Tractor industry in India

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1. Introduction

Agricultural mechanization made a small beginning with the introduction of imported tractors and by acquiring war surplus tractors and bulldozers for undertaking, basically, land reclamation and to some extent mechanical cultivation. In 1947, Central Tractor Organization and a few State Tractor Organizations were set up, which, during 1947-1959, reclaimed about one million hectares of land. This in turn created demand for tractors to undertake follow up cultivation in the reclaimed areas. The number of tractors in use estimated by [1] was 8,500 in 1951, 20,000 in 1955 and 37,000 in 1960. Up to 1960, the annual demand of tractors was met entirely through imports.

When planned economic development of the country was launched in 1951, tractor industry was included in the "Core Sector" which indicated its strategic importance. Its growth and development policies were, therefore, reviewed on Plan to Plan basis. As in the case of all other industries, farm equipment industry had to follow the legislation enacted under Industrial Development and Regulation Act, 1951, the main features of which were:

- reservation of certain sectors of core and heavy industry for the Government i.e., steel, machine-tools, aircraft, etc.;
- reservation of certain class of items exclusively for the defined small scale sector;
- necessity of obtaining an industrial license from the Government of India for manufacturing any new article when capital investment in land and building exceeds Rs 1.0 million;
- phased local manufacturing program;
- imported plant and machinery;
- technical experts from collaborators and training of Indian counterparts.

A policy of protection of domestic industry was introduced, wherein; imports were totally prohibited if local manufacturing capabilities were adequate for meeting demand. Import tariffs were levied in other cases where local manufacturing, though set up, was inadequate, necessitating imports. As industrialization progressed, exemptions from licensing were liberalized first to Rs 10.0 million, than to Rs.30.0 million, and further to Rs 50.0 million. During 1992-96, licensing was further liberalized and most of the industries were de-licensed. Development Councils for various sectors of industry were also set up at the national level to advise the Government on the steps to promote and foster industry. The growth of the Farm Equipment Industry in India has to be viewed in the backdrop of this national scenario.

2. Tractor industry: 1961 -70

Development of the tractor industry in the sixties was dictated by the anxiety to promote mechanization of agriculture by encouraging local manufacturing of tractors and at the same time, protecting the interest of farmers by making them available tractors at the reasonable prices. The tractor manufacturing in India started in 1961. The names of the units, their collaborators and the year of commencement of local manufacture are given in **Table 1**. First four entrepreneurs were representing trading houses as dealer or sub-dealer of tractors, the fifth, Mahindra & Mahindra, was a major player in the automobile sector. These units were licensed in 1960-61 with aggregate capacity to manufacture 11,000 tractors. Though all these units went into production subsequently, it was noted that pace of installation of production capacity was slow. On the other hand, the demand of tractors was increasing at a steep rate and expected to grow further in the ensuing years. Besides considering industrial licenses to add the additional production capacity, import of tractors continued to meet the demand of farmers. As the

the demand of farmers. As the prices of tractors imported from the East European countries were lower than locally manufactured tractors, the duties on imported component were raised to 40%. Simultaneously, to protect the interest of farmers in the situation of acute shortage of tractors Government imposed statutory control on the selling prices of indigenously manufactured tractors in 1967. However, this control was withdrawn in October 1974 when the supply position was eased. To meet the growing demand, the Government decided to invite additional entrepreneurs into tractor manufacture in 1968. As given by [2], the production of tractor started in 1961 with 880 units which rose to over 5000 units in 1965 and crossed 20,000 units in 1970 (**Table 2**). There were about 52,000 tractors in use in 1965, which increased to 146,000 tractors in 1970.

3. Tractor industry: 1971-1980

The Government decision to invite new entrepreneurs to manufacture tractors in 1968 and the sudden upsurge in demand due to Green Revolution led to a flood of requests for new collaborations. Of these only 6 units established the manufacturing facilities (number 6 to 11 in **Table 1**). Escorts established Escort Tractors Limited and started manufacturing Ford tractors in 1971 in collaboration with Ford, U.K. Three of these units, namely, Kirloskar Tractors, Harsha Tractors and Pittie Tractors could not survive and closed down their plants. During this period, the emphasis was on indigenous production of the tractors and the Government extended full support to old and new entrepreneurs to establish local manufacture. The credit facilities to the farmers for the purchase of tractors were increased and liberalized to enlarge the market. The import of tractors, both fully built and in CKD form to new entrepreneurs was continued. Because of oil crisis in 1973, and the resultant economic crisis, the import of fully built tractors was banned in 1973 except under specific World Bank Projects and CKD import to new entrepreneurs in the process of entrepreneurs in the process of establishing local production facilities. With more manufacturers entering in the field in a stagnant demand situation, the market became intensely competitive from 1973 onward. The Statutory Price Control on tractors was lifted in October 1974. As a result of Government directive to the commercial banks to increase their proportion for rural lending, the commercial banks opened branches in rural areas. This action was supported by availability of refinance facilities to commercial banks for agricultural development from National Bank for Agriculture and Rural Development. Credit available to farmers increased significantly and the tractor market expanded rapidly from the beginning of 1977. The production of tractors more than doubled during a five year period. It was 33,000 units in 1975 and increased to over 71,000 units in 1980 (**Table 2**). The number of tractors in use also crossed 500,000 units mark.

4. Tractor industry: 1981-90

The expansion in the tractor market during late seventies led to the setting up five more units for the manufacture of tractors. One of these was in the public sector in collaboration with an U.K. firm and the rest were in the private sector. Only one firm in private sector had collaboration with an outside (Romanian) firm and others used indigenous know-how. These units are listed in **Table 1** at serial numbers 12 to 16.

After having attained complete indigenous production by most of the already established tractor units, the post 1980 period was marked by increased production from all units. However, except VST Tillers & Tractors, other four newly established units during eighties could not sustain the market competition and closed their plants. In order to make available tractors to the farmers with small holding of land, the Government exempted production tax (excise duty) for tractors of 9 and lower drawbar kW. This exemption was extended to the tractors fitted with engine not exceeding 1800 cm^3

subsequently. This phase of industry was comprised of consolidation and up-gradation of technology to improve the quality of products. The Working Group in the Ministry of Industry and later on a Group in the Ministry of Agriculture, recommended to improve fuel efficiency of tractors by fixing norms of specific fuel consumption at power take-off shaft. They also recommended improving the parameters of noise and vibration levels, emission levels, ergonomics and safety aspects. The industry grew slowly in the early eighties and produced about 75,000 tractors in the year 1985 (**Table 2**). In the later half of eighties industry grew very fast and produced almost 140,000 tractors in 1990 (**Table 2**). The number of tractors in use in India reached one million units mark in 1989 and in 1990 the population of tractors was estimated to be 1.2 million units. Export of tractors mainly to the African countries, also started in the eighties. Thus, India, a net importer up to mid seventies became an exporter during eighties.

5. Tractor industry: 1991-98

Indian industry has seen a remarkable change from a complete protection in early days to a competition in the international market during nineties. Government approval and obtaining industrial license for manufacture of tractor was dispense with in 1992. The foreign companies can also take up tractor production in India, after following prescribed procedure or obtaining approval from the Government. However, import of fully built up tractor has been restricted presently and the same can be imported against import license or public notices issued in this behalf. Credit facilities to the farmers for the purchase of tractors have been continued. The collaboration of Escorts with Ford came to an end in 1994 and Escorts started to produce Farmtrac tractor in place of Ford tractor. Haryana Tractors (S. number 13 in **Table 1**) has been producing tractors on a very irregular basis. Bajaj Tempo started manufacturing in 1997 and International Tractors (Sonalika) has started production in 1998. The production of tractors from all units during 1997 was over 255,000 units (**Table 2**). The number of tractors in use in India at the end of 1997 was estimated to be over two million units.

6. Present status and future plans of tractor industry

Tractor manufacturing industry is now well established in India. Out of the sixteen units who took up manufacturing before 1990, six units, namely, Eicher, Escorts, HMT, Mahindra & Mahindra, PTL and TAFE are major manufacturers (**Table 3**). Out of the six units, five were set up with foreign col-laborations and one with the indigenous know-how (Punjab Tractors). Therefore, it may be said that the establishment and the present status of the tractor industry in India owe a great deal to the foreign collaborators who supported the Indian entrepreneurs during initial phase of manufacture. All these six units are now on their own and having mastered the manufacturing technology of tractor, have developed capabilities to expand their base further. Ancillaries have also been well established and the industry is no longer dependent on import of components or systems. Mahindra & Mahindra has emerged as the largest manufacturer with about 68,000 tractors produced in 1997. TAFE and Escorts with about 49,000 and 48,000 units each follow it, respectively. The Punjab Tractors produced over 40,000 units.

Three manufacturers who are likely to start production in near future are listed at serial numbers 19 to 21 in **Table 1**. New Holland Tractor (India) launched 50 kW Ford tractors with matching equipment in April 1998. The company is making US$ 75 million initial investment in a state of the art plant in Greater NOIDA, Uttar Pradesh with an initial capacity to produce 35,000 tractors annually. The Larsen & Toubro (L&T) is establishing a joint venture with John Deere of the USA. This joint venture will manufacture 25-50 kW tractors in a plant in Pune, Maharashtra. SAME Deutz-Fahr, Italy is developing a joint venture with Greeves Limited to produce

SAME brand of tractors. Case and M&M are developing a joint venture for producing tractors in the range of 45-150 kW for the export to South America. With the entry of new European tractor manufacturers into India, technology and sophistication is expected to improve further in the near future. The production is expected to rise to an estimated level of about 300,000 tractors by the year 2000.

The growth of physical output of tractors is accompanied by a significant increase in the number of models produced with different horsepower ranges to meet the diverse needs of the farmers. For instance, during initial years, when the production of tractors began in the country only a few models were produced and the same have now increased to over 40 numbers, in the power range of 11 kW to 50 kW at power take-off shaft. A few technical details of the tractor models produced in India are given in **Table 4**. The increase in the power range is a reflection of the preference of the tractor purchasers, which is composed of large, medium and small farmers as well as entrepreneurs who provide custom hire services.

7. Power tiller industry

The import of power tillers started in 1961 and continued till 1974. A total of 12,211 power tillers were imported from Japan during this period (**Table 5**). Initially, six manufacturers were given license to make 40,000 power tillers annually (**Table 6**). Krishi Engines limited; Hyderabad was the first manufacturer to start the production of Krishi power tillers in 1965. In 1970, three manufacturers, namely, VST Tillers & Tractors Limited (Mitsubishi), Maharashtra Co-operative Engineering Society (Yanmar) and Kerala Agro-Machinery Corporation (Kubota) started production of power tillers. Production of Yanmar power tillers was discontinued in 1977. In 1971 Indequip Engineering limited started production of Iseki power tillers and discontinued production in 1977. The J K Satoh Agricultural Machines limited started limited started production of Satoh power tillers in 1973 and discontinued production in 1985. Production of Krishi power tiller was discontinued in 1986. The Bihar Agro-Industries started producing Kubota power tillers in 1975 but discontinued production in 1989. The National Engineering Company started producing National power tiller in 1984 and closed production in 1989. The Dogar Tools Private Limited started production of Universal power tiller in 1984 and stopped production in 1994. Details on manufacturers are given in **Table 6**. At present there are only two well established manufacturers, namely, VST Tillers & Tractors Limited, Banglore and Kerala Agro-Machinery Corporation, Ernakulam producing about 10,000 power tiller units per year.

Recently a new manufacturer, Kalinga Engineers Limited, Bhubaneshwar has started to produce 3-HP power tiller in small quantities. Another manufacturer, Field Worthy Equipment Pvt. Ltd., Ahmedabad, Gujrat is also planning to produce a 5-HP power tiller. A number of companies in West Bengal and Tamilnadu are importing power tillers from China.

Though there is encouraging trend in the production of power tillers the present production of 10,000 units per year is only 25% of the installed capacity of 40,000 units. In the recent past sale of power tillers has increased significantly and the situation is highly favorable with the introduction of subsidy by the central government and many state governments. Development of several new matching equipment and R&D support by ICAR are contributing towards increased use of power tillers.

8. Population of tractors and power tillers

Annual production and annual sale of tractors and power tillers are given in **Table 2** and **Table 5**, respectively. Data on annual sales of tractors during last five decades clearly show that these sales have more than doubled in each next decade. It is expected that by the year 2000 the sale of tractors in India will be

around 300,000 units. Assuming the life of tractors as 15 years and power tillers as seven years, based on their sales, the population of tractors and power tillers in different states was estimated. The population density of tractors and power tillers was computed by dividing their respective numbers by the agricultural land area of a state. These population densities of tractors and power tillers as units per 1000 ha for different states are given in **Table 7**. It is clear that in 1997 Punjab had the highest density of tractors with 82 tractors per 1000 hectare. This was followed by neighboring states of Haryana (63 tractors per 1000 ha) and Uttar Pradesh (24 tractors per 1000 ha). Although the sale of power tillers has been rather small in India most of these have gone to rice growing states like West Bengal, Tamil Nadu, Karnataka, Assam, Kerala and Andhra Pradesh.

The easy availability of the agricultural credit has contributed significantly towards growth of the tractor industry, as more than 90% tractors are sold on credit. The Reserve Bank of India has also proposed to increase the capital of the National Bank for Agriculture and Rural Development (NABARD) from Rs 5,000 million to Rs 20,000 million to help it meet the needs of rural sector better. Punjab with over 80 tractors per 1000 ha has reached a saturation situation and will have mainly a replacement market. Haryana, with over 60 tractors per 1000 ha, will reach a similar position in next five years. The sale of tractors will continue to be very high in northern and western India, especially in Uttar Pradesh, Madhya Pradesh, Punjab, Haryana, Rajasthan, Gujrat and Maharashtra. The sale of tractors is expected to increase significantly in southern states, namely, Andhra Pradesh, Karnataka and Tamilnadu.

The average size of tractor in India at present is about 25 kW. The average size is expected to increase slowly to 35 kW in year 2020. The present population of two million tractors in India is expected to increase to about five million in 2020. The annual sale of tractors in India is expected to increase to about 320,000 units. The average size of power tiller in India at present is about 7 kW. The present population of 66,000 power tillers is expected to grow quite rapidly to 300,000 units in 2020 with annual sales reaching over 50,000 units.

References

[1] *Jain, B.K.S.*, 1971. Production of agricultural machinery in India. Presented at the Agricultural Mechanization Workshop held at the International Rice Research Institute, Manila, Philippines.

[2] *Mehta, M. M.*, 1989. Indian tractor industry - volumes and technological strengths. Presented at IV International Training Course on “Improved Farm Implements and Tools” held at Indian Agricultural research Institute, New Delhi, India.

[3] *T. M. A.* Periodical returns from tractor manufacturers in India. Tractor Manufacturers Association TMA), Institutional Area, Lodi Road, New Delhi, India

Table 1 List of tractor manufacturers, their collaborators and the year of commencement of production

	MANUFACTURER	COLLABORATOR	YEAR
1	Eicher Tractors Ltd.	Gebr, Eicher Tractorenfabrik, West Germany	1961
2	Gujarat Tractors Ltd./Tractors and Bulldozers Ltd.	Motokov-Praha, Czechoslovakia	1963
3	Tractor and Farm Equipment Ltd.	Messey Ferguson, UK	1961
4	Escorts Ltd.	Moloimport Warazawa Zaklady Mechaniczne Ursus, Poland	1964
5	Mahindra & Mahindra Ltd./ International Tractor Co. of India Ltd.	International Harvesters, UK	1965
6	(*)Escorts Tractor Ltd. / Escorts Ltd. (Farmtrac Division)	Ford, UK	1971
7	Hindustan Machine Tools Ltd. (Central Sector PSU)	Motokov-Praha, Czechoslovakia	1971
8	(#) Kirloskar Tractors Ltd.	Klochner-Humboldt Deutz, Germany	1974
9	Punjab Tractors Ltd. (State Sector)	CMERI, India	1974
10	(#) Pittie Tractors Ltd.	Own know-how	1974
11	(#) Harsha Tractors Ltd	Motoimport, Russia	1975
12	(#) Auto Tractors Ltd.	British Leyland, UK	1981
13	(§) Haryana Tractors Ltd. / Pratap Steel Rolling Mills Ltd.	Own know-how	1983
14	VST Tillers & Tractors Ltd.	Mitsubishi, Japan	1983
15	(#) United Auto Tractors Ltd.	Uzina Tractorul, Romania	1986
16	(#) Asian Tractors Ltd.	Own know-how	1989
17	Bajaj Tempo Ltd.	Own know-how	1997
18	International Tractors (Sonalika) Ltd.	Own know-how	1998
19	New Holland Tractor (India) Pvt.	New Holland Tractors, Italy	(°)
20	Larsen & Tubro Ltd.	John Deere, USA	(°)
21	Greaves Ltd.	Same Deutz-Fahr, Italy	(°)

Note: (*) now producing Farmtrac tractors;
(#) currently not in production;
(§) have been producing small quantities on "On & Off" basis;
(°) product under test and evaluation.

Table 2 Production, sale and population of tractors in India

YEAR	PRODUCTION	IMPORT	EXPORT	SALE	POPULATION (*)
Up to 1946	0	4,500	0	4,500	4,500
1947-51	0	4,000	0	4,000	8,500
1952-56	0	12,500	0	12,500	21,000
1957-60	0	16,000	0	16,000	37,000
1961	880	2,997	0	3,877	39,000
1962	1,414	2,616	0	4,030	41,000
1963	1,983	2,346	0	4,329	43,000
1964	4,323	2,323	0	6,646	47,000
1965	5,673	1,989	0	7,662	52,000
1966	8,816	2,591	0	11,407	62,000
1967	11,394	4,038	0	15,432	76,000
1968	15,466	4,726	0	20,192	93,000
1969	18,093	10,478	0	28,571	118,000
1970	20,099	13,300	0	33,399	146,000
1971	18,100	19,739	0	37,839	176,000
1972	20,802	1,000	0	21,802	210,000
1973	24,425	1,000	0	25,425	228,000
1974	31,088	793	0	31,881	256,000
1975	33,252	1,100	0	34,352	287,000
1976	33,146	2,920	0	36,066	319,000
1977	40,946	0	0	40,946	356,000
1978	54,322	0	0	54,322	406,000
1979	62,275	0	0	62,275	462,000
1980	71,024	0	0	72,012	526,000
1981	84,137	0	0	79,467	594,000
1982	63,155	0	0	65,776	644,000
1983	75,872	0	0	76,545	701,000
1984	84,876	0	0	82,390	754,000
1985	75,550	0	0	76,817	798,000
1986	80,369	0	0	80,670	841,000
1987	92,092	0	0	92,092	911,000
1988	109,987	0	0	109,987	996,000
1989	121,624	0	0	121,624	1,085,000
1990	139,831	0	458	139,373	1,190,000
1991	150,556	0	583	149,973	1,304,000
1992	144,350	0	1,174	143,601	1,407,000
1993	138,770	0	1,498	138,057	1,491,000
1994	164,841	0	3,038	164,309	1,593,000
1995	191,329	0	3,454	191,196	1,712,000
1996	221,689	0	3,719	220,941	1,853,000
1997	255,327	0	7,000	250,378	2,038,000

Note: (*) Based on estimated life of 15 years

Table 3 Tractor sales of major manufacturers. The data include sales from April of the stated year to March of next year

COMPANY/MAKE	1995	1996	1997
Eicher	21,875	23,129	24,255
Escorts (+ Farmtrac)	38,597	43,442	48,329
Gujrat (Hindustan)	1,807	1,354	1,115
H.M.T.	16,981	19,018	19,275
Mahindra & Mahindra	50,005	57,379	67,779
Punjab (Swaraj)	26,315	33,034	40,245
TAFE	36,370	43,585	49,160

Table 4 Model, power range and indicative price of tractors in 1997

MODEL		ENGINE		MAX. PTO POWER	SFC AT MAX. POWER	WEIGHT/ PTO POWER	PRICE (*) (SEP 30,98)
		Cylinders (n.)	Capacity (cm^3)	(kW)	(g/kWh)	(kg/kW)	(Rs)
1	Mahindra 225 DI	2	1261	12.0	271	142.92	176,950
2	Mahindra 265 DI	3	1788	22.8	249	76.10	200,395
3	Mahindra B-275 DI	3	1892	23.3	256	74.68	215,383
4	Mahindra 365 DI	3	1810	21.9	255	78.54	208,797
5	Mahindra 475 DI	4	2384	29.0	238	61.38	235,730
6	Mahindra 575 DI	4	2523	31.2	233	59.94	264,308
7	Swaraj 724 FE	2	1728	16.0	259	107.81	170,500
8	Swaraj 735 FE	3	2592	25.1	250	73.11	211,000
9	Swaraj 855	3	3308	33.9	257	57.27	263,000
10	Escorts 325 M	2	1795	16.6	288	100.00	174,7000
11	Escorts 335 M	2	1960	20.9	250	83.97	200,500
12	Escorts 340 M	3	3120	33.2	339	54.97	228,000
13	Escorts 355M	3	2727	29.6	245	62.67	247,000
14	Farmtrac 50	3	2868	31.0	297	59.35	269,000
15	Farmtrac 60	3	3147	33.3	253	59.31	298,000
16	TAFE 25 DI	2	1670	17.7	269	90.41	176,340
17	TAFE 30 DI	3	1788	25.1	258	65.74	213,273
18	TAFE 1035 DI	3	2365	24.9	243	65.66	218,738
19	MF 245	3	2500	30.5	256	58.20	256,475
20	Eicher 241 NC	1	1557	15.1	262	109.93	162,075
21	Eicher 242 NC	1	1558	14.1	267	114.54	165,620
22	Eicher 312	2	1790	20.3	259	85.47	184,745
23	Eicher 364 NC	2	1963	22.9	272	76.20	204,035
24	HMT 2522 Edi	2	1560	16.1	266	102.48	180,950
25	HMT 3511	3	2340	22.5	254	84.44	211,214
26	HMT 4511	3	2698	30.5	274	69.67	249,381
27	HMT 5911	4	3456	37.2	264	63.71	312,391
28	Hindustan G 312	2	1798	18.7	271	91.18	133,184
29	Hindustan G 453 DI	3	2697	32.3	290	61.61	242,903
30	Hindustan Super	4	4160	39.2	285	68.88	277,902
31	Hindustan G 614	4	4667	48.9	277	55.52	307,066

Note: (*) US$1= 42 Indian Rupees (Rs)

Table 5 Production, sale and population of power tillers in India

YEAR	PRODUCTION	IMPORT	EXPORT	SALE	POPULATION (*)
1961	0	2	0	2	2
1962	0	22	0	22	24
1963	0	12	0	12	36
1964	0	173	0	173	209
1965	329	983	0	1,312	1,521
1966	577	1,101	0	1,678	3,199
1967	171	1,271	0	1,442	4,641
1968	286	994	0	1,280	5,919
1969	314	961	0	1,275	7,172
1970	1,387	1,030	0	2,417	9,577
1971	1,081	2,523	0	3,604	13,008
1972	1,199	1,072	0	2,271	13,967
1973	1,526	1,107	0	2,633	14,922
1974	2,142	960	0	3,102	16,582
1975	2,617	0	0	2,617	17,919
1976	1,949	0	0	1,949	18,593
1977	1,602	0	0	1,602	17,778
1978	2,297	0	0	2,297	16,471
1979	2,576	0	0	2,576	16,776
1980	2,125	0	53	2,072	16,215
1981	2,352	0	59	2,293	15,406
1982	2,248	0	140	2,108	14,897
1983	2,751	0	107	2,644	15,592
1984	4,244	0	184	4,060	18,050
1985	3,917	0	21	3,896	19,649
1986	3,527	0	0	3,527	20,600
1987	3,258	0	0	3,258	21,786
1988	4,923	0	0	4,923	24,416
1989	5,324	0	10	5,314	27,622
1990	6,194	0	11	6,183	31,161
1991	7,573	0	60	7,513	34,614
1992	8,743	0	22	8,721	39,439
1993	9,406	0	96	9,310	45,222
1994	8,315	0	294	8,021	49,985
1995	10,375	0	256	10,119	55,181
1996	10,048	0	3	10,045	59,912
1997	12,200	0	0	12,200	65,929

Note: (*) Based on estimated life of 7 years

Table 6 Power tiller manufacturers in India

	MANUFACTURER	MAKE	SIZE (HP)	YEAR OF RODUCTION	
				Started	Closed
1	Krishi Engines Ltd., Hyderabad	Krishi	5-8	1965	1986
2	VST Tillers & Tractors Ltd., Banglore	Mitsubishi	8-10	1970	Continuing
3	Maharashtra Co-op. Engg. Society, Kolhapur	Yanmar	8-12	1970	1977
4	Kerala Agro Machinery Corp. Ltd., Ernakulam	Kubota	8-12	1970	Continuing
5	Indequip Engineering Ltd., Ahmedabad	Iseki	5-7	1971	1977
6	J K Satoh Agricultural Machines Ltd., Kanpur	Satoh	7-9	1973	1985
7	Bihar Agro-Industries Corp. Ltd., Patna	Kubota	8-12	1975	1989
8	National Engineering Company, Chennai	National	6.5	1984	1989
9	Dogar Tools Private Ltd., Raipur	Universal	6.5	1984	1994
10	Kalinga Engineers Ltd., Bhubaneshwar	Kalinga	3	1997	Starting

Table 7 Population and density of tractors and power tillers, 1997

STATE	AGRI. LAND	TRACTOR		POWER TILLER	
	1000 ha	Population	Density/000 ha	Population	Density/000 ha
Andhra Pradesh	14,460	100,067	6.92	3,564	0.22
Assam	3,205	6,434	2.01	6,127	1.73
Bihar	10,743	74,130	6.90	735	0.06
Goa	67	126	1.88	813	11.00
Gujrat	10,292	146,528	14.24	1,710	0.15
Haryana	3,711	233,376	62.89	21	0.01
Himachal Pradesh	1,010	2,189	2.17	12	0.01
Jammu & Kashmir	1,014	3,717	3.67	23	0.02
Karnataka	12,321	73,856	5.99	9,227	0.68
Kerala	1,796	7,708	4.29	5,121	2.59
Madhya Pradesh	22,111	195,108	8.82	407	0.02
Maharastra	20,925	110,763	5.29	3,153	0.14
Manipur	175	357	2.04	845	4.38
Orissa	5,296	12,989	2.45	1,551	0.27
Punjab	4,033	332,675	82.49	21	0.00
Rajasthan	20,971	175,288	8.36	32	0.00
Tamil Nadu	7,474	85,062	11.38	12,399	1.50
Uttar Pradesh	17,986	434,412	24.15	255	0.01
West Bengal	5,656	16,121	2.85	17,396	2.79
Other states*	2,123	77	0.04	2,237	0.96
Union Territories	140	4,568	32.63	281	1.82
Total	**165,509**	**2,015,551**	**12.18**	**65,929**	**0.40**