the INDO-ITALIAN Chamber of COMMERCE and INDUSTRY

OVERVIEW OF THE AGRICTULTURAL MACHINERY SECTOR IN INDIA

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Agriculture Sector in India

Agriculture in India is unique in its characteristics, where over 250 different crops are cultivated in its varied agro-climatic regions, unlike 25 to 30 crops grown in many of the developed nations of the world. Agriculture is one of the most important sectors of the Indian economy contributing 18.5 per cent of national income, about 15 per cent of total exports and supporting two-thirds of the work force.

India with its favorable agro-climatic conditions and rich natural resource base has become the world's largest producer across a range of commodities.

- India is the largest producer of coconuts, mango, banana, milk and dairy products, cashew nuts, pulses, ginger, turmeric and black pepper.
- It is also the second largest producer of rice, wheat, sugar, cotton, fruits and vegetables.

Present Food Grain production - After a near-stagnation or modest growth in output for several years, Indian agriculture has officially rebounded in 2007-08 with foodgrain production surging by 10 million tonnes, or 4.6 per cent, to touch a new high of 227.32 million tonnes. The grain output in 2006-07 was 217.28 million tonnes.

Introduction

The early agricultural mechanization in India was greatly influenced by the technological developments in England. Horse drawn and steam-tractor-operated equipments were imported during the later part of the nineteenth century. The horse-drawn equipments imported from England were not suitable for bullocks and buffaloes being used in India. These were suitably modified to suit Indian draught animals. With the production of indigenous tractors and irrigation pumps, the use of mechanical power in agriculture, has been showing an increasing trend.

As a result of Green Revolution in the sixties, the total food grain production increased from a mere 50.8 million tonnes during 1950-51 to 217 million tonnes in 2006-07, and productivity increased from 522 kg/ha to more than 1,500 kg/ha. The increase in production of food grains was possible as a result of adoption of quality seeds, higher dose of fertilizer and plant protection chemicals. Irrigation played a major role in increasing the productivity. Increased cropping intensity and higher quantity of inputs could no longer be effectively managed by animate power alone and, therefore, farmers adopted tractors, irrigation pumps, harvesters and power threshers extensively.

Progress of Farm Mechanisation in India

The progress of agricultural mechanization has been closely linked with the overall development in production agriculture. Till 1950, very few farmers possessed prime movers like tractors, engines and motors. Heavy agricultural tractors and machinery were imported by government organizations mainly for land reclamation and development of large government farms.

The picture changed quickly during the early sixties with the introduction of high yielding varieties of wheat and other crops which needed irrigation facilities. The progressive farmers soon realized that the traditional water lifts, which were driven by draught animals or operated manually, could not meet the water requirement of the high yielding varieties of different crops. Lift irrigation was, therefore, quickly mechanized through the use of electric motor or diesel engine powered pumps.

The rising production of foodgrains resulting from the extending area under high yielding varieties could not be handled within the normal harvesting and threshing periods. The farmers in North India suffered heavy losses as a result of damage to harvested wheat during the late sixties and early seventies because the threshing of increased wheat production could not be completed before the onset of pre-monsoon rains. Large scale adoption of threshers operated by electric motors, engines and tractors that followed in early seventies onwards was a result of the need to complete threshing operation quickly. Then came the extensive use of tractors for primary tillage and transport and the use of tractor powered or self-propelled harvesting equipment.

Production - Indian Scenario

The productivity of farms depends greatly on the availability and judicious use of farm power by the farmers. Agricultural implements and machines enable the farmers to employ the power judiciously for production purposes. Agricultural machines increase productivity of land and labour by meeting timeliness of farm operations and increase work out-put per unit time. Besides its paramount contribution to the multiple cropping and diversification of agriculture, mechanization also enables efficient utilization of inputs such as seeds, fertilizers and irrigation water.

The production of irrigation pumps and diesel engines started during 1930s. The manufacture of tractors and power tillers started in 1960. Since then by the virtue of its inherent edge over the conventional means of farming, agricultural mechanization has been gaining popularity. The increased use of farm machines found expansion of

cropped area and cropping intensity and also helped in diversification of agriculture from conventional crops to commercial crops.

- The manufacture of agricultural machinery in the country is carried out by village artisans, tiny units, small- scale industries and the State Agro-Industrial Development Corporations.
- Production of tractors, motors, engines and process equipment is the domain of the organized sector.

The traditional artisans and small-scale industries rely upon own experience; user's feedback and government owned research and development institutions for technological support and operate from their backyards or on road side establishments without regular utility services. Medium and large-scale industries operate in their own premises with sound infrastructure, usually forming a part of an industrial estate, well-established manufacturing and marketing facilities and employ skilled manpower.

Diesel engines, electric motors, irrigation pumps, sprayers and dusters, land development machinery, tractors, spare parts, power tillers, post harvest and processing machinery and dairy equipments are produced in this sector. They have professional marketing network of dealers and provide effective after sales service. They also have in-house research and development facilities or have joint ventures with advanced countries for technology upgradation. India is recognized, the world over, as a leader in the manufacture of agricultural equipment and machinery such as tractors, combine harvesters, plant protection equipment, drip irrigation and micro-sprinkler. Sizeable quantities of farm implements are exported to Africa, Middle East, Asia, South America and other countries.

With increased cropping intensity, farmers have supplemented or largely replaced animate power with tractors, power tillers, diesel engines and electric motors. The growth in the electro- mechanical power in India is evident from the sale of tractors and power tillers, taken as an indicator of the adoption of the mechanized means of farming, during the last five years and is reported as follows:

(In Nos.)

Year	Tractors Sale
2000-01	254825
2001-02	225280
2002-03	173098
2003-04	190336
2004-05	247693
2005-06	292908
2006-07	263146
2007-08	275000 (e)

India is largest manufacturer of tractors in India with an estimated 275000 units being produced in the last financial year. Different sizes of tractors are manufactured in India ranging from less than 25 HP to more than 45 HP but most popular range is 31-35 HP. The Tractor sales show that their demand is region specific. Punjab, Haryana and western UP constituted the major Tractor market. The share of eastern states, namely Bihar, Orissa, West Bengal and Assam had been consistently low at 7- 9% due to various socio- economic, agro-climatic and other reasons. The credit availability to the farmers in this area has been another major reason for the slow growth in the eastern states.

Tractor sales in Maharashtra, Tamil Nadu, Karnataka and Andhra Pradesh have been showing consistent growth since mid 1980's. This region is expected to contribute more than 30% to the tractor industry in this decade. This expectation is based on the fact that the farmers in this southern region have been adopting high value case crops and latest crop production/ management practices. After a drop in sales in 2006-07 sales have risen in 2007-08.

Territory	%age of Domestic Sales
North (Punjab, Haryana & Uttar Pradesh)	29%
Central (Madhya Pradesh & Rajasthan)	21%
East (Bihar, West Bengal, Orissa & Assam)	9%
West (Gujarat & Maharashtra)	15%
South (Andhra Pradesh, Tamil Nadu, Karnataka & Kerala)	26%

Power Tillers:

(In Nos.)

Year	Power Tillers Sale
2000-01	16018
2001-02	13563
2002-03	14613
2003-04	15665
2004-05	18985
2005-06	22303
2006-07	13375
2007-08	15000 (e)

The production of power tillers started in 1961 with license to manufacture 12 models. The manufacturers started offering these to farmers in various states covering upland and wetland farming conditions. Their introduction coincided with that of agricultural tractors which were more suitable for upland work and provided more comfortable work environment to the operators.

The power tiller models being manufactured, and also those being imported from China, etc, and being marketed for wetland, stationary and haulage work are being well received by the farmers. The available models have a Drawbar power between 5.3 kW to 10.7 kW.

The major Tractors and Farm Equipment Manufacturers in India are

- Balwan Tractors, Force Motors Ltd
- Captain Tractors Pvt. Ltd
- Crossword Agro Industries
- Eicher
- Escorts (Escort, Powertrac and Farmtrac)
- Ford Tractors
- HMT Tractors
- Indo Farm

- John Deere
- Mahindra Gujarat Tractor Limited
- Mahindra & Mahindra
- MARS Farm Equipments Ltd.
- New Holland
- Preet Tractors
- Punjab Tractors Ltd (Swaraj Tractors)
- Same Deutz-Fahr Ltd.
- Sonalika (International Tractors Ltd.)
- Standard
- TAFE
- VST Tillers

Stationary Power – Diesel Engines & Electric Motors

Electric Motors and Diesel Engines are the primary sources of stationary power for irrigation, threshing and various post-harvest agro-processing operations. Diesel Engine population, which was 1.443 million in 1971-72 increased to 5.528 in 1995-96, and, crossed 7.4 million in 2005-06.
Electric Motor population has increased from 1.535 million in 1971-72 to 7.464 million in 1995-96, and, was 12 million 2005-06.

Population of Power Sources and their power availability in India				
Year	Diesel Engines		Electrical Motors	
	Million Units	Power (kW/ha)	Million Units	Power (kW/ha)
71-72	1.443	0.053	1.535	0.041
75-76	2.075	0.078	2.064	0.056
81-82	3.061	0.112	3.203	0.084
85-86	3.742	0.139	4.192	0.111
91-92	4.800	0.177	6.019	0.159
95-96	5.528	0.203	7.464	0.196
00-01	6.466	0.238	9.525	0.250
05-06	7.432	0.273	11.866	0.311

The studies on operational efficiency of irrigation pumps have shown the efficiency of electric motor operated pumps to be 31.1% against only 12.7% of diesel engine operated pumps.

Other Machinery in Operation

Seed Bed Preparation Equipment:

Tractor mounted implements such as mouldboard ploughs, disc ploughs, cultivators and other crop- specific equipment are widely being used for seed bed preparation. Seed drills and planters, both animal drawn and tractor mounted, have become popular. The growth in use of tractor drawn machinery has been in the range of 9-17%. Different sizes of cultivators and disc harrows are used but due to farm road and terrain constraints, cultivators of more than 15 tines and disc harrows of more than 18 discs are not much in use. The power from higher horse power tractors, therefore, is not fully utilized.

Sowing and planting equipment

The line sowing not only saves seed but also facilitates regulated application of fertilizer near root zone. Besides, it helps control of weeds through use of mechanical weeders. For precise application of seed and fertilizer, mechanically metered seed drills and seed-cum- fertilizer drills operated by animals and tractors have been developed and are being manufactured to suit specific crops and regions

Mechanical transplanters for rice and vegetable crops are catching up with farmers. Long handle tools and power weeders for weeding and interculture and manual and power operated sprayers and dusters for application of chemicals have been commercialized.

Harvesting Equipment:

Cereal crop harvesters including various designs of vertical conveyor reaper windrowers and combine harvesters are being used on large scale. Tractor mounted digger- elevators for groundnut and tuber crops are being used. Spike-tooth and rasp-bar type threshers for cereal crops and crop specific threshers for major crops such as soybean, groundnut, sunflower have been developed and commercialized.

Reapers powered by engines, power tillers and tractors have been developed and introduced for harvesting wheat, paddy, soybean, ragi and mustard. Tractor-powered and self-propelled combine harvesters are being manufactured in India. About 700- 800 combines are sold annually. Track-type Combine harvesters, especially suitable for

paddy crop, are also being manufactured locally. The combine harvesting of wheat, paddy and soybean has been well accepted by farmers.

Regions having major concentration of Agricultural Machinery

Northern region

Ludhiana, Moga, Jalandhar, Goraya, Batala, Hoshiyarpur, Karnal, Panipat, Faridabad, Delhi, Agra, Ghaziabad, Meerut, Rudrapur, Muzaffarnagar, Lucknow, Kanpur, Fatehpur and Allahabad.

Western region

Bombay, Pune, Nagpur, Ahmed Nagar, Sangli, Kolhapur, Sholapur, Ahmedabad, Baroda, Anand, Junagarh, Bhopal, Indore, Dewas, Bina, Khurai, Raipur, Vidisha and Gwalior.

Southern region

Hyderabad, Guntur, Anantpur, Kakinada, Coimbatore, Madurai, Chennai, Salem, Palghat, Ernakulam, Kochin and Bangalore.

Eastern region

Calcutta, Vardhaman, Durgapur, Bhubaneswar, Sambhalpur, Patna, Ranchi, Dhanbad and Muzaffarpur.

Constraints & Misconceptions

It is misconceived that benefits of mechanization could be reaped only by farmers having large acreage. The Indian farmer, however orthodox he/she may be, has only to be convinced of the relevance of techniques and machinery to induce him to accept them. Equipments for tillage, sowing, irrigation, plant protection and threshing have widely been accepted by them.

Even farmers with small holdings utilize selected improved farm equipment through custom hiring to increase productivity and reduce cost of production. The small plot size might have been an impediment for use of large tractors but not for adoption of small tractors, power tillers and improved machinery. The improved hand tools, animal drawn and tractor operated implements have been adopted more in those states where productivity per unit area has increased.

The State Agro Industries Development Corporations of Madhya Pradesh, Gujarat, Maharashtra, Andhra Pradesh, Rajasthan, Uttar Pradesh, West Bengal, Assam, Orissa and Kerala are already manufacturing improved implements besides local small scale industries.

Import Duty

HS Code	Item Description	Policy	Total Import Duty
8432	Agricultural, horticultural or forestry machinery of soil preparation or cultivation; Lawn or sports-ground rollers		
8432 10	Ploughs:		
8432 10 10	Disc ploughs	Free	12.03400
8432 10 20	Other tractor ploughs	Free	12.03400
8432 10 90	Other	Free	12.03400
8432 21 00	Disc harrows	Free	12.03400
8432 29	Other:		
8432 29 10	Rotary hoes	Free	12.03400
8432 29 90	Other	Free	12.03400
8432 30 00	Seeders, planters and transplanters	Free	12.03400
8432 40 00	Manure spreaders and fertilisers distributors	Free	12.03400
8432 80	Other machinery:		
8432 80 10	Lawn and sports ground rollers	Free	12.03400
8432 80 20	Rotary tiller	Free	12.03400
8432 80 90	Other	Free	12.03400
8432 90	Parts:		
8432 90 10	Parts of agricultural machinery falling within headings. 8432 10, 8432 21, 8432 29, 8432 30 & 8432 40	Free	12.03400
8432 90 90	Other	Free	12.03400
8433	Harvesting or threshing machinery, including straw or fodder balers; Grass or hay mowers; Machines for cleaning, sorting or grading eggs, fruit or other agricultural produce, other than machinery of heading 8437		
	Mowers for lawn, parks or sports grounds:		
8433 11 00	Powdered, with the cutting device rotating in a horizontal plane	Free	12.03400
8433 11 90	Powered with 3 HP or more	Free	12.03400
8433 19	Other:		14.71200
8433 19 10	Non powered mowers, having width of 75 cm or more	Free	12.03400
8433 19 90	Other	Free	14.71200
8433 20 00	Other mowers, including cutter bars or tractor	Free	12.03400

	mounting		
8433 30 00	Other hay making machinery	Free	12.03400
8433 40 00	Straw or fodder balers, including pick-up balers:	Free	12.03400
	Other harvesting machinery and threshing machinery:		12.03400
8433 51 00	Combine harvester-threshers	Free	12.03400
8433 52 00	Other threshing machinery	Free	12.03400
8433 53 00	Root or tuber harvesting machines	Free	12.03400
8433 59 00	Other	Free	12.03400
8433 60	Machines for cleaning, sorting or grading eggs, fruit or other agricultural product:		
8433 60 10	Machines for cleaning	Free	12.03400
8433 60 20	Machine for sorting or grading	Free	12.03400
8433 90 00	Parts	Free	12.03400
			12.03400
8434	Milking machines and dairy machinery		
8434 10 00	Milking machines	Free	12.03400
8434 20 00	Dairy machinery	Free	12.03400
8434 90	Parts :		
8434 90 10	Of milking machinery	Free	12.03400
8434 90 20	Of dairy machinery	Free	12.03400

Indian Imports from Various Countries including from Italy

Commodity: 8434 MILKING MACHINES & DAIRY MACHINERY

Ranking	Country	Values in US$ Million	
		2006-2007	2007-2008(Apr-Jun)
1	U K	3.12	0.46
2	GERMANY	3.02	0.12
3	DENMARK	2.51	0.66
4	ITALY	1.26	0.51
5	AUSTRALIA	1.25	0.08
	Total Imports	15.23	7.6

- India's total imports of Milking and Dairy machines from the world were US$ 15.23 million in 2006-07 and were majorly from 24 countries.
- An analysis of the top 5 exporting countries to India reveals that Italy was the 4th largest exporter of Milking and Dairy Machines to India.

Commodity: 8433 - HARVESTING OR THRESHING MACHINERY, INCLUDING STRAW OR FODDER BALERS; GRASS OR HAY MOWERS; MACHINES FOR CLEANING, SORTING OR GRADING EGGS, FRUIT OR OTHER AGRICULTURAL PRODUCE

Ranking	Country	Values in US$ Million	
		2006-2007	2007-2008(Apr-Jun)
1	JAPAN	2.98	0.75
2	ITALY	2.91	0.89
3	NETHERLAND	2.76	0
4	U S A	2.39	0.23
5	GERMANY	0.87	0.08
	Total Imports	14.92	2.64

- India's total imports of Harvesting or Threshing machinery from the world were US$ 14.92 million in 2006-07 and were majorly from 33 countries.
- An analysis of the top 5 exporting countries to India reveals that Italy was the 2nd largest exporter of Harvesting or Threshing machinery at US$ 2.91 million.

COMMODITY: 8432 AGRICULTURAL, HORTICULTURAL OR FORESTRY MACHINERY OF SOIL PREPARATION OR CULTIVATION; LAWN OR SPORTS-GROUND ROLLERS

Ranking	Country	Values in US$ Million	
		2006-2007	2007-2008(Apr-Jun)
1	CHINA P RP	10.4	1.08
2	ITALY	1.42	0.21
3	U S A	0.94	0.14
4	NETHERLAND	0.61	0
5	ISRAEL	0.5	0.01
	Total	15.44	2.08

- India's total imports of Agricultural, Horticultural machinery from the world were US$ 15.44 million in 2006-07 and were majorly from 40 countries.
- An analysis of the top 5 exporting countries to India reveals that Italy was the 2nd largest exporter to India at US$ 2.91 million.

- But China is way ahead at US$ 10.4 million and constitutes nearly 80% of all exports to India.

Need for increased Mechanisation in India

Mechanization has been well received the world over as one of the important elements of modernization of agriculture. It is now recognized that availability of mechanical power and improved equipment has enabled States like Punjab and Haryana to achieve high levels of land productivity.

The results of the survey conducted under the project "Study Relating to Formulating

Long-Term Mechanization Strategy for Each Agro Climatic Zone/State" conducted by the Government of India confirm that in those States where agricultural mechanization has made good progress, its benefits are being shared by all farmers irrespective of the size of their operational holdings and whether they own tractors and machinery or not. However, the progress of mechanization in most of the States has been slow and its benefits of timely and precise operations, efficient use of costly inputs like seed, fertilizer, plant protection chemicals, limited water resource, etc. are not reaching the majority of farmers in full measure.

During the course of project implementation by the Government of India, certain issues need attention to if a more even spread of mechanization and the policy goal of modernizing Indian agriculture have to be achieved.

Future requirement for farm equipment and technologies include rota- tiller for seed bed preparation, till planter, strip till drill, pneumatic precision planter, sugarcane sett cutter planter, vegetable transplanter and check-row planter, for sowing and planting. Power weeders and equipment for chemico-mechanical weed management, electro-static spraying and tall tree spraying are required. Harvesting equipment for sugarcane and cotton are required to be developed.

Looking at the future requirement of India and its import statistics of agricultural and farm machinery it is clear that Italy is one of the top 5 exporters. But looking at the value of Italy's exports to India vis-à-vis India's total import of these farm machinery and equipment, it is clear that there are further potential opportunities for Italian manufacturers to sell and market their agricultural machinery and equipments in India.