to considerable displacement of labour, especially female labour. Similar was the effect of power tillers in case

[2] Other problems are more load on engine, high cost of spare parts, low speed, and more power use of tractor.

of paddy in Kerala (Jackson and Rao, 2004). The loss of labour income wa as much as Rs. 800 - 1200 per acre of wheat harvested (table 7.45).

However, farmers consider that the use of combine helps them not only in saving the labour cost but also helps them in saving food and other entertainment cost (especially tea and smoking) incurred on them while they hire them. Farmers felt that the loss of fodder is another issue but looking to the current occupational change, farmers are shifting from less remunerative crops to more commercial crops and reducing dependence on dairy, they prefer use of combine instead of labour hiring. The government support to labors through providing direct and indirect financial help in form of various subsidies for food, shelter and employment, and rapid industrialization have left the agricultural wage labour work less remunerative and attractive and hence it has created labour shortage for the agriculture.

The usual practice for farmers is to custom hire the combines which costs Rs 600-650 per acre. If straw reapers are used, it costs another Rs 500 per trolley. At 1.5 trolleys per acre, it comes to Rs 750. A combine can harvest, thresh and clean the wheat crop of an acre within 45 minutes. The left-over stalks can be separately recovered using a straw reaper, which again covers an acre within an hour.

Before combines came into vogue, farmers manually harvested their crop using sickles. This was both costly and time-consuming. In sickle harvesting, five men are required from early morning to late night to cover an acre. If they are migrants, they have to be given Rs 1,200-1,300. In case of local labourers, the demand is 130 kg. of wheat plus 100 kg of straw. On top of this, power-threshing takes up 3.5-4 hours an acre, costing another Rs 900-1,000 (HBL, 2007).

Table 7.45: State-wise distribution of combine owners by labour replacement by combine

Loss of labour income (Rs./acre)	Gujarat		Maharashtra	
	No of farmers	% of farmers	No of farmers	% of farmers
800-1000	1	14.3	5	55.6
1001-1200	1	14.3	2	22.2
1601-1800	0	0.0	1	11.1
1801-2000	1	14.3	0	0.0
No response	4	57.0	1	11.1
Total	7	100.0	9	100.0

For details of combine maintenance and operational costs, see tables in appendix 7.2.

In sum, the combine owners were large land holders in Gujarat with average size of operations holding being 23 acres and owned holding being 19 acres compared with 14 and 9 acres in Maharashtra and 15 and 13 acres in Punjab. In Gujarat, no combine owner was smallholder or even medium holder (<10 acres) while in Maharashtra and Punjab there were some small, medium land holder and even landless persons in Maharshtra had combines.

In Maharashtra, both types of combines were equally preferred [TD:SP = 55:45]. Punjab and Gujarat had huge majority of tractor driven combines over self propelled. Reasons for preferring a **s**elf Propelled combine included high work efficiency, followed by multi crop use, low maintenance and long life. This version was mostly preferred by large farmers for whom efficiency of farm operations was essential to reap economies of scale. On the other hand, tractor driven was driven by tractor's use in other field operations. It was, therefore, logically preferred by farmers with low land holdings. Other important factors were low price, low fuel and labour cost and suitable for less land area required for harvesting. 70% of the farmers in Gujarat and 80% of the farmers in Punjab used combines of a capacity of 50-60 HP. This ratio does not hold for Maharashtra where almost 45% of the farmers use combines of capacity 105-110 HP. The capacity of combines was higher in Maharashtra due to predominant use of these machines for custom hiring there.

In Punjab, popular brand image played a very important role in the purchase decision with 100% farmers factoring this in their purchase decision. Goodwill, experience of other farmers and resale value came next with almost the same proportion of farmers giving importance to each of these factors (around 20%). On the other hand, in Gujarat, dealer advice (57.2%) and popular brand image (42.9%) influenced the purchase decision of a majority of farmers. Maharashtra farmers went by popular brand image (33.3%) and good experience of other farmers (44.4%), though other factors also had an influence in case of 77.7% farmers. Other factors included affordable price, clearance, low maintenance, power steering, high work efficiency, local dealer, easy availability of spare parts, relationships with company, easy for use/driving, fine cutter, pressure of relatives, and dealing.

Apart from Maharashtra, where economic consideration was the major reason to buy a combine, the prime reason was farming in Gujarat and Punjab. This might be due to the high land and labour costs in Maharashtra as compared to Gujarat and Punjab. Brand name and low repair and maintenance cost formed the major chunk of decision making in Gujarat and Maharashtra. However, in Punjab, the prime considerations were cleaning and the material of the combine. Some other factors considered were work efficiency, easy to operate, power steering, engineering and technology, low fuel consumption, multi crop use, low man power requirements, no crack, long life, shafts, cross, facilities, combine barma, roller, quality of parts, belt, bearing, should be all material of one company, heavy, and resale value**.**

Annually, combine was used for 41-55 days in general by one-third of owners, 26-40 hours by 16% farmers and 56-70 hours by 19% farmers. It was used for higher number of days (>70 days by 88% owners) in Maharashtra due to custom hiring practice and lesser number of combines in the region so far. Hiring of combines was prevalent in Gujarat and Maharashtra. Around 45% farmers in Gujarat and 80% farmers of Maharashtra hired out combines for more than 90% of their usage.

Appendix 7.1

Table 7.35: State-wise distribution of combine owners by season wise use of Combines

Uses in hours Particular	No use	≤ 100	101-200	201-300	301-400	401-500	501-600	601-700	701-800	> 1000	Total
Gujarat-Kharif											
No of farmers	4	1	1	1							7 (70)
% farmers	57.1	14.3	14.3	14.3							
Rabi											
No of farmers			1	2		4					7 (357)
% farmers			14.3	28.6		57.1					
Summer											
No of farmers	6									1	7 (179)
% farmers	85.7									14.3	
Maharashtra-Kharif											
No of farmers		1	3	3	1	1					9 (247)
% farmers		11.1	33.3	33.3	11.1	11.1					
Rabi											
No of farmers				2	2	1		1	2	1	9 (564)
% farmers				22.2	22.2	11.1		11.1	22.2	11.1	
Summer											
No of farmers	8			1							9 (33)
% farmers	88.9			11.1							
Punjab-Kharif											
No of farmers			4	13	4	3	2				26 (309)
% farmers			15.4	50.0	15.4	11.5	7.7				
Rabi											
No of farmers			6	13	5	1				1	26 (335)
% farmers			23.1	50.0	19.2	3.8				3.8	

Note: Figures in brackets indicate average hours of combine use in respective season.

Table 7.36: State-wise distribution of combine owners by annual use of combines

Uses in hours / Particular	100-200	201-300	301-400	401-500	501-600	601-700	701-800	801-1000	1001-1200	1201-1400	> 1400	Total
Gujarat												
No of farmers	1			5							1 (1750)	7 (606)
% farmers	14.3			71.4							14.3	
Maharashtra												
No of farmers			1	2	1				4		1 (1500)	9 (844)
% farmers			11.1	22.2	11.1				44.4		11.1	
Punjab												
No of farmers			3	6	7	5	4				1 (2520)	26 (644)
% farmers			11.5	23.1	26.9	19.2	15.4				3.8	
All												
No of farmers	1		4	13	8	5	4		4		3	42
% farmers	2.4		9.5	31.0	19.0	11.9	9.5		9.5		7.1	

Note: Figures in brackets indicate average hours of combine use.

Table 7.37: State-wise distribution of combine owners by use of combine in different crops

Use in % time Particulars	Crops	No response	No use	Up to 10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	Total
Gujarat	**Wheat**													
No of farmers		4								1		1	1	7
% of farmers		57.1								14.3		14.3	14.3	
Maharashtra														
No of farmers								2	2	4	1			9
% of farmers								22.2	22.2	44.4	11.1			
Gujarat	**Paddy**													
No of farmers		4	2		1									7
% of farmers		57.1	28.6		14.3									
Maharashtra														
No of farmers			7		1	1								9
% of farmers			77.8		11.1	11.1								
Gujarat	**Soyabean**													
No of farmers		4	2		1									7
% of farmers		57.1	28.6		14.3									
Maharashtra														
No of farmers					1	6	2							9
% of farmers					11.1	66.7	22.2							
Gujarat	**Other crops**													
No of farmers		4	2		1									7
% of farmers		57.1	28.6		14.3									
Maharashtra														
No of farmers			5	3	1									9
% of farmers			55.6	33.3	11.1									

Table 7.38: State-wise distribution of combine owners by per day use of combine

Per day use (hrs/day)	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
4.0-6.0	0	0.0	2	22.2	0	0.0	2	4.8
6.01-8.0	2	28.6	2	22.2	0	0.0	4	9.5
8.01-10.0	0	0.0	2	22.2	8	30.8	10	23.8
10.1-12.0	5	71.4	0	0.0	10	38.5	15	35.7
12.1-14.0	0	0.0	3	33.3	6	23.1	9	21.4
>14.0	0	0.0	0	0.0	2	7.7	2	4.8
Total	7	100.0	9	100.0	26	100.0	42	100.0

Table 7.39: State-wise distribution of combine owners by number of days combines used in an year

Combine use (days)	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Up to 25	1	14.3	0	0.0	1	3.8	2	4.8
26-40	2	28.6	0	0.0	5	19.2	7	16.7
41-55	1	14.3	0	0.0	13	50.0	14	33.3
56-70	2	28.6	1	11.1	5	19.2	8	19.0
71-85	0	0.0	3	33.3	1	3.8	4	9.5
86-100	0	0.0	2	22.2	0	0.0	2	4.8
101-125	0	0.0	3	33.3	0	0.0	3	7.1
126-150	1	14.3	0	0.0	1	3.8	2	4.8
Total	7	100.0	9	100.0	26	100.0	42	100.0

Table 7.40: State-wise distribution of combine owners by use of combine on own farm

Use in %	Gujarat		Maharashtra	
	No of farmers	% of farmers	No of farmers	% of farmers
No use	0	0.0	3	33.3
< 5	2	28.6	3	33.3
6-10	1	14.3	2	22.2
11-20	0	0.0	0	0.0
21-30	0	0.0	1	11.1
No response	4	57.1	0	0.0
Total	0	0.0	3	33.3

Table 7.41: State-wise distribution of combine owners by custom hiring of combines

Use in %	Gujarat		Maharashtra	
	No of farmers	% of farmers	No of farmers	% of farmers
70-80	0	0.0	1	11.1
81-90	0	0.0	1	11.1
91-95	1	14.3	1	11.1
> 95	2	28.6	6	66.7
No response	4	57.1	0	0.0
Total	7	100.0	9	100.0

Table 7.42: State-wise distribution of combine owners by places of combine hiring

Places	Gujarat		Maharashtra	
	No of farmers	% of farmers	No of farmers	% of farmers
Gujarat (Surat)	1	14.3	0	
Maharashtra (Nandurbar)	0	0	5	55.6
Maharashtra and Andhra Pradesh	0	0	1	11.1
Gujarat and Maharashtra	2	28.6	3	33.3
No response	4	57.1	0	0.0
Total	7	100.0	9	100.0

Table 7.43: State-wise distribution of combine owners by percentage of custom hiring inside and outside the home state

Use in % time	Inside the home state					Outside the home state					
Particulars	Up to 25	26-50	51-75	76-100	Total	No use	Up to 25	26-50	51-75	76-100	Total
Gujarat											
No of farmers		2		5	7	5		1	1		7
% of farmers		28.6		71.4		71.4		14.3	14.3		
Maharashtra											
No of farmers		1	1	7	9	5	2	1	1		9
% of farmers		11.1	11.1	77.8		55.6	22.2	11.1	11.1		
Punjab											
No of farmers				26	26	24	2				26
% of farmers				100.0		92.3	7.7				
All											
No of farmers		3	1	38	42	34	4	2	2		42
% of farmers		7.1	2.4	90.5		81.0	9.5	4.8	4.8		

Table 7.44: State-wise distribution of combine owners by crop wise per acre rental income (charge) of combine in 2006

Per acre rental charges (Rs.)	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Wheat								
300	4	57.1	0	0.0	0	0.0	4	9.5
350	0	0.0	1	11.1	0	0.0	1	2.4
400	0	0.0	0	0.0	1	3.8	1	2.4
450	0	0.0	1	11.1	7	26.9	8	19.0
500	1	14.3	5	55.6	15	57.7	21	50.0
550	0	0.0	2	22.2	3	11.5	5	11.9
600	2	28.6	0	0.0	0	0.0	2	4.8
Total	7	100.0	9	100.0	26	100.0	42	100.0
Paddy								
No paddy harvesting	2	28.6	8	88.9	0	0.0	10	23.8
400	0	0.0	0	0.0	4	15.4	4	9.5
450	4	57.1	1	11.1	16	61.5	21	50.0
500	1	14.3	0	0.0	6	23.1	7	16.7
Total	7	100.0	9	100.0	26	100.0	42	100.0
Other crops*								
No harvesting of other crops	6	85.7	5	55.6	26	100.0	37	88.1
500	0	0.0	3	33.3	0	0.0	3	7.1
700	1	14.3	0	0.0	0	0.0	1	2.4
500-850	0	0.0	1	11.1	0	0.0	1	2.4
Total	7	100.0	9	100.0	26	100.0	42	100.0

* Other crops include Bajri, Mung, Soyabean, Maize, Karadi, Sunflower, and Tur (pigeon pea)

Appendix 7.2

Table 7.46: State-wise distribution of combine owners by adequate work for combine

Getting enough work	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Yes	1	14.3	4	44.4	0	0.0	5	11.9
No*	0	0.0	5	55.6	26	100.0	31	73.8
Subject to crop pattern	1	14.3	0	0.0	0	0.0	1	2.4
Expected to get enough work	1	14.3	0	0.0	0	0.0	1	2.4
No response	4	57.1	0	0.0	0	0.0	4	9.5
Total	7	100.0	9	100.0	26	100.0	42	100.0

*Combine owners in Maharashtra did not get enough work because of market competition.

Table 7.47: State-wise distribution of combine owners by seasonal repair cost of combine

Repair cost (Rs.)	Gujarat		Maharashtra		Punjab	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Kharif						
None	0	0	1	11.1	0	0
6,000-10,000	0	0	3	33.3	0	0
11,000-15,000	0	0	4	44.4	0	0
16,000-20,000	0	0	1	11.1	0	0
Total	0	0	9	100.0	0	0
Rabi						
11,000-15,000	0	0	3	33.3	0	0
16,000-20,000	0	0	2	22.2	0	0
21,000-25,000	0	0	1	11.1	0	0
30,000-35,000	0	0	2	22.2	0	0
55,000	0	0	1	11.1	0	0
Total	0	0	9	100.0	0	0
Seasonal (Kharif /Rabi)						
None	4	57.1	0	0	0	0.0
≤ 5,000	0	0.0	0	0	4	15.4
6,000-10,000	0	0.0	0	0	8	30.8
11,000-15,000	1	14.3	0	0	8	30.8
16,000-20,000	1	14.3	0	0	4	15.4
20,000-25,000	1	14.3	0	0	2	7.7
Total	7	100.0	0	0	26	100.0

Table 7.48: State-wise distribution of combine owners by annual repair cost of combine

Repair cost (Rs.)	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
None	4	57.1	0	0.0	0	0.0	4	9.5
≤ 10,000	0	0.0	0	0.0	3	11.5	3	7.1
11,000-20,000	0	0.0	0	0.0	8	30.8	8	19.0
21,000-30,000	0	0.0	4	44.4	9	34.6	13	31.0
31,000-40,000	0	0.0	2	22.2	4	15.4	6	14.3
40,000-50,000	0	0.0	2	22.2	2	7.7	4	9.5
51,000-60,000	0	0.0	1	11.1	0	0.0	1	2.4
100,000	1	14.3	0	0.0	0	0.0	1	2.4
No response	2	28.6	0	0.0	0	0.0	2	4.8
Total	7	100.0	9	100.0	26	100.0	42	100.0

Table 7.49: State-wise distribution of combine owners by major cost of combine operation (Fuel cost)

Rs in Lakh	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
0.26-0.50	0	0.0	0	0.0	14	53.8	14	33.3
0.51-0.75	1	14.3	0	0.0	10	38.5	11	26.2
0.76-1.0	1	14.3	1	11.1	2	7.7	4	9.5
1.01-1.50	4	57.1	4	44.4	0	0.0	8	19.0
1.51-2.00	0	0.0	1	11.1	0	0.0	1	2.4
2.01-2.50	0	0.0	1	11.1	0	0.0	1	2.4
2.51-3.00	0	0.0	2	22.2	0	0.0	2	4.8
3.51-4.00	1	14.3	0	0.0	0	0.0	1	2.4
Total	7	100.0	9	100.0	26	100.0	42	100.0

Table 7.50: State-wise distribution of combine owners by major cost of operation (Repair and maintenance cost)

R&M cost Thousand Rs.	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Up to 10	1	14.3	0	0.0	12	46.2	13	31.0
11-20	0	0.0	0	0.0	12	46.2	12	28.6
21-30	1	14.3	4	44.4	2	7.7	7	16.7
31-40	1	14.3	2	22.2	0	0.0	3	7.1
41-50	0	0.0	2	22.2	0	0.0	2	4.8
50-100	1	14.3	1	11.1	0	0.0	2	4.8
No response	3	42.9	0	0.0	0	0.0	3	7.1
Total	7	100.0	9	100.0	26	100.0	42	100.0

Table 7.51: State-wise distribution of combine owners by annual operating cost of combine

Operating cost Rs. 000	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Up to 10	3	42.9	0	0.0	4	15.4	7	16.7
11-20	2	28.6	0	0.0	13	50.0	15	35.7
21-30	1	14.3	0	0.0	0	0.0	1	2.4
31-40	0	0.0	0	0.0	0	0.0	0	0.0
41-50	0	0.0	0	0.0	1	3.8	1	2.4
51-75	0	0.0	2	22.2	0	0.0	2	4.8
76-100	0	0.0	3	33.3	0	0.0	3	7.1
101-150	1	14.3	3	33.3	0	0.0	4	9.5
151-200	0	0.0	1	11.1	0	0.0	1	2.4
No cost	0	0.0	0	0.0	8	30.8	8	19.0
Total	7	100.0	9	100.0	26	100.0	42	100.0

Table 7.52: State-wise distribution of combine owners by depreciation cost of combine

Depreciation Rs. lakh	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
Up to 0.25	0	0.0	2	22.2	3	11.5	5	11.9
0.26-0.50	0	0.0	0	0.0	9	34.6	9	21.4
0.51-0.75	0	0.0	1	11.1	3	11.5	4	9.5
0.76-1.0	0	0.0	0	0.0	6	23.1	6	14.3
1.01-1.50	1	14.3	3	33.3	1	3.8	5	11.9
1.51-2.00	1	14.3	2	22.2	1	3.8	4	9.5
2.01-2.50	0	0.0	0	0.0	0	0.0	0	0.0
2.51-3.00	0	0.0	0	0.0	1	3.8	1	2.4
No response	5	71.4	1	11.1	2	7.7	8	19.0
Total	7	100.0	9	100.0	26	100.0	42	100.0

Table 7.53: Insurance cost of combine in Maharashtra

Insurance premium (Rs.000)	No of farmers	% of farmers
Up to 5	4	44.4
6-10	1	11.1
11-15	3	33.3
30	1	11.1
Total	9	100.0

Table 7.54: State-wise distribution of combine owners by major problems farmers face in combine operation

Reasons	Gujarat		Maharashtra		Punjab		All	
	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers	No of farmers	% of farmers
No problem	1	14.3	3	33.3	19	73.1	23	54.8
Non-availability of spare parts	0	0.0	3	33.3	1	3.8	4	9.5
Higher repair cost	0	0.0	0	0.0	2	7.7	2	4.8
Poor quality of spare parts.	0	0.0	0	0.0	2	7.7	2	4.8
Poor after sales service	0	0.0	1	11.1	0	0.0	1	2.4
Operating problem (gear and centre pin)	1	14.3	0	0.0	0	0.0	1	2.4
frequent breakdown of different parts	1	14.3	0	0.0	0	0.0	1	2.4
Others*	0	0.0	0	0.0	1	3.8	1	2.4
Low fuel efficiency and operating problems	1	14.3	0	0.0	0	0.0	1	2.4
Low fuel efficiency and frequent breakdown of different parts	1	14.3	0	0.0	0	0.0	1	2.4
Low fuel efficiency and others	1	14.3	0	0.0	0	0.0	1	2.4
High fuel consumption and frequent breakdown of different parts	1	14.3	0	0.0	0	0.0	1	2.4
Poor quality of spare parts and non-availability of spare parts	0	0.0	0	0.0	0	0.0	1	2.4
Poor after sales service, non-availability of spare parts and others	0	0.0	1	11.1	0	0.0	1	2.4
Non-availability of spare parts and others	0	0.0	1	11.1	0	0.0	1	2.4
Total	7	100.0	9	100.0	26	100.0	42	100.0

*others include more load on engine, high cost of spare parts, low speed, and more power use of tractor

Chapter 8

Marketing of MIS Equipment in India: Case Studies from Gujarat

Introduction

The marketing of micro irrigations equipment in India where 60% cropped area is rainfed is a mystery as despite shortage of water and crucial role of irrigation in farm livelihoods, farmers are reluctant to adopt micro irrigation technology. It is in this context that the chapter examines the case of promotion by a state agency and marketing by private companies in the state of Gujarat as one where public and private sectors attempt to promote the market for micro irrigation equipment.

8.1 Promoting micro-irrigation- Case of Gujarat Green Revolution Company Ltd. (GGRCL)

Precursor

Chief Minister of Gujarat announced formation of GGRCL, on 13.01.2005 during closing ceremony of vibrant Gujarat 2005. GGRCL was established on the basis of a GR No. PRCH-102005-497-N dated 09.05.2005 circulated by the state government in 2005. GSFC had a registered company engaged in agricultural processing since 1991 which later became defunct and was revived on the name of GGRCL. The company is governed by the state irrigation department "Narmada water supply and water resources development and Kalpsar department". All GGRCL policies and functions are monitored and guided by concerned government departments, GSFC, GNFC, and GAIC. These three GSFC, GNFC and GAIC have equity share in a ratio of 45:45:10. Nevertheless, GSFC management sees GGRCL as an added burden on GSFC. GGRCL has a vision to provide professional services on MIS coupled with required equipments and essential agro-inputs to the farmers of Gujarat, either outsourced or self produced to bring 2nd green revolution in consonance with the agricultural policy of Gujarat vision 2010 so as to save water and energy, besides multiple benefits to improve agricultural productivity and farmers' prosperity at large.

The state government has deployed managerial staff and higher cadre officers from various government departments on deputation. The field staff is recruited on contractual assignment and hence the company does not have any personnel liabilities (table 8.1).

Table 8.1: Staff position of GGRCL

Position	Numbers
MD	01
Marketing managers, (one each in agriculture, technical and marketing)	03
Staff members, of which 17 are posted in the field across the state.	42
Joint Chief Executive Officer	01
OSD (officer on special duty)	01

Source: GGRCL, Baroda

8.1.1 Financial assistance and subsidy

The state government has allocated Rs. 1500 crore for the company to promote MIS on a large scale within stipulated time period by following target based approach. Annual budget of the GGRCL is Rs. 180 crore. However, Rs. 165 crore is central allocation and matching amount has to be allocated by the state government and together it will become 330 crore and equal amount would be contributed by participating farmers totaling Rs 660 crore.

Central government has floated several subsidy schemes for MIS under various programmes sponsored by different government departments. All subsidies available under various departmental schemes before formation of GGRCL are now clubbed together and a uniform package of subsidy is declared for all farmers irrespective of their farm size, caste, class, gender or any other categories to ease the complexities involved in availing the subsidy. Overall, central government share of subsidy would be approximately 40% in a unit cost of MIS and the rest 10% is contributed by the state government and 50% by participating farmers. Over all share of central v/s state government subsidy works out to be 42% v/s 58%.

On line drip, inline drip, impact sprinkler and porous pipe MIS systems are approved by GoG for subsidy purpose under GGRCL. Impact sprinkler is a mini form of sprinkler. Besides these MIS systems, conventional drip, and pop-up sprinkler – for landscaping and ornamental cultivation – are approved for subsidy. Sprinklers heads are getting converted from metal to plastics. An average cost of a sprinkler system is Rs. 19,000 per ha and for a drip system is up to Rs. 125,000 per ha.

MIS package

The package of MIS includes MIS system of buyer's choice, insurance of MIS and its buyer (equal to MIS cost except natural death) as well, and after sale services such as agronomical, system maintenance and fertigation. GGRCL has fixed up per ha unit cost of MIS. The unit cost of MIS includes equipment cost, 5 % transportation charges, installation charges, 5% management fees, insurance premium for the next 5 years and cost of after sale services which comes to Rs. 1250 per hectare and all other taxes applicable in the area of MIS installation. GGRCL has entered into an agreement with New India Assurance Co. Ltd. with regards to insurance coverage.

8.1.2 GGRCL Modus Operandi

GGRCL undertook a pilot experiment in 30 hectares land involving 56 farmers near Padra of Vadodara district and in Palanpur Taluka of Banaskantha District. Based on the experience gained from the pilot project, a standard business modality has been established to implement the project statewide. Stepwise procedure of MIS application and sanction to avail subsidy is thoroughly described hereunder.

1. Application forms
2. Scrutinization & registration of application by GGRCL
3. Approval of cost & design and issuance of work order for MIS installation
4. Laying down of MIS on farmers' fields
5. Third party inspection and submission of bills by MIS supplier
6. Third party inspection
7. Insurance coverage
8. Payment
9. Payment (Agronomical charges)

Application forms are available from GSFC/GNFC field Offices, GGRCL website, District/Taluka Agil. Officer, Banks, GWRDC offices, SSNNL and GAIC offices, and network of MIS suppliers. Loanee farmers submit the filled up application form to the bank for NOC and loan sanction and banks send it to GGRCL while non loanee farmers directly sent it to GGRCL for registration. After registration GGRCL direct MIS suppliers to initiate the process of soil and water testing, survey and designing and preparing cost estimate. MIS suppliers prepare techno-economic report and take farmers consent on cost and design. Thereafter, work order is issued to MIS supplier for the installation. Third party agreement takes place among farmer, GSFC depot and MIS supplier. Collection of 5 % of MIS cost as

management charges from farmers and difference amount from farmers in case of non loanee applicant. It is followed by laying down of system by MIS supplier which is followed by third party inspection and MIS insurance and JPA insurance of equal cost to MIS. Third party inspection includes physical verification including visual / dimension check of all items received at various farmers site as per IS specifications for installation of MIS on farmers' fields, verification of actual quantity of various items and accessories used for installation of MIS at farmers' fields compared to approved design and estimate by the farmers and GGRCL, verification of trial run and above activities are taken simultaneously. MIS supplier then submit the bills to GGRCL with supporting documents such as farmers acknowledgement, third party inspection report and two copies of subsidy claim form. GGRCL releases 25 % of MIS cost estimate to MIS supplier as an advance on approval of GGRCL against Performa invoice, and 75 % final payment against bill of MIS and on approval by GGRCL. Subsidy - 50% of the cost or Rs 50,000/ha whichever is less - is transferred along with bills of MIS Supplier. 60 % of the agronomical charges are paid after 7 months on approval by GGRCL and the rest 40 % are paid after 14 months to MIS supplier. Banks release payment to loanee farmers and GGRCL release payments to non loanee farmers.

8.1.3 Promotion

GGRCL is relying on networking to promote MIS. It takes help of key government institutions and their officials such as Panchayats, DDOs, Collectors, and other district authorities because of their well established infrastructural and logistical facilities. Apart from these government institutions, it also takes help of GSFC and GNFC depots spread over the entire state. GGRCL wants to get support from NGOs and it approached some selected NGOs such as AKRSP (I), Ambuja Cement Foundation (ACF), Kachchh Navnirman, etc. However, GGRCL experienced interest clash between NGOs and GGRCL and hence it could not get their support. GGRCL experienced that working with more numbers of government departments creates more problems. GGRCL is taking help of media in advertising and promoting MIS. Radio, TV, Exhibitions, Fairs, wall paintings, tractor painting, MIS suppliers are major media of communication to promote MIS. GGRCL has established collaboration with state agricultural universities and Krushi Vigyan Kendras (KVKs) for establishing MIS demonstration farms.

Farmers' financial liquidity crunch is a major problem in MIS promotion. Besides, higher Bank interest, cumbersome bank procedure, delay tactics of bank officials, hypothecation and mortgaging of assets are major problems. As per the RBI norms, no margin money is required to avail the bank finance up to an amount of rupees 50,000. However, Banks do not comply with this norm and insist collateral and security money from all categories of farmers who seek bank finance.

Fig 8.1: Flow Chart for Installation of MIS

Self finance (non-Loanee)

Submission of design and cost estimation by the supplier & release of Work Order (4 days)

↓

Tri-party agreement (TPA), Collection of Management Charge/Difference Amount, Submission of Performa Invoice for advance payment (5 days)

↓

Payment of Advance by GGRCL (4 days)

↓

Installation & trial run of MIS, Issuance of Insurance Certificate, Submission of Final Bill (15 days)

↓

Payment of Balance Amount by GGRCL (4 days)

↓

Total Cycle period is 32 days for self finance case.

Bank Finance (Loanee)

Submission of design and cost estimation by the supplier & release of Work Order (4 days)

↓

Tri-party agreement (TPA), Collection of Management Charge/Difference Amount, Submission of Performa Invoice for advance payment (4 days)

↓

Payment of Advance by Bank (10 days)

↓

Installation & trial run of MIS, Issuance of Insurance Certificate, Submission of Final Bill (15 days)

↓

Payment of Balance Amount by Bank (10 days)

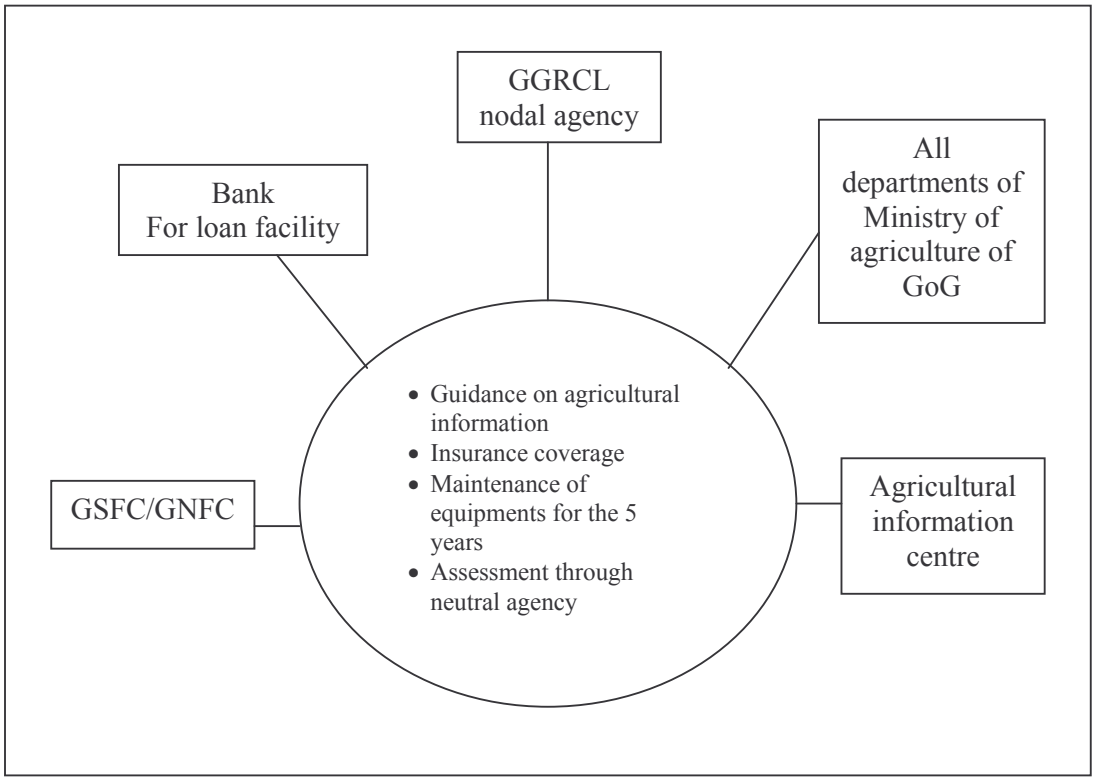
↓

Total Cycle period is 43 days in case of Bank finance by Applicant/Farmer

GGRCL does not interfere in bank operation but its officials continuously interact with bank officials to speed up the finance process and to make the bank procedure easy and smooth going. In the context, GGRCL organizes quarterly meeting with bank officials of concerned lead banks. GGRCL observed that Sabarkantha district cooperative bank has developed a good approach and working modality to finance MIS farmers.

Among all sugar cooperatives, Kodinar sugar cooperative has declared an incentive scheme of Rs 50 per tonnes of sugarcane production to promote MIS as it is water intensive crop. However, in a major belt of sugarcane i.e. south Gujarat, no sugar cooperative is coming forward to extend its support to promote MIS in sugarcane because of higher level of political interference.

Fig 8.2: Network of Agencies for MI promotion in Gujarat



Source: GGRCL, Baroda.

Farmer focused scheme

GGRCL once offered MIS winding machine worth Rs. 7,200 to farmers who purchased MIS for minimum 5 hectares of land at a time. In the last year, GGRC declared off season incentive scheme @ Rs. 500 per ha, especially in management charges for farmers.

8.1.4 Registration of MIS companies and quality control of MIS products

It takes registration fees of Rs. 100,000 from MIS companies. Till today, GGRCL has 26 registered MIS companies and the registration process of another 5 companies is under progress. Flexibility and transparency are the beauty of the GGRCL. It has appointed independent inspection authority (multimedia and SGS) for third party inspection of MIS installation work carried out by registered MIS companies. The third party inspection involves physical verification of MIS components, parts and material as per IS specifications with compared to the approved design and estimate and verification of trial run.

GGRCL has also appointed GIRDC, CIPE&T and GERI for technical inspection of factory units of registered MIS companies. Registered companies have to comply with and meet ISI standards in manufacturing MIS equipments. The independent technical team from appointed agencies regularly visits manufacturing units of the registered companies at six months interval to oversee and inspect manufacturing process. It has also appointed Agricultural Finance Corporation (AFC) for economic analysis of MIS and has appointed two NGOs (Viksat and Prakruti in Gujarat) to study socioeconomic impact of MIS.

8.1.5 MIS coverage under the project

Subsurface drip system is not accepted in Gujarat because of smaller land size and crop diversity problems. But above surface drip system is more popular in Gujarat. Farm size, crop pattern and financial liquidity are major influencing factors in selection of MIS. Among the total area covered under the GGRCL promoted MIS in 2006-07, 67 % land area was under drip system and 33 % land area was under sprinkler system. Sprinkler system is more suitable for Groundnut, wheat, mustard, and pulses. Drip system is more suitable for the area experiencing water shortage and also for potato, cotton, banana and all horticultural crops. Acceptance of MIS is higher in resource crunch areas. However, economic affordability is also a major issue in resource crunch areas such as Dang, Dahod, Panchmahal, Narmada, and Bharuch in increasing acceptance of MIS. Pockets like S. K., B. K. and Junagadh have intensive area under MIS. Pockets like Dehgam (S.K.) and Navagam Nayka (Kheda), and Mandvi (Kachchh) have large area under drip system. GGRCL has two types of farmers, loanee and non loanee farmers. Out of total MIS cases in 2006-07, 33 % were loanee cases and 67 % were non loanee cases.

Table 8.2: **Major pockets covered under MIS in Gujarat, 2006-07**

Major pockets	Drip (Land in ha)	Sprinklers (Land in ha)
Sabarkantha (S.K.)	2626	NA
Kachchh	2186	NA
Banaskantha (B.K.)	1733	626

Source: GGRCL, Baroda, Gujarat

MIS was formally introduced in 1991 in Gujarat. Since then 25,000 ha land was brought under MIS until GGRCL intervention. Approximately, 27,000 ha land area (12,000 ha in the first year and 15,000 ha in the second year) is additionally brought under MIS across the state so far within two years of GGRCL establishment. GGRCL MD had an opinion that one can monitor and check physical presence of installed MIS in the field after GGRCL intervention, but it was very difficult to monitor and physically check installed MIS in the field prior to GGRCL. GoG target is to cover 100,000 ha per year under MIS. However, because of limited human power resources and other limited resources, GGRCL finds it very difficult and challenging to achieve the set target. GGRCL employees observed the growth of the GGRCL as follows:

First year – awareness building by concept selling and clearing doubts of farmers
Second year – confidence building
Third year - active promotion of MIS

Rising cost of electricity and increasing power shortage (electricity) for agriculture are major factors that would determine future growth of MIS in the state.

8.2 MIS equipment companies

8.2. 1. Jain Irrigation

Company profile:

Jain Irrigation Systems Ltd., based at Jalgaon, is a manufacturer of Drip and Sprinkler Irrigation Systems and Components, PVC, Polyethylene (HDPE, MDPE) & Polypropylene Piping Systems, Plastic Sheets (PVC & PC sheets), Dehydrated Onions and Vegetables, Processed Fruits, Tissue Culture, Hybrid & Grafted Plants, Greenhouses, Poly and Shade

Houses, Bio-fertilizers, Solar Water Heating Systems and Solar Photovoltaic Appliances (Solar lighting systems). The company was established in 1982. It is a public limited company. Beginning in 1989, it toiled and struggled to pioneer water-management through Micro Irrigation in India. It is the world's second largest MIS equipment manufacturing industry after Naan of USA which is a world leader. It is also into food processing and contract farming of onion, other vegetables and fruits since 1994. It has employee strength of 3000 (JISL, 2004). Today with over 7000 committed employees strength worldwide, it has established its leadership in diverse products like Micro & Sprinkler Irrigation, Agricultural Inputs, Agro-Processed Products, Plastic Pipes & Sheets. Out of the total staff, 4000 employees are devoted for agricultural activities with 300 technical personnel.

Product profile

It manufactures 98 % PVC products of MIS and the rest 2 %, especially iron bolts and nuts are bought from domestic market. It has collaboration with bolts and nuts manufacturing units in India. It also has about 25 to 30 registered suppliers of bolts and nuts. The company design appropriate modern MIS considering soil, crop and climate relationship and water requirements. It is manufacturing only ISI products of very high quality. All divisions of the company are ISO-9001-2001 accredited by RWTUV, Germany. Irrigation, Plastic Piping & Plastic Sheet divisions are ISO-9001:2001 & ISO-14001:2004 accredited by RWTUV, Germany. The company's main manufacturing plant is located at Jalgaon in Maharashtra. It also has other manufacturing plants located at AP, Karnataka, Coimbatore and MP and is planning to install a new plant in Gujarat. The plant at MP is not functioning. It is annually processing over 1,00,000 MT of different polymers. The company keeps stock of their MIS products at manufacturing plants, depots and dealers' place and assembles them at farms. The processing capacity of MIS products and their processes are described in successive paragraphs.

Drip irrigation – capacity and process

Production capacity: 16644 M.T. Extrusion (on-line and in-line)
2640 M.T. Moulded parts
Extrusion lines: 16
Injection moulding machine: 32
Polymer processed: LDPE, LLDPE, HDPE, MDPE, PPCP, ABS, POM, PVC, NYLON

Process

On-line: LLDPE extruded using co-extrusion processes for multilayer polytube. Second extruder used for making yellow colour twin stripes as its registered trademark.

In line: During extrusion Turbo in-line emitters are inserted inside the tube at pre-determined intervals.

Moulded parts: Emitters, Poly/PVC fittings, valves and various components of MIS are moulded in-house using different polymers on close looped micro-processor controlled injection moulding machines.

Filtration and fertigation equipments: Manufacture of plastic and metal screen filters, disc filters, media filters, sand separators and fertigation tanks.

Application and features

Product	Range	Standard	Application
On-line tubes (polytubes)	up to 32 mm	IS: 12786, AS2698, 1& ISO: 8779	Orchards, Tree crops
In-line tubes (Emitting pipes)	6,12,16, 20 mm	IS: 13488, ISO: 9261	Row crops, Field crops
Oval hoses	10 to 110 mm	ASAE S:435	Row crops, Field crops
Online emitters PC, NPC & Anti leak	2, 4, 8, 14, 16 & 25 lph	IS: 13487	Orchards, Tree crops
In-line Emitters PC & NPC	1.3, 1.6, 2, 2.6, 3 & 4 lph	IS: 13487	Row crops, Field crops
Jets, Sprayers, Foggers	up to 45 lph	in house	Tree crops, Field crops, Row crops Nurseries and Green houses
Mini Sprinklers	up to 110 lph	in house	Tree crops, Field crops, Row crops Nurseries and Green houses
Bubblers: PC & Adj. Flow	9 & 15 lpm	in house	Shrubs, Trees

Source: JISL, Baroda

Salient features:
Increase crop yields and saves water
Useful even for problematic terrains, soil and water
Improved pest, diseases and weed control

Effective for orchard, tree crops, agroforestry crops, field crops, vegetables, pulses, oil seeds, sugarcane, cotton and other row crops.

Sprinklers irrigation – capacity and process

Production capacity: 5256 M.T. (QRC pipes and fittings)
1000000 Nos (sprinkler nozzles)
Extrusion lines: 2
Injection moulding machines: 5
Butt-fusion welding machines: 20

Process:

HDPE granules used for extrusion of pipes and injection moulding of fittings. Metal risers and sprinklers are fixed on saddles.

Application and Features:

Product	Range	Standard	Application
Sprinklers pipes	50 to 180 mm (2.5 to 16 kg/cm^2)	IS: 14151 & IS: 4984	Sprinkler irrigation and other water conveyance uses
Impact sprinklers	25 to 43 lpm (2.5 to 6 kg/ cm$^{2)}$	IS:12232	Field crops and closely spaced low income field crops
Floppy sprinklers	300 to 950 lph (2 to 6 kg/cm$^{2)}$	in-house	Field crops & closely spaced row crops
Rainguns*	1.3 to 25 lps (2 to 7 kg/cm$^{2)}$	in-house	Field crops & closely spaced row crops, Sports field irrigation and Dust suppression
Pop-up Rotors and Sprays*	0.01 to 4.4 lps (2 to 7 kg/cm$^{2)}$	in-house	Landscapes, Golf courses and Sports field irrigation

*Part of the range, only marketing (Source: JISL, Baroda)

Salient features:

Unique, quick-connect joint design ensures positive locking and leak-proof joints

Resistant to UV Rays & Impact

Suitable for extreme site conditions

Other high tech agri products of Jain Drip irrigation system includes poly tubes, drip lines, drip tapes, drippers, spray heads and jets, poly fittings, filtration and fertigation equipments and accessories; and Jain Sprinkler irrigation system include HDPE pipes, fittings, risers, nozzles and spray-heads. It also includes products of controlled farming such as green houses, shade houses, and tunnels.

The design life of company's MIS products (drip system, sprinkler system and rain gun) is 50 years; however, from experience, average life of these products is believed to be 10 years. But company gives only 5 years warranty.

The market price of MIS products varies from product to product. It ranges from Rs. 65,000 to 1,50,000 per hectare for drip with average Rs 1 lakh, and Rs. 20,000 per hectare for traditional sprinklers. The cost of impact sprinkler varies from crop to crop. For example, it is Rs 16,000 per hectare for cotton and Rs. 85,000 per hectare for potato. The market price depends on government programmes like GGRCL and crop type.

Sales, competition and market

The annual turnover is around Rs. 700 crore, of which MIS share is Rs. 400 crore. It increased from Rs.650 crore to Rs.1400 crore over the last three year's period. The company's sale turnover increased overtime and in the last year it was increased by 40 to 50 %. Water shortages, energy squeeze, expansion of area under MIS, product range expansion, encroaching up on share of unorganized sector are major reasons for increasing turnover. Till today, it brought approximately 12,000 to 13,000 hectares of land under its MIS. Of which, the last year share was 7000 hectare in which Drip and sprinkler contributes 70% and 30 %, respectively. It has 90 - 95 % individual and 5 - 10 % institutional buyers. Among its buyers, 80 % are new system buyers and 20 % are system replacement buyers.

It has product marketing collaboration with foreign companies. Naan in USA is one among them. The share of import coming from these foreign companies is hardly less than one % in its total product sale in India. The company has about 55% market share in India & it also exports its MIS products to more than 20 countries covering all 5 continents. It has been exporting various components of Micro Irrigation System to countries in Europe, America, Africa, South East, Middle East and Far East Asia. It is leader in providing custom made irrigation systems. Out of Rs. 700 crore annual sales turnover, the export contributes Rs. 300 crore, especially MIS contributes Rs.120 crore. 'Farm-fresh' is a registered trade mark in Europe and USA and stands for GMP, QMS, QA, SPC, Food Safety, Stringent Sanitation and Hygiene and similar modern practices. ISO-9001-2000 and HACCP accredited by RWTUV, Germany, have been achieved.

Localized manufacturers are its major competitors in the market. Localized companies are selling low price products. A senior marketing manager of the company is strongly criticizing low cost Pepsi drip system because of its very short life, less efficiency and low performance. According to his views, it is one time use and throws away disposable system. Because of its poor performance it creates negative impression in farmers' mind, which ultimately negatively affects ISI MIS product business. Making finance available to farmers to buy MIS is a major problem the company faces. Besides, lack of awareness and lack of quality consciousness are other problems in selling MIS.

Distribution and promotion

The company has a country wide dealer's network of 900 dealers. In Gujarat, it has 150 dealers. The company looks for a dealer who is having good farmers' contacts, and has infrastructure to stock the products, has vehicle for mobility in fields, and is ready to pay Rs. 51,000 towards deposit. It offers credit facility to its dealers on case to case basis. It offers 8 to 10 % dealer's margin. It does not have uniform sale target for all dealers, instead it varies from place to place.

The system installed at the farmer's field is commissioned and training is imparted to the farmer, and is followed by regular after sales services. The company does not merely sell the micro irrigation system, but provide agronomic and extension support, after sales services and all technical supports for getting better crop returns. And for this, it has more than 300 technocrats, engineers, agronomists, horticulturists and regional offices, as well as trained dealers, distributors all over India and abroad.

It prepares irrigation schedules keeping in view power quality, availability as well as lean, peak and average water requirements. It design and implement comprehensive class-room as well as on-farm training courses for farm operating and managerial personnel. It arranges on-farm visits for exposures to various research experiments and trials being conducted on the corporate, contract and/or leased farms; provides agronomical and commercial support for agricultural operations from land preparation through sowing, harvesting, storage and marketing. It also assists in formation of WUAs, SHGs and CIGs.

Pamphlets, posters and folders are major print media; and farm demonstration, farmers meeting, NGOs, Cooperatives, campaigns, exhibitions and fares are major advertising media for the company. It incurs 10 % of its total sale amount on these advertising and promotional activities. The company has singed MOU with the lead bank (Dena bank), Central District cooperative bank and UTI to facilitate bank finance. Besides collecting and processing documents for bank finance on be half of farmers, it helps farmers in making available government subsidy too. GGRCL has eliminated the problem of dealing with different government departments in making government subsidy available to farmers. However, collecting numbers of documents to avail the state government subsidy and the lengthy process of farmers' MIS application sanction and approval with compare to other states is a problem. Therefore, the company's employees have to devote lots of their time behind the paper documentation and processing. For example, 6 employees out of 10 remain engaged in the documentation and processing. The company is able to mange the central government norm of covering 25 % small and marginal farmers by concentrating on specific pockets.

8. 2.2 Netafim Irrigation India Pvt. Ltd.

Company profile:

Netafim Israel had manufactured the world's first dripper in 1965 and since then it is leading the irrigation industry with the largest market share and the most advanced product range. With its operations in 112 countries, Netafim has crossed the sales turnover of 1500 crore rupees at global level. Today, Netafim manufactures more than 3.0 million drippers per day in its 11 plants located all over the world, viz. four in Israel, one each in USA, Australia, India, South Africa, Brazil, China and France. It established its business in India in 1988. Later, Netafim Irrigation India Private Ltd, the Indian subsidiary of Netafim Israel was established on September 25, 1997. It is a Private limited multinational company. At present, it has 406 employees, of which, 313 are technical personnel, 30 administration personnel, 15 managers and 48 other staff members.

Product profile

Netafim India is dealing with mainly two types of MIS products, drip system and impact sprinkler system. It is manufacturing only drip system and its major components in India. It imports filters and drippers mainly from Israel which account for 15 % of its turnover. Its

Israel plant manufactures green house products. The company's manufacturing plant is located at Manjusar, Savli Taluka of Baroda district. The plant is producing 36.5 MT emitters, 11,000 MT emitting pipes and 2200 MT poly laterals per annum. The plant is running at 80 % capacity utilization.

It is buying Arkal brand filters from Arkal industries of Israel. The company is importing entire micro sprinkler system from Israel. Brand name of both the products is Netafim. The meaning of Netafim is a drop of water and that is why the products name has been kept Netafim. Since inception of the company there is no change in the brand name. Product life of both the systems is 15 years. A drip system costs Rs. 30,000 to Rs. 180,000 per ha and a micro sprinkler system costs Rs. 25,000 to 80,000. The cost of drip and micro sprinkler systems varies from farmer to farmer depending on his/her farm size, crop pattern and source of irrigation.

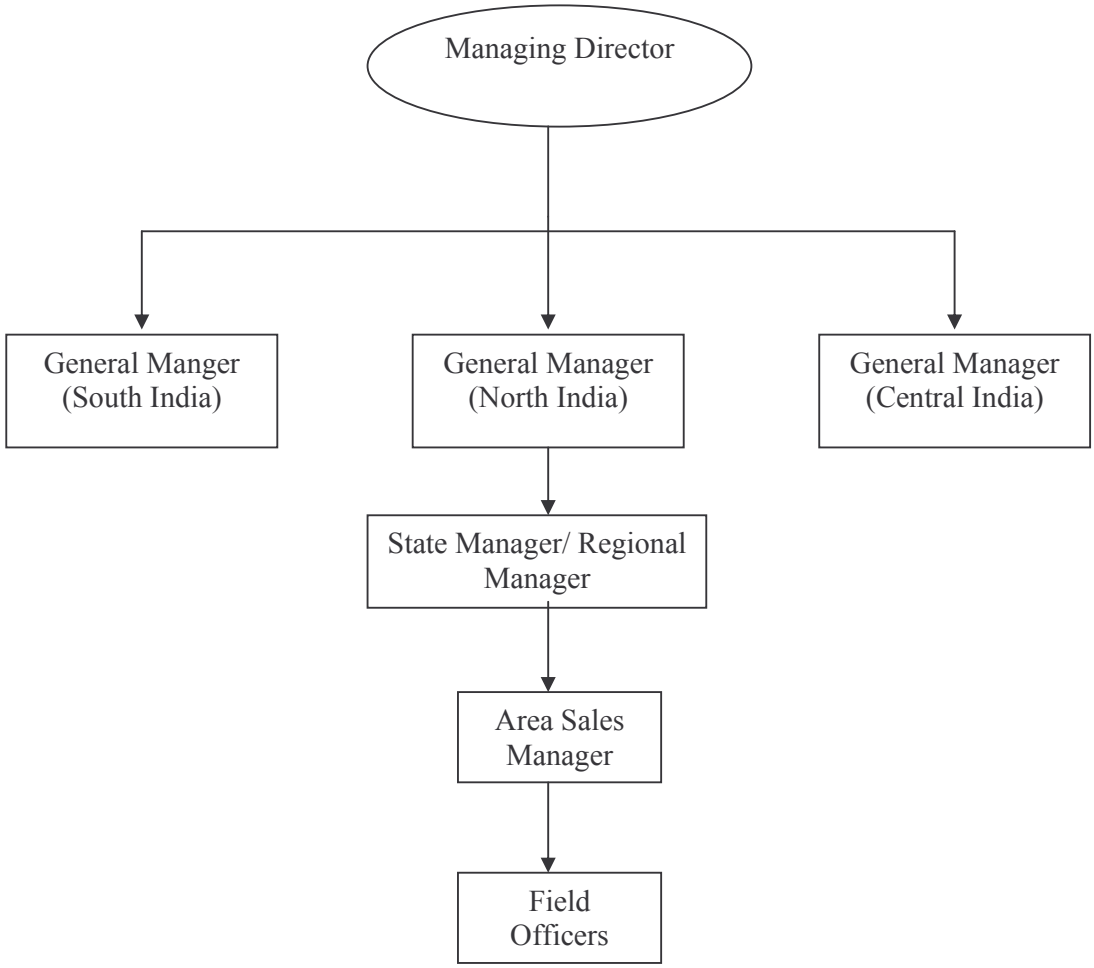
Market price of drip and micro sprinkler systems is determined based on production cost, profit margin, business volume, and government projects such as GGRCL. The company does not change any parts or components of drip and micro sprinklers often but instead it introduces new products at an interval of 3 to 5 years with new design and technology. The company has formal contract with 4 to 5 other Indian companies to buy some specific parts required to manufacture drip system components. The company provides standard specifications and designs to such companies so that it gets desired quality products. Prior to formal contract and after having contract, the company's technical team and management team periodically visit these companies to ensure about getting desire quality products. The entire MIS system is assembled at farmers' field.

Sales, Competition and Markets

The annual turnover of the company jumped from merely Rs. 63 crore in 2005-06 to Rs. 130 crores in 2006-07 mainly because of formation of GGRCL in Gujarat. The growth in turnover is more than 100 % in a year. Other major reasons for increasing growth are Andhra Pradesh Micro Irrigation Project (APMIP) project, assistance of government subsidy, electricity problem, and higher yield benefits. The company has three types of buyers, individual buyers (90 %), corporate buyers (8 %) and institutional buyers (2 %).

Among them, 85 % are new system buyers, 10 % are replacement buyers and 5 % are repair and maintenance buyers.

Fig. 8.3: Marketing Structure of the company



Source: Chopra and Moshawir, 2004.

Netafim MIS covered 30,000 ha in India in 2006-07 and 15,300 ha in 2005-06. Of which, 8,150 ha was in Gujarat. In overall sale, drip systems contribute 97 - 98 % and micro sprinklers 2 - 3 %. Today, more than 64,000 ha of Indian farms are irrigated by Netafim drip irrigation systems. Gujarat accounts for 50 % in the total MIS sale of the company. Netafim drip system has market share of 43 % in Gujarat. The major marketing pockets in Gujarat are all districts of south Gujarat, Sabarkantha district and Kachchh district. The company exports its products to Sri Lanka, Pakistan and China. The export contributes 7 - 8 % in the total sale.

Jain irrigation and Plastro Plasson Inds (I) Ltd. are two major competitors of the Netafim India. In Gujarat, the company experiences healthy competition because of fixed unit cost price suggested by GGRCL but in other states, it is facing problem because competitors and other companies get involved in politics and malpractices and that negatively affects Netafim's MIS business. The company supplies its products and components to Nagarjuna fertilizers and chemicals Limited in India.

The company provides technical services for 5 years and agronomical services for one year after MIS sale. The cost of these sevices is included in the unit cost of the MIS fixed by GGRCL. However, the company also bears a part of the service cost. Technical service includes repair and maintenance. Component replacement cost has to be borne by the farmers.

Distribution

A prospective dealer has to deposit Rs. 25,000 to become a dealer of the company. Apart from the money, the company looks for technical educational qualifications, farmers' contact, field staff (one person per 40 ha.), and office infrastructure for offering dealership. Netafim India has widespread dealers' network in the states of Andhra Pradesh, Chattisgarh, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Tamilnadu and Uttaranchal. It has 300 dealers across the country. Of which 45 are in Gujarat. For every two dealers the company has allotted one engineer, though he is either an agriculture engineer or BSc agriculture. So the company can analyse the requirements of the farmer and suggest a design for the drip to be installed in his/her field (Chopra and Moshawir, 2004). It has 11 regional offices across all the important geographical zones in the country. To ensure timely delivery and service its market efficiently, it has a network of 9 warehouses all over the country.

The company provides 30 to 60 days credit and offer 4 % margin to dealers. There is no fixed target for dealers but the company is working on the target given by GGRCL. However, generally a dealer has to sell MIS for 150 ha per year otherwise, the company appoints a new dealer in his/her area to achieve the target.

Lack of farmers' awareness and skepticism of farmers for making investment in MIS due to uncertain market price of agricultural produces are major problems in marketing MIS. In other words, uncertain return on investment is a major hurdle in selling MIS.

Promotion

Besides after sale services, the company also provides acidification treatment to farmers for which farmers have to pay the cost of liquid acid. Acidification is required in case of system clogging. The company provides free of cost training to dealers and farmers. It organizes on average 4 to 5 trainings per month.

Major areas of training involves:

- Basic principles and advantages of drip technology
- Basic agronomic principles used in drip irrigation
- Filtration principles and its use
- Products and its applications
- Designing of irrigation systems
- Operation and maintenance of irrigation systems
- Water and fertilizer management, best cultural practices in all major crops

The agronomic support offered to Netafim customers include:

- Water management
- Fertilizer management
- Cultivation practices
- Soil and water suitability for a particular crop

After sales service covers:

- Installation and after sales servicing of drip and sprinkler irrigation systems
- Chemical treatments like acid and chlorination of micro irrigation systems
- Training of farmers, company dealers and service staff in operation and maintenance of drip and sprinkler irrigation systems

The company uses following media for advertising and promoting its products.

T.V.
News papers
Pamphlets/Posters/leaflets/folders
Hoardings
Farm demonstrations
Farmers meetings
Individual contact
NGOs
Campaigns
Exhibition (mainly Agri-fair)

The company spends 2 % of its total sale amount on advertising and promotional activities.

The company's Research and development cell is continuously working on farmers' problem and introduces new product by making changes in product design and components at a long term interval may be at 3 to 5 years to meet farmers demand.
The demand for MIS is increasing and would continuously increase because many state governments are now planning to establish GGRCL type agency in their respective state. Besides, government support, increasing water scarcity, electricity supply shortage for agriculture, labour shortage and improvement in yield and quality of agricultural produces are major factors responsible for future growth.

GGRCL provides help to the company in promotion of MIS and minimizes procedural problems. The company also has signed MOU with State Bank of India and Union Bank to promote MIS. Of the total GGRCL customers, the company has 65 % loanee and 35 % non loanee customers. It extends helps to farmers in preparing documents required to avail subsidy from GGRCL and loan from banks. The company has to devote 60 % time in document preparations and 40 % time on product promotion and sale.

Payment terms for the companies and charging high management fees from farmers are major problems with GGRCL. There is corruption free corporate culture at GGRCL which is mainly responsible for rise in growth of MIS in Gujarat. GGRCL maintains good relations with all MIS companies but at the same time it is independent in making its policies and taking decisions without entertaining any company's interference.

8.2.3. Parixit Industries Ltd.

Company profile

The company is based at Ahmedabad. Mr. Amrut I. Patel is an owner and a Chief MD of the company. Mr. Parixit Patel is a joint MD and Chairperson of the company. The company was established in 1989. It is a family owned limited company. The total staff strength of the company is 422. The breakup of the staff employees is given in the table.

Table 8.3:Break up of the company staff

Staff category	Numbers
Technical	62
Non technical	104
Managerial	22
Casual	140
Others	94
Total	422

Source: Parixit industries Ltd, Ahmedabad.

Its MIS product manufacturing plant is located at Vatva, Ahmedabad, Gujarat. However, the company is going to shift its Vatva plant to Sanand soon.

Product profile

The company manufactures filters, laterals, inlines, drippers, HDPE sprinkler pipes, sprinkler nozzles. Besides, these components of drip and sprinkler systems, the company is also manufacturing HDPE pipes, HDPE column pipes, HDPE pipe fittings, PP/HDPE and ball valves. It has acquired 9 BIS licenses for manufacturing MIS products. The company has started manufacturing different products in different years as shown in the table below:

Table 8.4: product wise manufacturing year of different products of company

Product	Starting year of manufacturing
Sprinkler nozzles	2006
PVC	2004
Filters	2004
Inlines	2000
HDPE sprinklers	1996
Drippers	1995
Laterals	1994
HDPE	1992

Source: Parixit industries Ltd, Ahmedabad.

Average market price of company's different MIS systems is given in the table below:

T**able 8.5: Average market price and range of MISs of Prixit**

MIS system	Average market price (Rs.)	Price range (Rs.)
Drip	85,000	32,000 to Rs. 140,000
Sprinkler	13,000	12,000 to 22,000
Impact sprinkler	83,000	75,000 to 100,000

Source: Parixit industries Ltd, Ahmedabad.

The average product life of all MIS systems is 10 years. All products have a unique brand of Parixit. No specific reason behind the brand name except its association with the

company's name. The company manufactures 95 % MIS product components at its manufacturing unit and bought 5 % product parts such as metal valves, bolts and nuts from the market. Since inception, the company has not changed its product brand name. The company follows GGRCL price structure for its MIS product market price.

The company has made following changes in its product profile over a period of time:
Pipe size and shape, fitting size and shape, shifting from steel/metal to plastic and HDPE material since 2005, quality of material (thickness and durability), etc. The company does not manufacture any other agricultural implements/equipments. The company keeps stock of its products at manufacturing plants and assembles them on farmers' farms. It does not have any type of collaboration with any other manufacturing plants/ companies; neither has it any formal tie up with any other suppliers. It buys metal products from about 40 to 50 informal suppliers from the open market. The company imports 10 % MIS products, especially drippers from Israel. The annual production capacity of its manufacturing plant is 7600 MT. The plant utilization capacity is 40%.

Sales, competition and markets

The annual turnover of the company is Rs. 46 crores. MIS is contributing 60% to its annual turnover. Out of overall MIS turnover (60%), the company generates 50% turnover from Gujarat. The turnover is increasing because of GGRCL intervention, built up awareness of farmers, and availability of government fund to support MIS. Before GGRCL intervention, the company's MIS sale was based on cash and carry and it was components sale but after GGRCL, now it is system selling and thus, the business is increasing. Since 1992, it has started its MIS business operation in Gujarat. In Gujarat, the company's MIS sale jumped from Rs. 8 crore covering 1103 hectare in 2005-06 to Rs. 13 crore covering 1485 hectare in 2006-07. Out of total farmers covered in Gujarat during the last year, there are approximately 35 % loanee farmers and 65 % non loanee farmers. Kachchh, Surendranagar, Bhavnagar and Amreli are major pockets of Drip system marketing in Gujarat. These pockets together contribute 50 % of the total drip system sale. Junagadh, Banaskntha, and Amreli are major pockets of marketing sprinkler system. Impact (micro) sprinkler is a recent product and it occupies less than 1 % in total sale. The company sells 98 % of its MIS products in India and only 2 % MIS products is being exported to Libiya and a European country.

Jain and Netafim are major market competitors for the company. Actually because of increased awareness and market promotion activities followed by these competitors there is a healthy market competitions and that helps company to grow business. In a way the competition helps increasing business. The company is thriving on quality products and it is very confident about its quality products. It does not supply any parts/products to MNCs in India.

The company has 90% individual buyers, 6-7% institutional buyers, and 2-3% corporate buyers. Among these buyers, 90% are new system buyers, 8% are system replacement buyers and 2% are repair and maintenance purpose buyers.

Distribution and promotion

The company has 80 dealers in Gujarat and 520 dealers in other states. The company has framed terms and conditions for offering dealership as follows.

- Rs, 50, 000 as deposit on which company pays 8 % interest.
- Technical staff – one surveyor and one person for MIS installation
- Infrastructure – office space and storage space

The company provides after sale service to its buyers. The service includes system maintenance and agronomical guidance. The tenure of system maintenance service is for 5 years and agronomical service is for one year. Company bears the cost of after sale services. However, farmers pay a part of after sale service charges in GGRCL scheme which is already included in the unit cost of MIS. It organizes various types of training programmes for dealers and its own employees. It organizes dealer training once in a year, and manpower training and company employee training on quarterly basis. Besides, the company provides MIS assembling trainings to its dealers and farmers at its own cost.

The company offers average 7-8% dealer margin. However, it does not provide any type of credit facility to its dealers. There are no any specific sale conditions for dealers but the company asks dealers to bring minimum 50 hectare land under Company's MIS in a year. Company does not have the concept of area based dealership appointment but it appoints dealers looking to the market growth.

Lack of advance crop planning is a major problem from farmers because it creates supply problem for the company. About 5-10% farmers take their own time in trial run and that delays the company's payment. Because as per the GGRCL rule, the company can not get full payment unless farmers give their consent for releasing the payment by signing required documents after carrying out trial run successfully on farmers' farm.

The company takes help of following advertising and promotional materials to increase MIS sale.

a. newspapers
b. pamphlets
c. farm demonstration
d. farmers meeting
e. individual contact
f. NGOs
g. posters
h. folders/flash cards
i. wall painting
j. exhibition such as agriculture fair

It spends about 1-1.5% amount of its total sale on advertisement and sale promotion activities. It places new MIS products as and when required based on suggestions and requirements of farmers. For example, it has recently introduced fertilizer injectors.

GGRCL provides following help to the company:

- Prepare modality for MIS installation
- Allocate target to individual company
- Organize monthly review meeting
- District wise monthly meeting to be initiated shortly
- Facilitate bank finance process on case to case basis.

The company helps farmer in preparing all required documentation to be eligible for availing GGRCL benefits. Though it has relationship with banks with regards to fulfill its financial requirement for the growth of the company, except GGRCL it does not have any linkages with banks or any other organizations to promote MIS in particular. Only one major problem it faces with GGRCL is collecting more number of documents and their processing.

Demand for MIs will increase in the next 5-10 years because of government support. Gujarat state government is planning to bring entire Sardar Sarovar Project canal command area under MIS. Gujarat Electricity Board (GEB) policy of promoting MIS under which, as per the changed GEB norm, any applicant who is ready to get MIS install on his/her farm on which s/he would like to get electricity connection for groundwater extraction will be given the first priority in the list of pending application and the GEB will release the electricity connection accordingly, will also help spread of micro irrigation. Farmers are experiencing higher production because of MIS. State governments of Rajasthan, Maharashtra, Madhya Pradesh, Uttar Pradesh Chattisgarh, Tamil Nadu, and Karnataka are planning to implement GGRCL model in their respective states to promote MIS. 11^{th} plan has targeted to cover 7 lakh hectares of land under MIS.

To conclude, in Gujarat, a public-private partnership is in place to promote MIS as the state is in dire need of water saving technologies. The companies focus on products and extension and the GGRC on farmer awareness and facilitation in providing finance and quality materials.

Chapter 9

Distribution of Micro-irrigation Equipment: Dealer level analysis

Dealers of micro irrigation equipment have an important role to play in promoting the technology among farmers. Therefore, a survey of MI equipment dealers was carried out to understand the industry practices at the dealer level and to appreciate the issues in marketing of such technologies among farmers. This chapter focuses on dealer level aspects of marketing of micro irrigation equipment in Gujarat. The sample dealers include those if major players i.e. Jain, Netafim, Parixit and Plasto and across major pockets of micro irrigation spread in Gujarat i.e. north Gujarat and Kachch regions (table 9.1).

Table 9.1: Company wise dealership sample for the study

Company	Ahmedabad	Himmatnagar	Bayad	Palanpur	Vadgam	Bhuj	Total
Jain	-	1	1	1	-	1	4
Netafim	-	1	-	1	-	1	3
Parixit	-	-	-	1	1	1	3
Plastro	1	1	-	1	-	1	4
Total	1	3	1	4	1	4	14

Dealers' profile

Different company dealers operated at different levels like district or taluka or even more than one district (table 9.2) and were either proprietary or partnership firms with maximum partners being four in some cases (table 9.3). A large majority of the dealers were either graduate or agri graduates in terms of their educational background (table 9.4). Except one, all were Hindu Patels which is a dominant caste in Gujarat.

Table 9.2: Dealers' area of jurisdiction

Company	Area of work
Jain	cluster of talukas
Netafim	entire district
Parixit	adjoining talukas
Plastro	district and/or cluster of districts

Table 9.3 : Nature of dealership and Number of entities involved*

Company	Single ownership / proprietorship	Partnership	No of partners	Total
Jain	2	2	4 each	10
Netafim	3			3
Parixit	3			3
Plastro	2	2	2, 3	7
Total	10	4	9	23

Note: * though the number of absolute dealership out lets surveyed is 14 the total number of dealers are 23 because 4 outlets have more than one dealer partners.

Table 9.4: Distribution of dealers by education*

Company	Under graduation	Graduation	Agricultural graduation
Jain	3	5	2
Netafim	0	1	2
Parixit	1	1	1
Plastro	2	1	4
Total	6	8	9

Note: * though the number of absolute dealership out lets surveyed is 14 the total number of dealers are 23 because 4 outlets have more than one dealer partners.

A majority of dealers had significant experiences in this business which ranged from 5-10 and 10-15 years in case of one third each of the total dealers. Only about 15% each had less than 5 years and more than 15 years experience each (table 9.5). More than half of the dealers were not involved in any other business and others were involved in diverse businesses like agri inputs, hardware, and landscaping (table 9.6 and 9.7).

Table 9.5: Distribution of dealers by previous experience

Years Company	< 5.00	5.00-10.00	10.01-15.00	15.01 to 20.00	Total
Jain	1	1	1	1	4
Netafim	1	2	-	-	3
Parixit	-	-	2	1	3
Plastro	-	2	2		4
Total	2	5	5	2	14

Table 9.6: Distribution of dealers by other businesses carried out

Company	Yes	No	Total
Jain	2	2	4
Netafim	0	3	3
Parixit	2	1	3
Plastro	2	2	4
Total	6	8	14

Table 9.7: Distribution of dealers by type of other businesses carried out

Company	Agri-inputs	Hardware	Agriculture linked other business	Total
Jain	2	-	-	2
Netafim	-	-	-	0
Parixit	1	1	-	2
Plastro	1	-	1 (Agri-inputs, Landscape irrigation, Green house, Agro consultancy, Selling PVC pipes)	2
Total	4	1	1	6

Specifically, for present dealership, the experience ranged from just tow years to as many as 10 years with an equal proportion being very young in this dealership and very experienced each (35-40%) (table 9.8). The other company dealerships were carried out by just three dealers that too in other agri inputs like seeds, fertilizers and the like (table 9.9).

Table 9.8: Distribution of dealers by MIS dealership experience

Years Company	< 2.00	2.00-5.00	5.01-10.00	Total
Jain	3	-	1	4
Netafim	1	1	1	3
Parixit	1	-	2	3
Plastro	1	2	1	4
Total	6	3	5	14

Table 9.9: Distribution of dealers by dealership of other products

Company	Agri-inputs	Name of companies
Jain	1	Gujarat Agro, Gujarat Seed Corporation and United Phosphorous Ltd.
Parixit	1	Mangalam seeds corporation and Krushi Rasayan Pvt ltd.
Plastro	1	Coromandal fertilizers
Total	3	

Volume of business

As table 10.10 shows, most of the turnover was from MIS equipment sale and average sale per dealer worked out to be Rs. 2.66 crore ranging from minimum of 90 lakh to a high of more than five crore. Most of the turnover was from MIS equipment sale except in case of Jain dealers and main outlets accounted for as much as 87% of total turnover. One of the Ahmedabad based Plastro dealers possessed dealership of two other MIS companies (Nagarjuna plastic and Paragon Synthetics and polymer Ltd.) which together account for 10% sale of his MIS business. This was the only dealer outlet possessing multi brand MIS dealership. All others were single brand ownership outlets.

Table 9.10: Distribution of dealers by annual sales turnover (Rs. in crore)

Company	Total sale	MIS sale in total sale	Average business sale/dealer	Average MIS sale/ dealer	Share of MIS sale in business sale (%)	Share of main outlets in business sale (%)
Jain	6.30	3.85	1.58	0.96	61.11	96.43
Netafim	15.92	15.92	5.31	5.31	100.00	100.00
Parixit	2.71	2.59	0.90	0.86	95.39	47.97
Plastro	12.24	11.84	3.06	2.96	96.73	75.69
Total	37.17	34.20	2.66	2.44	92.00	87.60

Interestingly, many dealers across companies had appointed sub dealers or agents ranging from three to as many as 13 with the average number of such subdealers being seven (table 9.11). Netafim dealers have appointed sub-dealers with office establishment support on 50:50 cost sharing basis to increase their business. They offer 1% commission on sale turnover to their sub-dealers. Besides, they incur the cost of telephone communication and field travel. A Plastro dealer and a Parixit dealer have appointed commission agents without providing any financial support. But they offer 50% commission from their dealer's margin to their commission agents. A Jain dealer had appointed commission agents by offering 1.5% commission. ISI companies' market share is higher than non ISI companies' market share in the study area. For example, the Palanpur MIS market is dominated by ISI companies which account for 80% market share.

Table 9.11: Distribution of Dealers by sales network

Company	Number of dealers selling MIS through commission agents or sub dealers	Number of commission agents and sub dealers	Average number of commission agents and sub-dealers / dealer
Jain	1	4	4
Netafim	2	13	6.5
Parixit	2	3	1.5
Plastro	2	26	13
Total	7	46	6.57

The level of competition measured in terms of number of dealers in the area ranged from minimum of two in Bayed to as high as 11 in Bhuj district (table 9.12). Each dealer on an average covered 350 hacs in an year ranging from minimum of 145 hacs to as much as 570 hacs (table 9.13). Further, ¾ of the sales were to loanee farmers and only ¼ to non-loanee farmers (table 9.14).

Table 9.12: Distribution of dealers by competitors in the area

Area	No. of MIS dealers
Ahmedabad	9
Himmatnagar	6
Bayad	2
Palanpur	8
Bhuj	11
Total	36

Table 9.13: Distribution of dealers by MIS coverage (in hacs) in their area in 2006-07

Company	Total land	Average land/dealer
Jain	1230	307.50
Netafim	1707	569.00
Parixit	435	145.00
Plastro	1515	378.75
Total	4887	349.07

Table 9.14: Distribution of dealers by loanee and non-loanee farmers (N=13)

Company	% of loanee farmers	% of non loanee farmers
Jain	57.50	42.50
Netafim	92.33	7.67
Parixit	77.50	22.50
Plastro	77.50	22.50
Total	74.77	25.23

Most of the pre and post sales services were provided by dealers which ranged from awareness raising to installation of equipment and even market linkage for farm produce. Companies provide MIS designing, cost estimate preparing and agronomical services to farmers. Dealers build awareness and identify potential customers. They carry out field survey and installation work. They also provide technical and maintenance services besides taking the responsibility of processing documents for bank finance as well as subsidy. MIS has introduced cultivation of commercial crops to maximize economic benefits and return on investment. However, farmers are not used to do marketing of commercial crops and hence they require market support. Some of the dealers provide such market support and that develops a relationship and builds mutual trust between dealers and their clients.

Table 9.15: Main services provided to farmers

Nature of services	Who provide the service	Number of dealers	% of dealers
Building farmers awareness	Dealer	14	100.00
Customer identifications	Dealer	14	100.00
Designing and Cost estimate	Company	14	100.00
Field survey for MIS design	Dealer	14	100.00
Document processing for bank finance and subsidy	Dealer	14	100.00
MIS installation (Fittings)	Dealer	14	100.00
Market linkages	Dealer	4	28.57
Provide agri-input information	Dealer	4	28.57
Introduce new crops	Dealer	2	14.29
Provide crop production knowledge	Dealer	2	14.29
After sale services			
Agronomical service	Company	14	100.00
Maintenance service	Dealer	11	78.57
Operating system knowledge	Dealer	7	50.00
Technical guidance	Dealer	3	21.43
Chemical treatment (acidification treatment)	Dealer	4	28.57
Monthly or Fortnightly visit	Dealer	2	14.29

A Netafim dealer of Palanpur has established linkages between Balaji Wafers and potato growers and also between Papaya growers and a private trader. Another Netafim dealer in Himatnagar has established marketing linkages between McCain Foods and 150 potato growers. Some of the dealers provide agri-input information, introduce new crops and provide crop production knowledge. Except agronomical services, dealers provide all other after sale services which include operation, maintenance and other technical guidance and chemical treatments. A few dealers regularly visit farmers' fields to inspect the system (Table 9.15). GGRCL registered companies are made responsible to provide technical and agronomical services to its client farmers; however, it is found that the companies hardly provide any satisfactory agronomical services to their client farmers, but their dealers provide technical and maintenance services to farmers. A Netafim dealer of Himmatnagar strongly believed that the MIS industry is service oriented. Dealers have to provide regular, continuous and quality services to their client farmers. Quality of service is a major determinant of MIS marketing and sale growth. Major requirements of farmers in MIS included multiple crop relevant systems, subsidy information and access to it, speedy processing of applications and lower cost systems (table 9.16),

Table 9.16: Dealer opinion about customers' main requirement in MIS

Farmers requirements	No of dealers	% of dealers
MIS for Multiple crop	9	64.29
Maximize subsidy benefits	5	35.71
Demand low cost system	3	21.43
Speedy processing	3	21.43
After sale service	2	14.29
Quality products	2	14.29
Agronomical service	1	7.14
Demand in-line drip system	1	7.14
Demand impact sprinkler	1	7.14
Interested in pipeline for water conveyance	1	7.14
Demand micro-tube MIS	1	7.14

The dealers had to pay an average of Rs. 37,642 as deposit and make an investment of Rs. 8, 16,538. Besides, working capital requirements were of the order of Rs. 55000 per month. Across dealers of different companies, deposit varied from a low of Rs. 25, 000 to as much as rs. 50, 5000 for Jain. Similarly, fixed investment also varied from rs. 66,000 to as much as Rs. 20 lakh and working capital from Rs. 19000 to Rs.1, 14 444 per month (table 9.17). A majority of the dealers had mobilised this resource from their own sources and only some had partly obtained bank loan for these requirements (table 9.18).

Table 9.17: Distribution of dealers by investment in dealership (in Rs.)

Company	Avg. deposit to company	Avg. fixed investment	Avg. working capital/month
Jain	50,500	510,000	19,625
Netafim	25,000	2,025,000	114,444
Parixit	33,333	66,667	15,833
Plastro	37,500	766,667	75,417
All companies	37,642	816,538	55,071

Table 9.18: Distribution of dealers by sources of investment in dealership

Source of investment	Number of dealers	% of dealers
Own	5	35.71
Own, Bank	4	28.57
Own, Relatives/Friends/Parents	3	21.43
Own, Bank, Relatives, Friends	2	14.29
Total	14	100.00

Except Jain, no other company provides credit to dealers. Jain also provides it on case to case basis. It has offered 60 days credit to two dealers. One Parixit dealer of Bhuj received credit because of his personal relationship with the company as he was an employee of the company for a long period of time before initiating this business. Besides, he did not pay

any deposit amount to the company for the same reason. But this is exceptional case and no other company including Parixit provides credit to dealers.

The other conditions to obtain dealership included technical staff, business or marketing experience, farmer contact, office space and technical knowledge besides vehicles to visit rural areas (table 9.19). Dealers should be financially capable enough to invest to begin with. About 4-5 technicians (for survey, installation and marketing) were required to claim Jain dealership. Half of the dealers perceived their companies terms and conditions as better than the other companies' terms and conditions due to quick support in case of need, release of payment in time, regular contact with dealers and performance based compensation (table 9.20 and 9.21).

Table 9.19: Distribution of dealers by requirement to attain dealership

Requirements	No. of dealers	% of dealers
Staff	8	57.14
Business or marketing experience	8	57.14
Dealer network (farmers contact)	7	50.00
Office space	7	50.00
Educational qualifications and/or technical knowledge	6	42.86
Technicians	6	42.86
Vehicles	4	28.57
Computer	3	21.43

Table 9.20: Distribution of Dealers by perception of dealership terms & conditions being better than other companies

Dealers' responses about company's terms and conditions	No of dealers	% of dealers
Not better	4	28.57
Better	7	50.00
At par with other companies	3	21.43

Table 9.21: Distribution of dealers by reasons for better terms and conditions N=7 with multiple responses

Reasons for considering better T&C	No of dealers	% of dealers
Quick support	3	42.86
Release payment in time	3	42.86
Regular contacts with dealers	2	28.57
Offer performance based commission	2	28.57
Strict in following rules and regulations	1	14.29
No false commitment to farmers	1	14.29
Got dealership without money deposit	1	14.29

Dealers' terms and conditions were better in Jain irrigation as it offers work load based margin to dealers. It provided its employees to dealers to support MIS marketing and hence sharing of work between company employees and dealers staff decides the dealer's margin. But, Jain irrigation dealership terms and conditions were changing from time to time because of market competition and there was no restriction on dealers' jurisdiction and hence any dealer could do business from anywhere and that negatively affects dealers' business. Jain irrigation experienced a dealers' scandal of Rs. one crore in the past and were still facing legal action to get rid of that scandal. Hence, it was very careful and cautious in promoting MIS on a large scale in Gujarat. The company would like to follow Bajaj auto model of open boundary dealership. However, dealers were skeptical about the dealership policy of the company and hence were not keen in either developing or expanding the business. Its dealers felt that there should be synchronized efforts from both company and dealers to make the business grow.

Support to dealers

All companies provide technicians to dealers. However, different companies provide different type of technicians to dealers. Jain provides agronomist and design engineer, Netafim provides agronomist, design engineer and field assistant, Parixit provides agronomist and Plastro provides engineer for MIS installation work especially when the large area has to be put under MIS. No company provides salary to dealer's technicians.

Jain and Netafim provide training to dealers' field staff/technicians and also organize dealers' training. Parixit and Plastro do not provide any training to dealers' field staff/technicians neither they organize dealers' training. However, Plastro provides on-farm installation training to its dealers technicians. Netafim also organizes farmers' training. Plastro is willing to provide training to dealers' field staff/technicians provided dealers are ready to bear the cost of training.

MIS installation, system operation and maintenance, agronomical services, and chemical treatment (acidification and fertigation) are major areas of Jain training. In addition to all Jain training topics, Netafim training includes after-sale service, survey and designing and dealing with farmers/ customers (marketing). The perceived life of MIS equipment varied

from 7 to 14 years across company dealers and average was 10.7 years in case of drip and 12.4 years in case of sprinkler with range of 8-17 years (table 9.22)

Table 9.22: Dealer perception of life of MIS of various companies (in years)

Company	Drip	Sprinkler
Jain	14.4	17.5
Netafim	10.3	12
Parixit	7	10
Plastro	10	8.3
All companies	10.7	12.4

Dealers carry out different types of advertisement and sale promotion activities (table 9.23). Farmers meeting and/or farmers contact is one of the major activities for 93% dealers. It is followed by exposure visits/field tours and distribution of printed literature in case of 71% and 57% dealers, respectively. About 21 % dealers carry out wall painting activities. Parixit dealers in particular organize village level video show. Jain dealer of Bhuj organizes one day after sale workshop by inviting only client farmers. Netafim dealers also occasionally organize farmers' seminar. The result clearly shows that personal contact is a leading sale promotion activity.

Table 9.23: Distribution of dealers by advertising and sale promotion expenses and liability

Activities	No of dealers	% of dealers	Who bears the cost
Farmers contact and/or farmers meeting	13	92.86	Dealers
Exposure visit/ field tour	10	71.43	50:50
Distribution of printed materials such as handouts and pamphlets in local news papers.	8	57.14	50:50
Wall painting	3	21.43	Company
Video Show	2	14.29	50:50

Table 9.24: Distribution of dealers by type of advertising/sales promotion activity

Activities	Who bears the cost	No of dealers	% of dealers
Brand awareness building	Companies	7	50.00
Sale promotion	Share on 50:50 basis between companies and dealers	10	71.43

Generally, it is found that companies incur the cost of brand awareness building activities, while companies and dealers share the cost of sale promotion activities on 50:50 basis. For example, companies bear the full cost of wall painting activity and companies and dealers

share the expenditure incur on other promotional activities such as one day farmers' seminar, exposure visit, distributing printed literature in local news papers and participating in agri-fair, etc. However, two Plastro dealers incurred the entire cost of literature printing and distribution. In case of video show, companies provide the CDs/video cassettes and dealers bear the cost of organizing village level video show. Dealers incur the full cost of farmers contact/meeting. Sometimes, company and dealers share the cost of events such as farmers' field day or farmer's seminar on 50:50 basis. Companies such as Jain initially bears all the cost of advertisement and sale promotion activities until dealers get establish their identity in local areas. Jain bears the entire cost of long distance outside the district farmers' tour (table 9.24). All dealers said that advertisement and sale promotion activities positively influence farmers' behavior. It builds brand awareness and system awareness and increases quality consciousness among farmers which ultimately increases acceptance /adoption of MIS (table 9.25). Resultantly, it increases MIS sale.

Table 9.25: Distribution of dealers by their perception of influence of advertisement and sale promotion on farmer behaviour and sale

Particulars	No of dealers	% of dealers
Influence farmers' behaviour	14	100.00
Built up brand awareness and system awareness	12	85.71
Increased acceptance/adoption because of higher Motivation	6	42.86
Influence sale	14	100.00
Little impact on sale	2	14.29
Increased sale by 10 to 60 % with average 24%	7	50.00

Formal tie-up with banks or other financial institutions

Except Netafim no other companies have established formal tie-up with banks or any other financial institutions in the study areas. Netafim has established formal tie-up with SBI in S.K. and B.K. districts. Nevertheless, dealers neither establish any formal tie-up with banks nor with any financial institutions.

Costs involved in making financial arrangement for the customers

Dealers do not incur any direct cost but incur indirect cost in terms of allocating resources such as manpower and business time behind making finance available to their customers. About 93% dealers allocate their business time and 42% dealers allocate exclusive manpower behind the activity. A dealer considered that vehicle operating cost and time

goes in bank follow up is a major cost of the activity. About 78.5 % dealers spent on an average 26 % of their business time behind the activity. Different dealers spent different amount of time as shown in the table-. A Netafim dealer of Palanpur has employed a full time person throughout the year for this work and that costs him Rs 12,000 per month. Similarly, another Netafim dealer of Himantnagar has employed a person at each of his sub-dealer out let to follow up bank procedure and he bears the salary cost of these employees (table 9.26).

Table 9.26: cost of dealing with farmers in arranging a sale of MIS

Business time spent on making financial arrangement for the customers	No of dealers	% of dealers
Vehicle operating cost and bank follow up	1	7.14
5 %	2	14.29
10-15 %	1	7.14
20-30 %	5	35.71
33-60 %	3	21.43
Avg. 26 %	11	78.57

Dealers focused scheme from company

About 36% dealers said that companies offered them either target based incentives or sale turnover incremental incentives. It is found that Netafim regularly offers sale turnover incremental incentive schemes. Jain and Parixit often offers target based incentive schemes. Different companies offer different types of incentive schemes to their dealers. Netafim offers different types of sale linked incentive scheme for dealers starting from Rs. 50 lakh to 12 crore. If a dealer sells MIS worth greater than Rs. 6 crore in a year then s/he gets 1% additional commission on her/his sale turnover and if s/he crosses sale turnover of Rs 12 crore in 3 years then s/he gets a four wheeler as an incentive besides additional commission. No other benefit company provides to dealers. Parixit also offers sale linked incentive scheme in line of Netafim but its sale volume target is different.

Table 9.27: Dealer margins of different MIS companies

Company	Average dealer margin (%)
Jain	7.50
Netafim	7.12
Parixit	6.89
Plastro	5.88
Over all	6.82

Companies on an average offer 6.82% dealer margin. Different companies offer different amount and type of dealer margin (table 9.27). Jain offers the highest dealer margin and Plastro offers the lowest dealer margin. Jain and Parixit offer different dealer margin on different MIS components. Jain offers 6% margin on PVC materials, which account for 30 % of the MIS components, and 10 % margin on other MIS system components and materials. Parixit offers 5% margin on PVC material, 15% margin on inline drip system and 7.5% margin on all other MIS components and materials including micro tubes. The share of PVC material in Parixit's MIS is 50 % in on line drip and 4 % in inline drip.

Major business problem

About 86% dealers faced different types of business problems (table 9.28). Short supply of material is a major problem for about 43% dealers. About 21% dealers faced problems such as lack of support from company in providing after sale service, following up bank finance procedure, and delay in releasing dealer's commission. A Netafim dealer of Himatnagar felt that because of the costly system it is very difficult to penetrate below the large and medium size categories of farmers. He has apprehension that market saturation point for MIS will reach within 1 to 2 years owing to low purchasing capacity of majority farmers in his area.

Table 9.28: Distribution of dealers by major problems faced

Problems	No of dealers	% of dealers
Non availability of MIS in time (short supply of material)	6	42.86
Lack of support from company in providing after sale service	3	21.43
Bank finance procedure follow up	3	21.43
Delay in releasing dealer's commission	3	21.43
Company gives lower margin	2	14.29
Costly system	2	14.29
Company is weak in marketing	2	14.29
Minor problems related to the MIS quality	1	7.14
Dealing with uneducated farmers	1	7.14
Procedural delay from company in putting farmers file before GGRC	1	7.14

Some of the dealers face company specific and location specific problems. Plastro dealer of Bhuj has to bear the cost of soil and water testing. Besides, he has to make necessary lodging and boarding arrangements at his cost for the company's technicians and employees who have been temporarily deployed at his field site for MIS installation in a

larger area. Two Bhuj dealers suggested that agronomical charges are unnecessary and very high. Similarly, insurance premium charges are also unnecessary and hence these two charges should be left to the choice of farmers, especially for non loanee farmers. Non loanee farmers should be given freedom to select alternate MIS cost excluding these two charges. Because, sometimes, it is very difficult for them to convince farmers about these charges and they observed that companies do not provide agronomical services when it is required the most.

Dealers' collaboration with GGRCL

The dealers have only subsidy related relationship with GGRCL. They did not have any direct collaboration with GGRCL, but 28.5 % dealers said that their respective company has made collaboration with GGRCL in promoting MIS. Jain collaborated with GSFC depot for awareness building and promotion of liquid fertilizer. Netafim sponsored caps with company logo on a mass awareness function organized by GGRCL.

Before January 2007, GGRCL was doing follow up with banks for bank finance but since then GGRC has given this responsibility to farmers who do not able to do proper follow up with banks and that hampers the bank finance procedure and ultimately it is affecting the MIS selling business. A dealer of Parixit Industries in Palanpur opined that the delay in documentation and processing under GGRCL, easy access to and low cost of non-ISI MIS attract farmers to purchase non-ISI MIS materials from the market and that adversely affects the business of ISI MIS industries. Therefore, dealers have to take active part in document preparation and their processing besides dealing with banks for follow up. Subsequently, half of the dealers faced different types of problems from GGRCL (table 9.29). Another very important problem is that decisions and policies discussed during quarterly meetings held between GGRC officials and higher level bank officials often do not percolate down to the lower level bank officials and that delays the bank finance process. GGRCL does not listen to dealers and always favours farmers. It asks dealers to approach GGRCL through their respective companies to deal with any type of matter and/or complain.

Table 9.29: Distribution of dealers by problems faced with GGRC

Problems	No of dealers	% of dealers
Procedural delay	2	28.57
Documentation and processing	1	14.29
GGRCL does not listen to dealers	2	28.57
Procedural delay and documentation and processing	1	14.29
Procedural delay and lower fitting charges	1	14.29
Total	7	100.00

Dealers' view on future of MIS

Dealers differed in their views on the future growth of MIS. A Netafim dealer of Himatnagar was of the view that given the adoption pattern of farmers, there was very limited scope for the future growth of MIS business in his area. As per the standard extension adoption process, progressive farmers were pioneers in adoption of innovations followed by early adopters who were active and ready to experiment and then followed by late adopters who adopt the innovations after seeing the success of early adopters. At present, MIS has reached only these three groups of farmers i.e. majority of the resource rich farmers have adopted MIS and the forth and the last group of farmers who are known as laggards will never adopt the innovations unless it was made economically accessible to them. Therefore, the MIS business has bleak future unless some financial assistance is made available to large numbers of the fourth group of farmers in the process of adoption. A Plastro dealer of the same district had totally opposite and optimistic view. He felt that after inception of GGRCL, the growth in MIS sale jumped from Rs. 50-60 lakh to Rs. 5 crore in the past two years. MIS has improved crop production and productivity and hence the growth of MIS selling would sustain till the next 10 years. A Jain dealer of Palanpur did not see good future for MIS because of high cost of MIS and system operating problem.

In sum, dealers and subdealers play a major role in spread of MIS technology in the rural areas and have relevant background and experience in the business which is mostly exclusive business. These dealers use other players like commission agents and agri input sellers to penetrate markets at the farmer level. The competition was severe and each dealer covered about 3-4 hundred hacs with ¾ farmers being loanee farmers. Most of the services to the farmers were provided by the dealers and even promotion is carried out by them though costs are shared by the companies.

Chapter 10

Purchase and Use of Micro-irrigation Equipment in Gujarat-Farmer perspectives

Introduction

The purchase and use of agricultural equipment at the farmer level determines the success or failure of a new equipment and its marketing program. There have been problems in adoption of micro irrigation at farmer level and its promotion by various agencies. What was seen as very relevant technology has got stuck in its low adoption. Therefore, this chapter examines the farmer level adoption and use of this equipment in Gujarat – one of the pioneer states in this technology. This chapter examines the farmer purchase and use behaviour in micro irrigation equipment based on a survey of 34 farmers who owned this equipment. The district wise breakup of farmers surveyed is given in table 10.1.

Table 10.1: Distribution of MIS farmers by districts in Gujarat

District	Block	No. of farmers	% of total
Sabarkantha	Himmatnagar	3	8.82
	Dhansura	2	5.88
	Bayad	5	14.71
Banaskantha	Palanpur	5	14.71
	Vadgam	4	11.76
Kachchh	Bhuj	-	-
	Nakhtrana	10	29.41
	Anjar	5	14.71
Total		34	100.00

So far as education of MIS owners was concerned, a significant chunk was secondary literate, and 20% each primary, higher secondary and collegiate (table 10.2). In terms of land holding, 41% had holdings of 4-10 hectares and another 23% between 10-25 hectares. Only 20% were holders of 2-4 hectares and just 6% with holdings below two hectares. Thus, most of the MIS farmers were medium, large or very large holders with 9% even holding as much as more than 25 hectares each (table 10.3).

Further, most of these holdings were owned with only 15% being leased in that too by large and very large holders. Almost the entire land was cultivated and most of it (more than 90%) irrigated (table 10.4). Thus, the average operated land holding was

10 hectares and as much as 15 and 35 hectares for large and very large holders (table 10.5). Two-third of these farmers depended on tubewells for irrigation of more than 50% their lands and 94% of the operated area was irrigated (table 10.6 and 10.7). 80% of the operational land was irrigated with MIS equipment, with some area being subject to both methods- drip and sprinkler (table 10.8). Thus, average land under MIS per farmer was seven hectares and that under flood/furrow method just three hectares (table 10.9).

Table 10.2: Distribution of MIS farmers by level of education

Educational level	Total	% in total
Primary education (up to 7th std.)	7	20.59
Secondary education (8 to 10th std.)	10	29.41
Higher secondary education (11 to 12th std.)	8	23.53
College level education and graduates	7	20.59
Post graduation	2	5.88
Total	34	100.00

Table 10.3: Classification of farmers according to their operational landholding

Category of farmers Parameters	**< 2 ha**	**2-4 ha**	**4-10 ha**	**10-25 ha**	**>25 ha**	**Total**
Number of farmers	2	7	14	8	3	34
% of farmers	5.88	20.59	41.18	23.53	8.82	100.00

Table 10.4: Distribution of farmers by land ownership (land in ha)

Category of farmers Land ownership	< 2 ha	2-4 ha	4-10 ha	10-25 ha	>25 ha	All
Own land	3.12	23.84	96.75	99.40	88.80	311.91
Leased in land	0.00	0.00	5.80	24.80	16.00	46.60
Leased out land	0.00	0.00	6.00	0.00	0.00	6.00
Operational land	3.12	23.84	96.55	124.20	104.80	352.51
Cultivated land	3.00	23.84	96.07	121.20	104.40	348.51
Irrigated land	3.00	23.14	90.39	113.20	100.80	330.53

Table 10.5: Distribution of farmers by average land ownership and cultivation (land in ha)

Category of farmers Land ownership	**< 2 ha**	**2-4 ha**	**4-10 ha**	**10-25 ha**	**>25 ha**	**All**
Own land	1.56	3.41	6.91	12.43	29.60	9.17
Leased in land	0.00	0.00	0.41	3.10	5.33	1.37
Leased out land	0.00	0.00	0.43	0.00	0.00	0.18
Operational land	1.56	3.41	6.90	15.53	34.93	10.37
Cultivated land	1.50	3.41	6.86	15.15	34.80	10.25
Irrigated land	1.50	3.31	6.46	14.15	33.60	9.72

Table 10.6: Distribution of farmers by sources of irrigation

Category of farmers Sources of irrigation	< 2 ha	2-4 ha	4-10 ha	10-25 ha	>25 ha	Total
Canal+TW	-	-	1	1	-	2
Canal+Well	-	-	2	-	-	2
Canal+Well +TW	-	-	-	1	1	2
Tank+Well+TW	-	-	1	-	-	1
TW	2	7	9	5	1	24
Well	-	-	1	-	1	2
Well+TW	-	-	-	1	-	1
Total	2	7	14	8	3	34

About 23.5% farmers have multiple sources of irrigation.

Table 10.7: **Distribution of farmers by sources of irrigation of total land** (Land in ha.)

Category of farmers Sources of irrigation	< 2 ha	2-4 ha	4-10 ha	10-25 ha	>25 ha	Total
Canal+TW	-	-	8.88	12.00	-	20.88
Canal+Well	-	-	12.24	-	-	12.24
Canal+Well +TW	-	-	-	12.00	31.20	43.20
Canal+Tank+TW	-	-	-	-	-	0.00
Tank+Well+TW	-	-	8.40	-	-	8.40
TW	3.00	23.14	51.27	76.40	21.60	175.41
Well	-	-	9.60	-	48.00	57.60
Well+TW	-	-		12.80	-	12.80
Total	3.00	23.14	90.39	113.20	100.80	330.53

Table 10.8: Distribution of farmers by method of irrigation (Land in ha.)

Category of farmers Irrigation method	< 2 ha	2-4 ha	4-10 ha	10-25 ha	>25 ha	Total
Drip	3.00	12.92	53.31	52.96	44.32	166.51
Sprinkler	0.00	0.80	0.00	48.00	0.00	48.80
Drip +sprinkler	0.00	0.00	6.72	0.00	12.00	18.72
Total MIS	3.00	13.72	60.03	100.96	56.32	234.03
Flood/furrow	0.00	9.42	30.2	15.04	44.48	99.14

Some farmers use both sprinkler and drip system on the same piece of land. Use of sprinkler is subject to amount of rainfall, especially in Kharif season.

Table 10.9: Average land under different methods of irrigation (land in ha.)

Category of farmers Irrigation method	< 2 ha	2-4 ha	4-10 ha	10-25 ha	>25 ha	Total
MIS	1.50	1.96	4.29	12.62	18.77	6.88
Flood/furrow	0.00	1.35	2.16	1.88	14.83	2.92

On the whole, 65% of the farmers had part of their land under MIS and another 35% their entire land under MIS and they mostly used electric motors (99%) for extraction of groundwater (table 10.10 and 10.11). More than 50% farmers has one electric motor each and another 24% two motors each with rest owning more than two motors each (table 10.12). This was so given the depth of groundwater in the regions (table 10.13).

Table 10.10: Distribution of farmers by Use of MIS

Use	No of farmers	% of farmers
Entire crop land under MIS	12	35.29
Part of the crop land under MIS	22	64.71
Total	34	100.00

Table 10.11: Distribution of irrigated area by water extraction mechanism used

Water extraction devices	Numbers	Land under irrigation	% of irrigated land
Electric motors	72	328.21	99.17
Diesel pump	1	2.88	0.87

Table 10.12: Distribution of farmers by number of water extraction devices used

Electric motors	Number of farmers	% of farmers	Diesel pump sets	Number of farmers	% of farmers
1	15	44.12	1	1	2.94
2	8	23.53			
3	5	14.71			
4	4	11.76			
10	1	2.94			
Total	33	97.06	1	1	2.94

Table: 10.13 Distribution of farmers by depth of water table

District	**Block**	**Water level (feet)**
Sabarkantha	Himmatnagar	35-60
	Dhansura	30-40
	Bayad	30-40
Banaskantha	Palanpur	100-160
	Vadgam	70-80
Kachchh	Bhuj	350-400
	Nakhtrana	250-350
	Anjar	400-440

Most of the cropped area was under kharif crops and perennial crops of fruits (table 10.14). The major crops under MIS were groundnut, cotton, potato, mango and papaya and other horticultural crops (table 10.15). 95% the MIS area was on landholdings of above 10 hectares with only 5% being on holdings of below 10 hectares.

Table 10.14: Cropping Pattern of MIS farmers (Area in hectares)

Category of farmers Crops	< 2 ha	2-4 ha	4-10 ha	10-25 ha	>25 ha	Total	% of seasonal area	% of gross cropped area
Kharif crops								
Cotton	0.00	1.36	35.75	13.68	27.60	78.39	37.30	19.20
G'nut	0.00	1.20	16.24	32.48	14.80	64.72	30.79	15.85
Castor	0.00	0.80	4.40	6.00	6.80	18.00	8.56	4.41
Fennel	0.00	0.00	6.72	2.40	8.40	17.52	8.34	4.29
Others	0.00	6.30	9.88	10.00	5.36	31.54	15.01	7.73
Season total	0.0	9.66	72.99	64.56	62.96	210.17	100.00	51.48
Rabi crops								
Potato	0.00	0.00	11.52	26.08	37.60	75.20	69.42	18.42
Wheat	0.00	1.84	5.60	9.20	7.92	24.56	22.67	6.02
Others	0.00	1.04	6.12	1.40	0.00	8.56	7.90	2.10
Season total	0.0	2.88	23.24	36.68	45.52	108.32	100.00	26.53
Summer crops								
Bajri	0.00	2.84	2.72	8.80	0.00	14.36	61.16	3.52
G'nut	0.00	0.00	0.72	2.00	2.00	4.72	20.10	1.16
Others	0.00	0.00	1.20	3.20	0.00	4.40	18.74	1.08
Season total	0.00	2.84	4.64	14.00	2.00	23.48	100.00	5.75
Perennial crops								
Mango	0.00	2.40	4.40	14.40	0.00	21.20	31.98	5.19
Papaya	0.00	0.00	0.00	0.00	14.72	14.72	22.20	3.61
Vegetables	2.60	3.56	0.00	0.00	0.00	6.16	9.29	1.51
Others	0.40	5.62	4.60	11.60	2.00	24.22	36.53	5.93
Season total	3.00	11.58	9.00	26.00	16.72	66.30	100.00	16.24
All crops	3.00	26.96	109.87	141.24	127.20	408.27		100.00
% of gross cropped area	0.73	6.60	26.91	34.59	31.16	100.00		

So far as source of information for MIS technology was concerned, a large chunk each of the farmers had come to know of the technology from neighbouring farmers, company dealers and from both of the channels each (26% and 17% each) (table 10.16). A farmer each had also learnt about it from NGOs, GGRC advertisement and agricultural fair each.

Table 10.15: distribution of area irrigated by crops under MIS (Area in hacs)

Category of farmers Crops	< 2 ha	2-4 ha	4-10 ha	10-25 ha	>25 ha	Total	% of seasonal area	% of gross MIS area
Kharif crops								
G'nut	0.00	0.80	12.00	26.00	12.00	50.80	43.90	17.26
Cotton	0.00	0.40	25.43	12.48	4.00	42.31	36.57	14.37
Castor	0.00	0.00	5.68	4.00	0.00	9.68	8.37	3.29
Fennel	0.00	0.00	3.12	2.40	0.00	5.52	4.77	1.88
Others	0.00	1.40	0.00	6.00	0.00	7.40	6.40	2.51
Season total	0.00	2.60	46.23	50.88	16.00	115.71	100.00	39.31
Rabi crops								
Potato	0.00	0.00	11.52	39.28	37.60	88.40	92.70	30.03
Wheat	0.00	0.80	0.24	4.40	0.00	5.44	5.70	1.85
Others	0.00	0.00	0.72	0.80	0.00	1.52	1.59	0.52
Season total	0.00	0.80	12.48	44.48	37.60	95.36	100.00	32.39
Summer crops								
Bajri	0.00	0.00	2.40	9.60	0.00	12.00	59.17	4.08
Mung	0.00	0.00	0.00	5.20	0.00	5.20	25.64	1.77
Others	0.00	0.00	1.08	2.00	0.00	3.08	15.19	1.05
Season total	0.00	0.00	3.48	16.80	0.00	20.28	100.00	6.89
Perennial crops								
Mango	0.00	2.40	4.40	14.40	0.00	21.20	33.63	7.20
Papaya	0.00	0.00	0.00	0.00	14.72	14.72	23.35	5.00
Vegetables	2.60	3.20	0.00	0.00	0.00	5.80	9.20	1.97
Others	0.40	5.52	4.60	8.80	2.00	21.32	33.82	7.24
Season total	3.00	11.12	9.00	23.20	16.72	63.04	100.00	21.41
All crops	3.00	14.52	71.19	135.36	70.32	294.39		100.00
% of grossed MIS area	1.02	4.93	24.18	45.98	23.89	100.00		

Table 10.16: Distribution of farmers by sources of information for MIS

Sources of information	Number of farmers	% of farmers
Neighbour farmers	9	25.71
Approached by company dealer	6	17.14
Neighbour farmers and approached by company dealer	6	17.14
Relatives	2	5.71
Other farmers	2	5.71
Agriculture fair	1	2.86
Former dealer	1	2.86
Neighbour farmers, relatives and approached by company dealer	1	2.86
Neighbour farmers and news paper	1	2.86
Relatives and GGRCL advertisement	1	2.86
GGRCL advertisement and development organization	1	2.86
Approached by company dealer and development organization	1	2.86
Neighbour farmers, and development organization	1	2.86
Neighbour farmers, newspaper and TV	1	2.86
Other farmers and TV	1	2.86
Total	35	100.00

Water saving, energy saving and solving labour problem were major reasons behind MIS purchase. It was followed by economical, effective and careful use of fertilizers and pesticides for buying MIS. Farmers selected sprinkler system in water rich and sandy soil areas and preferred drip in water scare areas (table 10.17).

Table 10.17: Distribution of farmers by reasons for buying MIS (multiple responses)

Reasons	No of farmers	% of farmers
Water saving	31	88.57
Energy saving	23	65.71
Labour saving/solving labour problem	19	54.29
Increase crop productivity	18	51.43
Reduce fertilizer cost	9	25.71
Soil improvement	3	8.57
Increase area under irrigation	3	8.57
Solving weeding problem	3	8.57
Commercial crop cultivation	2	5.71
Water quality problem	1	2.86
Good soil aeration	1	2.86
Saving land levelling cost	1	2.86
Reduce production cost	1	2.86

Major brands were Jain, Netafim, Prixit and Captain and Nandan in terms of proportion of farmers ad Netafim, EPC, Captain and Nandan and Jain in that order in terms share of area under MIS (table 10.18). Sprinkler head of Nandan and lateral pipes of Captain are sold together since both the companies have collaboration in selling sprinklers system. Thus, about half of the farmers used a single brand and another half multiple brands of MIS equipment (table 10.19). Thus, four brands- Netafim, Jain, Prixit, and Nandan were the major players in terms of area covered (table 10.20). The major reasons for preferring a particular brand were good product quality and/or ISI standards, good experience of other farmers, company approaching farmers and the brand image besides relationship with dealer, good services and low cost of the equipment and documentation responsibility being taken by the dealer (table 10.21).

Table 10.18: Distribution of farmers by Brand of MIS owned/purchased

Brands				
	No. of farmers	% of farmers	Area (ha)	% of TBA*
Netafim & EPC	1	2.94	48.00	20.34
Netafim	5	14.71	38.64	16.37
Captain & Nandan	3	8.82	34.00	14.40
Jain	8	23.53	25.20	10.68
Parixit and Non-ISI	3	8.82	17.60	7.46
Jain, Narmada, Captain & Nandan	1	2.94	15.20	6.44
Jain, Parixit, Plastro and Non-ISI	1	2.94	14.80	6.27
Parixit	5	14.71	13.80	5.85
Netafim, Captain & Nandan	1	2.94	10.80	4.58
Jain and Parixit	2	5.88	8.40	3.56
Jain, Netafim and Plastro	1	2.94	4.67	1.98
Parixit and Plastro	1	2.94	1.92	0.81
Narmada and Plastro	1	2.94	1.60	0.68
Everest	1	2.94	1.40	0.59
Total	34	100.00	236.03	100.00

* Total brand area

Table 10.19: Distribution of farmers by MIS brand Ownership pattern

Brand ownership		
	No. of farmers	% of farmers
Single brand ownership	18	52.94
Multibrand ownership	16	47.06
Total	34	100.00

Table 10.20: Distribution of farmers by Brand wise area under MIS

Brand		
	Area (ha)	% of MIS area
Parixit	38.76	16.42
Netafim	79.04	33.49
Jain	34.07	14.43
Captain & Nandan	35.20	14.91
EPC	18.00	7.63
Jain, Narmada, Captain & Nandan	15.20	6.44
Non ISI	6.80	2.88
Plastro	6.76	2.86
Everest	1.40	0.59
Narmada	0.80	0.34
Total	236.03	100.00

Table 10.21: Distribution of farmers by reason for selection of particular brand (multiple responses)

Reasons	No of farmers	% of farmers
Good product quality and/or ISI standards	11	31.43
Good experience of other farmers/relatives	10	28.57
The only company approached farmers	8	22.86
Brand image	7	20.00
Relationship with dealer (family relationship/friend/village fellow)	6	17.14
Good services	5	14.29
Dealer accepted documentation processing responsibility for bank finance	4	11.43
Purchased low cost product because of non availability of subsidy	4	11.43
Competitive price	3	8.57
Good product design	3	8.57
Low cost	2	5.71
Good system efficiency	2	5.71
Dealer succeeded in providing subsidy	2	5.71
Knew only one company in the market at the time of purchase	2	5.71
Long life	1	2.86
Former dealership experience	1	2.86
Motivated by farm demonstration	1	2.86
Because of Israel company	1	2.86
Business contact with Jalgaon traders	1	2.86
Other company dealers failed in providing subsidy	1	2.86

Popular brand names in local areas

In case of drip irrigation system, Netafim and Plastro were more popular in Himmatnagar, Dhansura and Bayad talukas of Sabarkantha district, followed by Jain.

In Banaskantha district, Netafim and Jain were more popular in Palanpur and Vadgam talukas. In Kutch district, Parixit was more popular in Anjar taluka, Jain and Parixit were more popular in Nakhtrana, and Netafim was more popular in Mandvi taluka. In case of sprinkler system, Captain and Nandan were more popular in BK and SK districts. Normally, these two brand products were getting sold together (Captain pipes and Nandan sprinkler heads). Sprinkler irrigation was not a practice in Kutch district mainly because of high wind velocity. It shows that there is a regional differentiation in brand name. Brand name popularity highly depends on dealers' relationship with farmers and effective and efficient delivery of after sale services.

Problems faced by farmers at the time of MIS purchase

Average price recently had been Rs. 1,35,417 (2007) per hectare and Rs. 75, 000 per hectare over the years on an average (table 10.22). Jain was the costliest followed by Netafim, EPC and Captian. The lowest cost was non-ISI local brands (table 10.23).

Table 10.22: Distribution of farmers by Year of purchase and avg. purchase price of MIS equipment

Year	No of farmers	% of farmers	Average price (Rs./ha)
1991-92	1	2.86	83,333
1993-94	1	2.86	8,333
1999	1	2.86	1,25,000
2001	1	2.86	20,833
2002	2	5.71	30,625
2003	6	17.14	57,083
2004	3	8.57	53,484
2005	9	25.71	80,078
2006	9	25.71	93,326
2007	2	5.71	1,35,417
Total	35	100.00	75,233

The cost of MIS varies from crop to crop. It is higher for narrow spacing crops such as potato and lower for wider spacing crops such as castor and cotton. However, the return on investment is higher in commercial crops and lower in traditional crops or subsistence crops. Nearly 83% farmers did not face any problem at the time of purchasing MIS, 12% farmers got late delivery and 6% farmers could not get the system in time due to delay in processing of documents by the MIS companies.

Farmers faced major problem with Jain dealers, especially in Bayad taluka of S. K. district.

Table 10.23: Distribution of farmers by brand wise average purchase price of MIS

MIS brand	No. of farmers	% of farmers	Average price (Rs./ha)
Jain	9	25.71	1,01,942
Netafim	6	17.14	98,863
EPC	1	2.86	83,333
Jain, Narmada, Captain & Nandan	1	2.86	65,789
Captain & Nandan	4	11.43	58,333
Parixit	11	31.43	56,374
Everest	1	2.86	55,357
Narmada	1	2.86	43,750
Non-ISI	1	2.86	20,833
Total	35	100.00	75,233

Table 10.24: Region wise purchase price of MIS

Region	No. of farmers	% of farmers	Avg. Purchase price (Rs. /ha.)
SK	10	28.57	83,924
Himmatnagar	3	8.57	83,643
Dhansura	2	5.71	45,833
Bayad	5	14.29	99,329
BK.	9	25.71	76,819
Palanpur	5	14.29	80,117
Vadgam	4	11.43	72,697
Kutch	16	45.71	68,910
Bhuj	1	2.86	20,833
Anjar	5	14.29	70,357
Nakhtrana	10	28.57	72,994
Overall	35	100.00	75,233

Surprisingly, 37% farmers did not receive any after sales service, another 20% only need based and another 11% agronomical, technical and acidification services (table 10.25). Only large players like Jain, Netafim and Prixit provided some after sales services, not the local companies (table 10.26). No farmer was getting after sale services before GGRCL intervention. The concept of after sale services has been introduced after implementation of GGRCL subsidy scheme. GGRCL has included the after sale services, especially agronomical and technical (repair and maintenance) in its MIS package being offered to farmers who are availing subsidy. Company wise performance of after sale services is presented in table 10.26. Companies are very poor in providing agronomical services but good in providing technical services. This

is mainly because local dealers are made responsible for technical services while agronomical services have to be provided by the respective company. Companies appoint agronomist on workload basis. These agronomists have to cover larger area under their jurisdiction and hence sometimes they could not visit all client farmers' farms but provide telephonic services to the farmers. They prepared and followed their own schedule of visit as a part of their routine job responsibilities. Many companies lack adequate number of agronomists. Kutch farmers felt that agronomical services are not required on regular basis and hence agronomical services charges should be removed from the unit cost of MIS to reduce financial burden on farmers.

Table 10.25: Distribution of farmers by after sale services facility

Nature of after sale service	No. of farmers	% of farmers
No service	13	37.14
Farmers' need based services	7	20.00
Agronomical, technical, fertigation & acidification	4	11.43
Agronomical	3	8.57
Agronomical and technical (O, R&M)	3	8.57
Technical	2	5.71
R&M, fertigation & acidification	1	2.86
Farmers' need based services, fertigation & acidification	1	2.86
Do not require services because of hired farm manager	1	2.86
Total	35	100.00

Life of MIS and replacement

Since the average life of the MIS equipment was 10 years of more in case of most brands (table 10.27), the farmers replaced it only once and that too a part of the system for minor dysfunctions or bought another system to bring larger area under the system (table 10.28, 10.29 and 10.30).

Table 10.26: Company wise distribution of farmers by after sale services

Company	Nature of after sale service	No. of farmers	% of farmers
Captain & Nandan	No service	4	11.43
EPC	No service	1	2.86
Everest	No service	1	2.86
Jain	No service	2	5.71
	Agronomical	3	8.57
	Agronomical and technical	2	5.71
	Agronomical, fertigation & acidification	1	2.86
	Technical	1	2.86
Narmada	No service	1	2.86
Netafim	Agronomical, R&M, fertigation & acidification	2	5.71
	Farmers' need based services	2	5.71
	R&M, fertigation & acidification	1	2.86
	Farmers' need based services, fertigation & acidification	1	2.86
Non-ISI	No service	1	2.86
Parixit	No service	2	5.71
	A farmer does not require any services as he has hired a farm manager on salary	1 5	2.86 14.29
	Farmers' need based service	2	5.71
	Only technical service	1	2.86
	Agronomical and technical		
Jain, Narmada, Captain & Nandan	No services before GGRCL but it is available after GGRCL	1	2.86
All		35	100.00

Table 10.27: Company wise average life of MIS equipment

Company	Average life (years)	
	Drip	Sprinkler
Captain & Nandan	-	10
EPC	10-15	-
Everest	10	-
Jain	8-10	-
Jain (lateral only)	10-15	-
Narmada	3	-
Netafim	5-10	-
Parixit	10-12	-
Jain, Narmada, Captain & Nandan	7-8	7-8
All ISI brands	10	10
Non-ISI	3	-

Table 10.28: Distribution of farmers by replacement of the MIS system/parts

Particulars	No. of farmers	% of farmers
Replaced system or parts of the system	12	34.29
Increased area under MIS	15	42.86
No replacement	8	22.86
Total	35	100.00

Table 10.29: Distribution of farmers by frequency of replacement

Replacement times	No. of farmers	% of farmers
One time	11	31.43
Three times	1	2.86
Increased area under MIS	15	42.86
No replacement	8	22.86
Total	35	100.00

Table 10.30: Distribution of farmers by reasons for replacement of MIS

Reasons	No of farmers	% of farmers
Dysfunctional fertigation cocks	3	8.57
Lateral pipes damaged by Dogs	1	2.86
Dysfunctional take off pipes	1	2.86
Bushing and filter ring have to be replaced every year	1	2.86
GM valves because of theft	1	2.86
Switched to ISI brands and increased the capacity of filter due to sand problem	1	2.86
Switched to ISI brands	1	2.86
PVC valve handle breakage	1	2.86
Replaced old system	1	2.86
To adjust crop spacing due to crop change	1	2.86
Increased area under MIS	15	42.86
no replacement	8	22.86
Total	35	100.00

Purchase of MIS

Most of the farmers (80%) bought the equipment from dealers followed by sub-dealers (11%). One farmer each bought it from manufacturer, local shop, and farmer each (3% each) (table 10.31). The place of purchase was district or block headquarter in 60% and 35% case respectively (table 10.32).2/3rd of farmers had bought it on credit and 1/3rd on cash payment basis (table 10.33). The credit was mostly from national banks or local co-operative or rural banks (table 10.34). The amount of credit was linked with the amount of subsidy in majority cases. All nationalized banks credits were linked with subsidy. Farmers got average 63.72% credit. The amount of

credit under GGRCL was 45% and that under National Horticultural Board (NHB) around 20% of the total cost of MIS.

Table 10.31: Company wise source of purchase of MIS equipment

Source / Company	Manufacturer	Dealers	Sub dealers	Local shops	Farmers
Captain & Nandan	-	3 (8.57)	-	-	1 (2.86)
EPC	-	1 (2.86)	-	-	-
Everest	1 (2.86)	-	-		-
Jain	-	7 (20.00)	1 (2.86)	-	--
Jain (lateral only)	-	1 (2.86)	-	-	-
Netafim	-	6 (17.14)	-	---	-
Parixit	-	8 (22.86)	3 (8.57)	-	-
Jain, Narmada, Captain & Nandan	-	1 (2.86)	-	-	-
Narmada	-	1 (2.86)	-	-	-
Non-ISI	-	-	-	1 (2.86)	-
Total	1 (2.86)	28 (80.00)	4 (11.43)	1 (2.86)	1 (2.86)

Note: Figures in brackets indicate percentage of farmer

Tale 10.32: Distribution of farmers by place of purchase of MIS

Place / Company	Local town	Nearby town	Block headquarter	District head quarter
Captain & Nandan	1 (2.86)		2 (5.71)	1 (2.86)
EPC				1 (2.86)
Everest				1 (2.86)
Jain			5 (14.29)	4 (11.43)
Netafim			1 (2.86)	5 (14.29)
Parixit			3 (8.57)	8 (22.86)
Jain, Narmada, Captain & Nandan			1 (2.86)	
Narmada				1 (2.86)
Non-ISI		1 (2.86)		
Total	1 (2.86)	1 (2.86)	12 (34.29)	21 (60.00)

Note: Figures in brackets indicate percentage of farmer

Table 10.33: Company wise purchase pattern of farmers for MIS

Purchase Company	Cash (no. of farmers)	% of farmers	Credit (no. of farmers)	% of farmers
Captain & Nandan	-	-	*3*	*8.57*
EPC	-	-	*1*	*2.86*
Everest	*1*	*2.86*	-	-
Jain	*2*	*5.71*	*7*	*20.00*
Narmada	*1*	*2.86*	-	-
Netafim	*1*	*2.86*	*5*	*14.29*
Non-ISI	*1*	*2.86*	-	-
Parixit	*5*	*14.29*	*6*	*17.14*
Jain, Narmada, Captain & Nandan	-	-	*1*	*2.86*
Total	*11*	*31.43*	*23*	*65.71*

Table 10.34: Distribution of farmers by credit facilities for MIS

Sources	No of farmers	% of credit farmers	Avg. amount of credit (Rs.)	Avg. period of credit (years)	Avg. number of installment (numbers)	Avg. annual rate of interest (%)	Avg. amount of margin money (Rs.)
District/village cooperative banks	5	21.74	208,250	6.40	6.40	11.5	16,650
Nationalized banks and LDB	1	4.35	175,000	8.00	16.00	10.0	17,500
Farmers	1	4.35	20,000	0.50	2.00	No interest	20,000
Gramin (Rural) bank	2	8.70	89,125	5.00	10.00	10.0	13,375
Nationalized banks	12	52.17	419,167	4.08	4.82	9.79	79,792
Relatives	2	8.70	100,000	1.00	Not fixed	6.00 & no interest	100,000
Total	23	100.00	288,891	4.57	6.15	10.05	56,739

Table 10.35: Distribution of farmers by frequency of installment

Nature of installment	Number of farmers	% of credit farmers
Annual installment	14	60.87
Six monthly installment	5	21.74
Not yet fixed	1	4.35
No fixed installment	3	13.04
Total	23	100.00

Reasons for credit and margin money paid

Shortage of funds was the major reason accompanies by subsidy facility for availing of a loan for MIS (table 10.36). Land mortgage was the only security in most cases (table 10.37). On average framers paid 12.52% margin money. Credit source wise margin money is shown in table 10.38. No margin money was required in NHB subsidized scheme. Average 20% margin money was required in availing bank credit in all other subsidy schemes in general. Farmers paid 5% management fees to GGRCL through banks and banks provided 50% credit. Except management fees, no other margin money was required under GGRCL subsidy scheme. Cooperative bank took average 5% margin money. Land development bank took 10% amount towards margin money. About 69% of the farmers had availed of subsidy largely through GGRCL and in some case through NHB (table 10.38 and 10.39). GGRCL provided 50% subsidy, NHB provided 22 % subsidy and other government schemes provided 8-36% subsidy. Farmers had to make arrangement for only 50% amount to get the benefit of GGRCL subsidy as they received fore-ended subsidy. While in case of all other government subsidy schemes, farmers had to make arrangement for 100% amount as they received back ended subsidy.

Table 10.36: Distribution of farmers by reasons for taking credit

Reasons	Number of farmers	% of farmers
Money shortage	12	52.17
Money shortage and low interest rate	1	4.35
Money shortage and subsidy attraction	5	21.74
Money shortage and easy to get loan	3	13.04
Money shortage, low interest rate and crop loan	2	8.70
Total	23	100.00

Table 10.37: Distribution of farmers by collateral/securities required getting loan

Collateral/securities	Number of farmers	% of farmers
Land mortgage	20	86.96
Mutual trust	3	13.04
Total	23	100.00

Table 10.38: Distribution of farmers by Subsidy for MIS

Benefit of subsidy	No. of farmers	% of farmers
Availed subsidy	24	68.57
Not availed subsidy	11	31.43
Total	35	100.00

Table 10.39: Distribution of farmers by scheme wise subsidy availed

Name of subsidy scheme	Number of farmers	% of farmers	Subsidy %
GGRCL	15	42.86	50
NHB	2	5.71	22%
Others	3	8.57	8%, 30%, 36%
Overall	20	57.14	-

Repair and maintenance and major problems faced

About 74% farmers either did not incur any repair and maintenance expenditure or incurred negligible amount. The rest 26% farmers incurred average of Rs 218 per hectare towards R&M. It shows that R&M cost is not a major problem for most of the farmers. Major problems faced by farmers included damage to equipment by animals and rodents and poor after sales service resulting in low operational efficiency (table 10.40).

Table 10.40: Distribution of farmers by major problems in MIS (multiple responses)

Problems	No. farmers	% of farmers
Damaged by rats and other animals	19	54.29
No problems	10	28.57
Poor after sale services	9	25.71
Low working efficiency	5	14.29
Clogging of drippers	1	2.86
High cost and hence require more care	1	2.86
Information gap between farmers and MIS companies	1	2.86
Leakage of valves	1	2.86
Minor quality related problem	1	2.86
Nematode problem	1	2.86
Not suitable for diesel engine	1	2.86
System failed because of sand siltation	1	2.86
System operating problem	1	2.86
Theft problem	1	2.86

Farmers' knowledge and experience of dealing with GGRCL

Out of 35, 71% farmers had knowledge about GGRCL and 69% farmers had taken benefit of its subsidy. 51% farmers had a good experience, 23% did not have direct contact with GGRCL and equal percentage of farmers did not have any experience of dealing with GGRCL (table 10.41). Those who reported good experience considered following reasons; easy access to information, putting efforts in building awareness and promoting MIS, 50% subsidy benefit, quick approval, immediate release of subsidy amount, reduction of management charges from 5% to 2.5%, no ceiling on MIS area coverage, no corruption, proactive, and prompt attention to farmers' complaints, actual (physical) implementation, good working system, strict monitoring and inspection, etc. (table 10.42)

Table 10.41: Distribution of farmers by their experience of dealing with GGRCL

Experience	No of farmers	% of farmers
Good	18	51.43
No direct contact	9	25.71
No experience	8	22.86

Table 11.42: Distribution of farmers by reasons for good experience of dealing with GGRCL

Reasons	No of farmers	% of farmers
Farmers' complain redresses system is very good	4	11.43
Pro farmer and problem solving approach	3	8.57
50% subsidy benefit and actual installation	2	5.71
Easy access to subsidy, farmers friendly, mgt fees reduced to 2.5 % from 5 %	1	2.86
Putting efforts in building awareness and promoting MIS	1	2.86
No restriction on area coverage & easy to get subsidy	1	2.86
No corruption, actual implementation	1	2.86
Quick release of subsidy	1	2.86
Good working system and quick approval of MIS application.	1	2.86
Good monitoring, inspection and no malpractice	1	2.86
Easy access to information	1	2.86

A few farmers have suggested that GGRCL should not take management fees from farmers. A farmer reported that though unit cost of MIS of all companies is same, Parixit was taking charge of fitting accessories from farmers if the material was falling short of the design estimate, while all other GGRCL registered companies

were providing it free of cost. Another farmer reported that farmers had to pay 5% of MIS cost estimate towards management fees before initiating the bank finance procedure in case of loanee farmers. Instead of it, banks should give written assurance to loanee farmers about getting bank loan and then only they should pay management fees to GGRCL to avoid uncertainty about getting bank finance. There are cases of system failure. A farmer suggested that GGRCL should introduce sand siltation test before approving the system in alluvium and sandy soils. Like soil and water quality testing, water test to know foreign matters should be conducted before MIS suppliers design the MIS. It would help them to design siltation proof system.

To sum up, 65% of the farmers had part of their land under MIS and another 35% their entire land under MIS and they mostly used electric motors (99%) for extraction of groundwater. More than 50% farmers has one electric motor each and another 24% two motors each with rest owning more than two motors each. This was so given the depth of groundwater in the regions. The major crops under MIS were groundnut, cotton, potato, mango and papaya and other horticultural crops. 95% the MIS area was on landholdings of above 10 hectares with only 5% being on holdings of below 10 hectares. So far as source of information for MIS technology was concerned, a large chunk each of the farmers had come to know of the technology from neighbouring farmers, company dealers and from both of the channels each (26% and 17% each).

Water saving, energy saving and solving labour problem were major reasons behind MIS purchase. It was followed by economical, effective and careful use of fertilizers and pesticides for buying MIS. Farmers selected sprinkler system in water rich and sandy soil areas and preferred drip in water scare areas. Major brands were Jain, Netafim, Prixit and Captain and Nandan in terms of proportion of farmers and Netafim, EPC, Captain and Nandan and Jain in that order in terms of share of area under MIS. Four brands- Netafim, Jain, Prixit, and Nandan were the major players in terms of area covered. The major reasons for preferring a particular brand were good product quality and/or ISI standards, good experience of other farmers, company approaching farmers and the brand image besides relationship with dealer, good

services and low cost of the equipment and documentation responsibility being taken by the dealer.

Most of the farmers (80%) bought the equipment from dealers followed by sub-dealers (11%). One farmer each bought it from manufacturer, local shop, and farmer each (3% each). The place of purchase was district or block headquarter in 60% and 35% case respectively. 2/3rd of farmers had bought it on credit and 1/3rd on cash payment basis. 71% farmers had knowledge about GGRCL and 69% farmers had taken benefit of its subsidy. 51% farmers had a good experience, 23% did not have direct contact with GGRCL and equal percentage of farmers did not have any experience of dealing with GGRCL

Chapter 11
Conclusions and recommendations

Agricultural machinery and implements are an important factor in agricultural production and productivity enhancement. There are direct as well as indirect effects of agricultural machinery and implements on productivity through better use of other inputs, more efficient and timely completion of agricultural operations and increase in cropping intensity. But, the adoption of machines is the result of many factors at the farm level like size of land holding, irrigation, labour, credit and risk orientation and socio-economic profile of the farmer. Still, level of mechanization of agriculture in India remains low. Except a few states like Punjab, Haryana, U.P., Rajasthan and Tamilnadu, the area under five major crops being tilled with tractors is low and, that too, is largely with hired tractors. Though it is not necessary for each farmer to own a tractor, but hired use also shows that there is scope for higher penetration of tractors provided their viable use can be made possible. This is also reflected in the number of tractors per 1000 hac of operated area. In this context, the study has found certain gaps in business strategies and promotional policies of the state and development agencies which need to be plugged and these are detailed below for the three major segments of the agricultural machinery industry:

Tractors

The value chain for tractors involved manufacturers and dealers with farmers at the user end. The dealers had an important role to deliver and service the product and thus were crucial link in the chain.

Most common use of tractors was 401-600 hours per annum with 30% farmers reporting that. The next major group was the one which used it between 1001-1500 hours per annum which is more than the minimum use of tractor for viability. Further, Kharif had moré tractor usage than Rabi largely due to paddy cultivation. But, still, on an average, the tractor was used only for 751 hours which is much below the NABARD norm for viable use of the machine. It was surprising that about 9% farmers used it for less than 200 hours and another 13% for less than 400 hours

altogether during the year. 70% of the owners were using it for less than 1000 hours – a minimum prescribed by NABARD for viability.

Given small size of holdings, it is necessary to encourage custom hiring of agricultural machinery especially tractors and combines to raise productivity while maintaining costs of cultivation. This can be done by encouraging panchayats, PACS and agricultural machinery cooperatives/companies, clinics or even private entrepreneurs with loans, training and subsidies. Easier and wider availability of credit for second hand machines can also come in handy to deepen agricultural mechanization. Since every village now owns 15-20 tractors in northern region, it is necessary to establish agricultural machinery service centres at the village level or the cluster of villages level (IASRI, 2006).

A study of training and testing facilities for farm machinery at the state level in 2000-2001 revealed that all the 11 major states, except Bihar, had an institute of farm machinery training and testing or a an agricultural university which were providing training to farmers. But, in many state like Rajasthan, Punjab, Maharashtra, Karnataka, UP, WB, and Bihar, facilities were inadequate. Further, there were very few programmes for farmers compared with those for extension workers and no state, except Assam and Karnataka, had trained more than 1000 farmers over 10 years (1991-2000) (Singh et al, 2008).

Also, contract farming can encourage mechanisation as the crops grown under this arrangement are new, more amenable to mechanization and come with good agricultural practices which cut costs or raise yields and productivity (IASRI, 2006).

Combine harvestors

The value chain for combine harvestors was short with direct selling of the product by manufacturers to the owner users or custom service providers. The product was even tailor made for specific requirement of specific buyers. The communication between seller and buyer was direct and trust based.

Combine harvestor is a costly machine and requires good and careful usage to attain viability. As seen in average annual use figures, in Punjab and Gujarat, it is not being used enough (only around 50 days in a year) compared with Maharashtra where it was primarily bought for custom hiring and was used for as much as 90 days. In order to ensure its viability there is need to exercise caution in its funding and ownership. Banks should insist on definite business plans before approving loans for farmers so that second hand combine markets like tractors do not emerge in India. There is need to provide for collective purchase of combine harvestors by farmers' groups or PACS like tractors so that local availability during times of need especially during peaks of harvesting seasons can be ensured.

Further, due to the labour displacing nature of combine harvesting, there is a need to exercise caution in promotion of combine harvestors. It not only ends up displacing labour but also causes shortage of fodder which happened in Punjab this year. But despite this obvious cost and time advantage from harvester combines, the current season has witnessed something unusual: Manual harvesting is back and combine are out of favour suddenly. This time, not more than 40% of the wheat has been combine-harvested. The main reason given by them is better straw recovery. One acre yields 20 quintals of wheat and an equal quantity of straw. Through manual harvesting, one can recover almost this entire straw, whereas the combine-reaper would salvage only 10-12 quintals. This is because the combine operates 30-40 cm above the ground and the left-over stalk gives less straw. In normal years, straw yields do not matter much. But this time, with straw prices ruling at Rs 400-500 per quintal (against last year's Rs 200-300), farmers have found it worthwhile to invest extra time and money in manual harvesting, instead of combines (HBL, 2007).This can hit the dairy industry hard which is an important allied sector crucial for local livelihoods in many parts of India.

Micro irrigation

The value chain for micro irrigation equipment involved dealers between manufacturers and farmers besides the state agency –GGRC- which promoted and facilitated the purchase with subsidy.

Farmers are now becoming more aware about the benefits of micro irrigation system. They know that in the increasingly water scarce environment, only micro irrigation could give them sustainable means for agriculture. The increasing sale of drip system in the reduced subsidy regime is also an indicator of farmer's reducing dependence on subsidy and they are now ready to pay higher amount for improved technology. But considering the economic condition of average Indian farmer, the following would be helpful for irrigation companies and the government at various levels, in promoting micro irrigation:

To the average farmer, finance is a major problem. So, companies should come up with some solutions like tie-up with banks, financial institutions, etc. to provide easy loans to the farmers. The limit of Rs. 50,000 on getting loans without collateral should be increased to Rs. one lakh or the redeemable value of the micro irrigation equipment and lease financing for micro irrigation by the manufacturing firms to provide credit support, like in the case of a car, should be promoted (FICCI, 2004). Preference should be given in the matter of bank loans for digging wells and electricity connection to those opting for drip irrigation.

In the drip irrigation technique, labour saving on land preparation is a major benefit which farmers have not yet realized. Irrigation companies should highlight this benefit to attract customers for their products.

The companies should ensure quality components like drippers, emitting pipes, filters, etc., so that farmers face no major technical problems like system clogging, which affect their motivation on drip irrigation (Chopra and Moshawir, 2004).

The decreasing subsidy indicates that low cost would be key factor for survival in the future. Therefore, companies should come up with more cost effective products and business strategies (Sengupta *et al*, 2004).

After sales service to the farmers is a must to enable them to derive the maximum benefits that drip irrigation technology can offer to them (Sakthivadivel and Bhamoriya, 2004). Surprisingly, 37% farmers did not receive any after sales service, another 20% only need based and another 11% agronomical, technical and

acidification services. Only large players like Jain, Netafim and Prixit provided some after sales services, not the local companies. No farmer was getting after sale services before the GGRCL intervention. GGRCL has included the after sale services, especially agronomical and technical (repair and maintenance) in its MIS package being offered to farmers who are availing subsidy. Companies were very poor in providing agronomical services but good in providing technical services. This was mainly because local dealers were responsible for technical services while agronomical services were provided by the respective company. Companies appointed agronomists on workload basis. These agronomists had to cover larger area under their jurisdiction and hence sometimes they could not visit all client farmers' farms but provide telephonic services to the farmers. They prepared and followed their own schedule of visit as a part of their routine job responsibilities. Many companies lack adequate number of agronomists.

There is need for educating the farmer that the plant can do with less water than provided to the plant in conventional furrow irrigation. Farmers need to be educated through extension services and publicity on the effectiveness of drip irrigation, especially, for narrow spaced crops like sugarcane, cotton, etc. Micro irrigation equipment manufacturing companies should be involved intensively in promoting the method through frequent field demonstrations at the farms. Word of mouth and demonstration are the biggest promotional strategies in the industry (Chopra and Moshawir, 2004). What is needed is a promotion at the grassroots to change perceptions and educate farmers on how the drip can benefit them apart from water saving.

Rather than advertisement, personal selling is a more effective way of MIS marketing (Chopra and Moshawir, 2004). Farmers should be educated on concomitant use of liquid fertilizers through pipe network and their reservations on system clogging should be dispelled through frequent demonstrations. Further, importance of liquid fertilizer in increasing input efficiency and bringing down the cost of cultivation should be clearly brought home by effective extension (Narayanamoorty, 1997).

Pepsee systems are not complete substitutes for highly sophisticated drip technologies. Though returns offered by micro-tubes and drip kits are higher that

those offered by *Pepsee*, *Pepsee* systems are viewed as a "stepping stone" to adoption of a higher degree of sophistication and higher cost technologies and if these technologies are designed in such a way that the transition is made simple and modular, the results can be very positive. Thus, as the farmers are convinced about the results, become familiar with the technology and possibly also improve their financial status in the process, they will shift to the more efficient technologies being marketed today (Verma *et al*, 2004).

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