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Abstract

Secondary data analysis revealed that the Public Private Partnership mode of promotion of self-propelled transplanters is effective in the state of Odisha, though the spread of transplanters was not uniform across regions. The sale of number of power operated transplanters under Public Private Partnership mode has increased from a mere three units during 2005-06 to 608 during 2013-14. Primary data analysis of the transplanter owners revealed that there was a total monetary gain of Rs. 15,570 (US$ 255) and Rs. 18,220 (US$ 299) per ha in inland and coastal Odisha, respectively over manual transplanting even without extending subsidy. Though the Public Private Partnership program was effective in adoption of power operated transplanters, it was not inclusive in covering a large section of small and marginal farmers. A legal bond with the transplanter owner is required to make the program more inclusive. Prompt after sale service for the machine, training on mat type nursery raising and to driver of the transplanter is needed as assessed from the survey. Cooperation with irrigation department of Odisha is necessary for timely release of water in canals for planting.

Introduction

The process of economic development and structural transformation in a developing economy involves withdrawal of labour from agricultural sector and engagement in industrial and service sectors (Timmer, 2010). In the process of economic development, more and more labours from agricultural sector are diverted for non-farm activities. As a result, wages of agricultural labours rise and farmers try to substitute machines in place of labours to carry out various agricultural operations. The era of unlimited labour supply has already passed in rural China (Xiaobo *et al*., 2011) and the process of economic development in India has led to diversion of rural agricultural labours to other sectors of the economy. As a result, the wages of agricultural labour has increased and in the recent past, the rate of increase was observed to be faster due to operation of the mega government labour employment program like Mahatma Gandhi National Rural Employment Guarantee Scheme (Gulati *et al*., 2013). Due to continuous rise in wages, the profit margins from rice cultivation have decreased year after year in different states (Narayanmoorthy and Suresh, 2012; Samal, 2013). Further, rural youths are reluctant to attend various agricultural operations due to more drudgery involved in such operations in comparison to jobs in non-farm sector. Therefore, mechanization of different operations in paddy cultivation has become inevitable to reduce labour use in production process and reduce drudgery. Moreover, agricultural machineries increase productivity of land and labour by meeting timeliness

of farm operations and increasing work output per unit time. The sequential adoption of mechanization, first for power intensive operations (land preparation, pumping water, transport, threshing, milling, etc.) and then for control intensive operations (transplanting, weeding, shifting, winnowing, etc.) is a farmer response induced by changing relative prices of factor inputs (Pingali, 2007) like human labour, animal labour, chemicals, machineries, etc. In the initial stage, government ought to play a facilitating role in the acquisition and maintenance of mechanical technologies as the initial cost of acquisition of machineries is relatively high. In the process of facilitation, this may require some capital subsidies in the beginning.

Odisha is an agrarian state with 83% of its total population (42 million) living in rural areas. Rice crop covers maximum area (4.02 million ha) among all crops in Odisha. The studies relating to formulating long-term mechanization strategies for each agro-climatic zone / state of India have recommended introduction of rice transplanters in Odisha (Annamalai, 2010 and Pandey, 2010). Rice cultivation is labour intensive and the operations where very little mechanization has taken place are transplanting and weeding. Availability of labour is a major problem during transplanting for which Government of Odisha has decided to introduce power operated rice transplanters in Public Private Partnership (PPP) mode during 2004. Promotion of rice transplanters in PPP mode not only improves the efficiency in paddy cultivation but also increase effective extension services and faster pro-rural innovative activity in the agricultural sector. Government is providing subsidy to farmers for purchase of transplanters and no study has been conducted to assess the effectiveness of the program and how different regions of Odisha and different categories of farmers have benefitted from the program. Therefore, this study was planned to study the effectiveness of PPP in promotion of rice transplanters in different regions of Odisha and also to study the equity aspects. The hypothesis set for the study was that all the zones and all categories of farmers of Odisha have equally benefitted from the PPP program on promotion of self-propelled rice transplanters by the Government of Odisha.

Means and Methods

During 2004, three models of self-propelled rice transplanters from three firms were approved by Government of Odisha for promotion by extending subsidy. A list of farmers who have purchased transplanters in PPP mode up to the year 2011-12 was obtained from the office of the Agriculture Promotion and Investment Corporation of Odisha Ltd. (APICOL), Government of Odisha, during 2012. The number of power operated transplanters sold in PPP mode was 147 up to the year 2011-12. It was noticed that all the transplanters purchased by the farmers under PPP mode were of one model i.e. Yanji Shakti 2ZT-238-8 sold by VST Tillers and Tractors Ltd. This is due to aggressive marketing strategies like extension of credit to dealers, wide network and lower cost of the transplanter of the promoting firm. Therefore, it was decided to undertake the primary survey based on this model only.

Physiographically, the state of Odisha is divided into four broad zones viz. Eastern Ghats, Central Table Land, Northern Plateau and Coastal Plains (**Fig. 1**). Sixty transplanter owners from 15 districts of

Fig. 1 Map showing different zones of Odisha

Table 1 Zone wise sampled farmers (transplanter owners) surveyed in Odisha

Zone	Districts in the zone	No. of transplanter owners contacted
Eastern Ghats	Bolangir, Kalahandi, Koraput, Malkangiri, Nawarangpur, Nuapara, Rayagada and Sonepur.	25 (60)
Central Table Land	Angul, Bargarh, Boudh, Deogarh, Dhenkanal, Jharsuguda, Kandhamal and Sambalpur.	9 (23)
Northern Plateau	Keonjhar, Mayurbhanj and Sundergarh.	8 (19)
Coastal Plains	Balasore, Bhadrak, Cuttack, Ganjam, Gajapati, Jagatsinghpur, Jajpur, Kendrapara, Khurdha, Nayagarh, Puri.	18 (45)
Odisha	30	60 (147)

Figures in parentheses indicate actual number of transplanters available in the zone up to 2011-12

Odisha were selected on the basis of random sampling with probability proportion to the number of transplanters available in each zone up to the year 2011-12. The number of samples selected from each zone is mentioned in **Table 1**. Data on area coverage by each transplanter (both own farm and on custom hiring basis), number of small farmers covered, irrigation availability by source, training needs and availability of after sale service etc. were collected from the transplanter owners with the help of a questionnaire. The cropping season for which data on area coverage and number of farmers covered refers to the year 2012-13 (wet and dry seasons). As machine transplanting requires mat type seedlings, labour requirement for different operations of mat type nursery raising along with materials required were also collected from the transplanter owners along with labour and material required for normal method of nursery raising. The depreciation of the machine was taken into account while computing the cost of planting mat type seedlings. As the wage rates of three zones viz. Eastern Ghats, Central Table Land and Northern Plateau were similar, these three zones were combined and reported as inland Odisha for computing cost of nursery raising cum planting and compared with similar method of nursery raising in the Coastal Plains zone, where wage rate was higher during the survey period. Further data collection to assess the progress of sale of transplanters in PPP mode was made from the office of the Director of Agriculture and Food Production (DAFP), Odisha for the years 2012-13 and 2013-14, as the system of sale was changed from manual to online system from the year 2011-12 onwards. Total area coverage and irrigated area under rice in different districts were also collected from the same office and the share of each zone in total area and number of transplanters available per thousand ha of irrigated area was computed. Tabular method was used to analyze the data. In the process of study, other stakeholders like officers of the state department of agriculture and dealers of the machines were contacted to cross check the data.

Results and Discussion

Odisha has a total geographical area of 15,571 thousand ha out of which 6,180 thousand ha (39.7%) is cultivated area (**Table 2**). The distribution of cultivated area in Eastern Ghats, Central Table Land, Northern Plateau, and Coastal Plains zone was 30.2%, 21.3%, 17%, and 31.5%, respectively during 2012-13. Rice is the main crop of the state and covered about 45% of the gross cropped area (8.88 million ha). Eastern Ghats, Central Table Land, Northern Plateau, and Coastal Plains zone accounted for 27.4%, 19.9%, 16.5% and 36.2% of the total rice area (4.02 million ha), respectively. Rice is grown in two seasons in the state i.e. wet (May to December) and dry (December to May). The wet and dry season rice accounts for 93% and 7% of total rice area, respectively. The dry season rice is totally irrigated, while 47% of the wet season rice is irrigated. The availability of transplanters per thousand ha of irrigated area is about two and it varies from zone to zone. It was least in Northern Plateau zone. However, these numbers are very less in comparison to the available irrigated area in all the zones. Hence, there is need for its promotion with involvement of subsidy in the state for some more years. It was observed that all the transplanter owners were medium and large farmers (holding size > 2 ha) and the average land holding size of the owners was 9.5 ha. In Coastal Plains zone, the holding size of sample farmers were relatively less (6.00 ha) due to high population density and smaller holdings in comparison to other zones.

Table 2 Land holding size, rice area and availability of transplanters in different zones of Odisha of the sample farmers

Year	Zones				Odisha
	Eastern Ghats	Central Table Land	Northen Plateau	Coastal Plains	
Land holding size (ha)	10.46	11.83	9.04	6.00	9.49
Geographical area (000 ha)	4,764	3,947	2,843	4,017	15,571
	(30.6)	(25.3)	(18.3)	(25.8)	(100.00)
Cultivated area (000 ha)	1,866	1,317	1,048	1,949	6,180.00
	(30.2)	(21.3)	(17.0)	(31.5)	(100.00)
Rice area (000 ha)	1,104	799	663	1,457	4023
	(27.4)	(19.9)	(16.5)	(36.2)	(100.00)
Irrigated rice area (000 ha)	499.7	426.2	229	899	2,053.90
	(24.3)	(20.8)	(11.1)	(43.8)	(100.00)
Availability of transplanters per 1,000 ha of irrigated rice area	2.59	2.94	1.35	2.19	1.94

Figures in parentheses indicate percent of all Odisha

The PPP Mode of Promotion

Due to growing labour shortage during transplanting period, Government of Odisha decided to introduce power operated rice transplanters during 2004 and accordingly three models from three firms were field tested by Odisha Farm Machinery Research and Development Centre, Government of Odisha and approved for promotion by the state level technical committee. The government has decided to extend a subsidy amount of Rs. 30,000 per transplanter, which was distributed through APICOL from 2004 wet

season onwards. The application process starts from the farmer to the District Agriculture Officer (DAO) through the Assistant Agriculture Officer (AAO) of the area. After verification of land records and addresses, the concerned AAO recommends the case to the DAO. The DAO after verification of the papers issues a permit to purchase the transplanter from the identified dealer of the machine with a copy of the permit each to the Assistant Agriculture Engineer (AAE) of the area, dealer of the machine and Director of Agriculture and Food Production (DAFP), Odisha. The DAO forwards the application of the farmer to a nationalized bank of the area in case the farmer needs loan. The farmer procures the machine from the dealer after paying the balance amount i.e. cost of the machine minus subsidy declared by the government for that year in self finance cases. In case of bank finance cases, the dealer supplies the machine to the farmer after obtaining the loan amount from the bank. The dealer informs the AAE after supply of the machine to the farmer and after proper inspection of the machine, the AAE recommends the case to the DAO for consideration of subsidy release. The DAO, after verification of all the papers recommends the case to APICOL for release of subsidy to the dealer. From the year 2011-12, on-line system of issue of permit and release of subsidy was introduced as the manual system took a long time for processing. It was later noticed that there was inordinate delay in release of subsidy by the APICOL. Therefore, from the year 2012-13, government has identified Bank of India through tender process for release of subsidy to the dealer. The subsidy amount has increased in phases from Rs. 30,000 (US$ 493) in the initial years to Rs. 150,000 (US$ 2,465) per transplanter from the year 2012-13 onwards.

Table 3 Zone wise and year wise number of transplanters purchased by farmers under PPP mode in Odisha (2004-05 to 2013-14)

Year	Zones				Odisha
	Eastern Ghats	Central Table Land	Northen Plateau	Coastal Plains	
May-04	1	2	Nil	2	5
Jun-05	2	Nil	1	Nil	3
Jul-06	3	Nil	1	1	5
Aug-07	12	Nil	1	1	14
Sep-08	18	1	2	2	23
Oct-09	7	6	8	9	30
Nov-10	10	7	1	3	21
Dec-11	7	7	5	27	46
2012-13	30	21	25	88	164
2013-14	103	101	126	278	608
Total	193	145	170	411	919

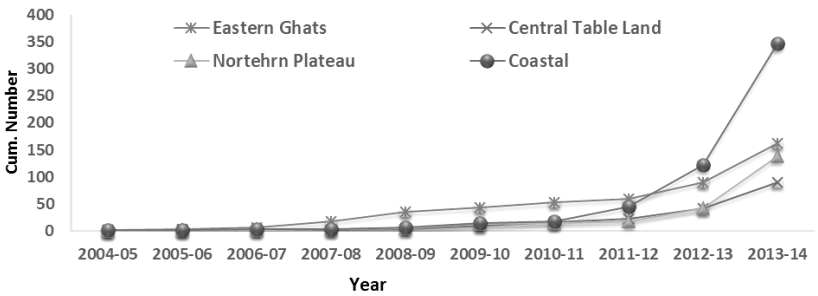

Fig. 2 Zone wise cumulative number of VST transplanters sold in Odisha (2004-05 to 2013-14)

Spread of Rice Transplanters

It was observed that the transplanters were adopted in irrigated areas only. As the transplanters require mat type seedlings and are to be planted within a fixed time frame in the main field, it is natural that only irrigated farm owners have purchased the transplanters. The adoption of transplanters in different zones of Odisha over the last 10 years is presented in **Table 3** and cumulative adoption is presented in **Fig. 2**. It was observed that the farmers of Eastern Ghat Zone, more particularly the farmers of Sonepur and Kalahandi districts within the zone, were early adopters, followed by Coastal Plains and Northern Plateau zones.

In the course of promotion of self-propelled transplanters over time, the state level technical committee has recommended 15 models of twelve firms and increased the subsidy amount to Rs. 150,000 (US$ 2,465) per transplanter from the year 2012-13. Therefore, many firms have entered the market and sold their transplanters, though Yanji Shakti 8 row model marketed by VST Tillers and Tractors Ltd was purchased by maximum number of farmers. By the year 2013-14, the cumulative sale figures of transplanters in PPP mode by different firms was 768, 93, 31, 15, 4, 3, and 2 numbers by VST Tillers and Tractors Ltd, Kubota Agriculture Machinery Private Ltd, Premier Power Equipment and Products Ltd, Greaves Cotton Ltd, Southern Agro Engineering Private Ltd, Yanmar Co Ltd India, and Kisan Kraft, respectively. Among the new firms, the model NSP-4W (4 row) promoted by Kubota Agriculture Machinery Private Ltd has made impressive progress within two years and sold as many as 86 transplanters under PPP mode. VST Tillers and Tractors

Ltd in the meantime has introduced a 4 row transplanter and sold 34 units during 2013-14. During the year 2012-13, Coastal Plains zone surpassed the Eastern Ghat zone in adoption of number of transplanters and is the leading zone now. By 2013-14, Coastal zone possesses 411 transplanters followed by Eastern Ghat zone (193), Northern Plateau zone (170) and Central Table Land zone (145). The adoption rate was only one to three in each zone during the initial three years, which has picked up during last two years, with maximum number of adoption (608) being in the year 2013-14. The above analysis shows that the PPP mode of promotion of rice transplanters is effective. However, it was observed that the spread was not uniform across zones. Therefore, the hypothesis set for the study that all the zones are equally benefitted from the mechanization program is rejected.

Economics of Transplanting

The details of cost of nursery raising and transplanting in inland and coastal Odisha are presented in **Table 4**. Though the material cost for raising mat type nursery was the same in both the regions of Odisha, the labour costs vary. The average cost of nursery raising and transplanting per ha was found to be Rs. 6,905 (US$ 113) without subsidy, Rs. 5,650 (US$ 93) with subsidy by using power operated transplanters against Rs. 12,650 (US$ 207) in manual transplanting in inland Odisha. Therefore, there was a net saving of Rs. 5,745 (US$ 94) and Rs. 7,000 (US$ 115) per ha due to use of power operated transplanters without subsidy and with subsidy, respectively in inland Odisha. In coastal Odisha, due to higher labour wages, the average cost of transplanting per ha was computed to be Rs. 7,705 (US$ 126), Rs. 6,450 (US$ 106) and Rs. 16,100 (US$ 264) in transplanters without subsidy, with subsidy and manual transplanting, respectively. The net cost saving was Rs. 9,650 (US$ 158) and Rs. 8,395 (US$ 138) by use of transplanters with and without subsidy, respectively in coastal Odisha. On an average, there was a net yield gain of 0.75 tonnes per ha in both inland and coastal Odisha. If this gain is taken into account, there was a net return of Rs. 16,825 (US$ 276) and Rs. 15,570 (US$ 255) per ha in inland Odisha due to use of transplanters with and without subsidy, respectively. Similar figures for coastal Odisha are Rs. 19,475 (US$ 319) and Rs. 18,220 (US$ 299). Besides the yield and economic advantage, the other advantages in machine transplanting as opined by the farmers were, reduction in weeding cost due to use of weeders, easier plant protection operation, less occurrence of pests and diseases, better tillering, straight planting of seedlings by machine as compared to inclined position by manual transplanting, reduction in drudgery, overcome labour shortage during peak transplanting period, saving of labour and timely transplanting, etc. On an average, there was a labour saving of 53 man-days per ha in power operated transplanting over manual transplanting.

Table 4 Economics of use of power operated transplanters vs. manual transplanting for planting 1 ha area in Odisha

Particulars	Inland Odisha		Coastal Odisha	
	Machine transplanting	Manual transplanting	Machine transplanting	Manual transplanting
Seed	1,125	1,250	1,125	1,250
Ploughing cost (Nursery area)	250	300	250	300
Iron / Wooden frame - depreciation	100	-	100	-
Plastic sheet	150	-	150	-
Straw	100	-	100	-
Fertilizers and manures	625	750	625	750
Labour for nursery raising	1,500	1,050	2,000	1,400
Labour for uprooting and transplanting	900	9,300	1,200	12,400
Depreciation, maintenance and fuel cost of the transplanter				
a) Without subsidy	2,155	-	2,155	-
b) With subsidy	1,055	-	1,055	-
Total cost				
a) Without subsidy	6,905 (113)	12,650 (207)	7,705 (126)	16,100 (264)
b) With subsidy	5,650 (93)		6,450 (106)	

Note: Wage rate for labours has been taken as Rs. 150 for inland Odisha and Rs. 200 for coastal Odisha;

Figures in parentheses indicate total cost in US dollars; 1 US$ = 61 Indian Rupees.

Area Coverage by Transplanters And Coverage of Type of Farms

Primary data analysis revealed that among the transplanter owners, 42% have used transplanters on their own farm only. Maximum owners (55%) of Eastern Ghat zone have used their transplanters on their own land followed by Central Table Land (38%) Northern Plateau zones (38%), and Coastal Plains zone (15%). The average area coverage by a transplanter in different zones is presented in **Table 5**. Ideally, a transplanter can cover 24 ha in a season. But, it was observed that on an average, a transplanter has covered 13.75 ha during wet season and 5.39 ha during dry season. When zone wise area coverage during both the seasons was considered, Northern Plateau zone was ahead of other zones followed by Central Table

Land, Eastern Ghats and Coastal Plains zone. But, when only wet season was considered, the maximum area coverage by a transplanter was in Coastal zone (17.17 ha) followed by Northern Plateau, Central Table Land and Eastern Ghat zones. The labour demand during transplanting period in wet season was the highest among all operations. There was no area coverage in Coastal zone in dry season due to sowing/planting of other crops among surveyed farms. Moreover, 58 percent of the farmers in Odisha were of the opinion that the transplanter was not fully utilized during a season.

Further data analysis on area coverage in own farm and other's farm revealed that on an average, owners have covered 10.88 ha (7.58 ha in wet and 3.30 ha in dry season) by a transplanter on their own farm and 8.26 ha (6.17 ha in wet and 2.09 ha in dry season) on other's farm involving large and small farmers. The percent of small and large farmers covered by owners on custom hiring basis is presented in **Table 6**. It is observed from the table that 53% of small farmers were extended custom hiring service of rice transplanter, though in Odisha, as per 2010-11 agriculture census (Government of India, 2012), 92% of total farmers have land holdings up to 2 ha. Hence, a large section of medium and large farmers availed the benefit of power operated transplanters and a large section of small farmers are neglected by this program. Therefore, the hypothesis set for the study that all categories of farmers are equally benefitted from the PPP program on power operated rice transplanter is rejected. When different zones were considered, Eastern Ghats and Central Table Land zone owners have covered less number of small farmers than the other two zones on custom hiring.

Table 5 Season-wise average area (ha) covered by a transplanter in different zones

Zone	Own farm		Others' farm		Total area	
	Wet	Dry	Wet	Dry	Wet	Dry
Eastern Ghats	7.52	3.97	4.14	2.35	11.66	6.32
Cental Table Land	10.20	4.60	3.45	1.85	13.65	6.45
Northern Plateau	8.29	4.80	8.13	4.70	16.41	9.50
Coastal Plains	5.66	-	11.51	-	17.17	-
Odisha	7.58	3.30	6.17	2.09	13.75	5.39

Table 6 Percentage of small and large farmers covered by owners on custom hiring

Zone	Small (< = 2 ha)	Large (> 2 ha)
Eastern Ghats	31.3 (52)	68.7 (114)
Cental Table Land	25.8 (8)	74.2 (23)
Northern Plateau	61.2 (49)	38.8 (31)
Coastal Plains	68.6 (166)	31.4 (76)
Odisha	53.0 (275)	47.0 (244)

Figures in parentheses indicate actual number of farmers.

Table 7 Number of sample farmers getting irrigation from different sources

Zone	M&M	MIP	Borewell / Dugwell	Tank / Pond	Government lift point / Stream	Multiple Sources
Eastern Ghats	17	6	14	2	1	9 (36.0)
Cental Table Land	5	-	3	3	-	3 (33.3)
Northern Plateau	3	2	2	4	-	3 (37.5)
Coastal Plains	7	1	11	2	2	10 (55.6)
Odisha	32 (53.3)	9 (15)	30 (50)	11 (18.3)	3 (5)	25 (41.7)

M&M: Major and Medium irrigation projects; MIP: Minor irrigation projects.
Figures in parentheses indicate percent of total farmers.

Availability of Irrigation

Adoption of mechanical transplanting requires timely irrigation facilities, proper training to owners on the techniques of raising mat type nursery and prompt after sale service including supply of spare parts. The availability of irrigation facilities with the owners is presented in **Table 7**. It was observed from the table that farmers use different sources of irrigation in different zones. Forty two percent of farmers have multiple sources of irrigation. Maximum percent of farmers (53) get irrigation from major and medium irrigation projects through government laid out canals followed by bore well/dug well (50), tank/ pond (18), minor irrigation projects (15) and government lift points (5). The successful farmers are those who have multiple irrigation sources. More particularly, the farmers who have bore well/ dug well/ tank/ pond are the ones, who raised mat type nursery in time, were most successful in planting their main field in time. Among different zones, Coastal zone farmers have maximum percentage of multiple irrigation sources. The transplanter owners, who depend on government irrigation sources like canal irrigation from major, medium, minor and government lift irrigation projects, have complained that erratic supply of irrigation water was a major problem in raising mat type nursery and preparing the main field in time.

Training Needs and After Sale Service

The information about training needs for raising mat type nursery and prompt supply of after sale service by the dealer of the machine was collected from the owners, and the results are presented in **Table 8**. The prompt repair service is required during planting time

as the machine cannot work with older seedlings and the seedlings go waste, if not planted in time. It was assessed that all the farmers need training for successful raising of mat type nursery and 92% of the farmers complained for not getting prompt after sale service. Only some farmers in Eastern Ghat zone (13%) and Central Table Land zone (12%) got prompt after sale service from the dealer. Therefore, before supply of the transplanters, it should be made mandatory to train the owner on the techniques of raising mat type nursery and repair and maintenance of the transplanter.

Policy Recommendations

The following policy implications emerged from the study to make the program more efficient and inclusive. More efforts should be made for promotion of transplanters in Northern Plateau zone. A legal bond should be executed with the owners that at least 30 small and marginal farmers per year should be covered through custom hiring by each transplanter owner and the report regarding coverage should be submitted to the District Agriculture Officer at the end of each season. Before supply of machine, training to driver and the techniques of raising mat type nursery should be made mandatory. Spare parts should be kept ready by dealers, so that the machine does not remain idle for more days, as the duration of planting time is limited. Co-operation with irrigation department is essential for timely release of water in canals for field preparation, so that planting can be taken up in time.

Conclusions

Secondary data analysis on the spread of rice transplanters revealed that PPP mode of promotion is effective in the state of Odisha. The adoption of self-propelled rice transplanter is fast in Odisha and the number of transplanters purchased by farmers in PPP mode during the year 2013-14 was 608 from a mere three numbers during 2005-06. Though the program was effective in the state in terms of spread, it was not uniform across all the zones of Odisha. Primary data analysis revealed that use of self-propelled transplanters reduced the cost of cultivation by Rs. 5,745 (US$ 94) per ha in inland Odisha and Rs. 8,395 (US$ 138) per ha in coastal Odisha without extending subsidy on transplanters. The total monetary gain per ha from power operated transplanters without subsidy was Rs. 15,570 (US$ 255) and Rs. 18,220 (US$ 299) per ha in inland and coastal Odisha, respectively due to additional yield advantage over manual transplanted plots. The labour saving due to the transplanter use was 53 man-days per ha over manual transplanting in the state.

Though the PPP program was effective in adoption of power operated transplanters in Odisha, it was not inclusive in terms of covering large section of small and marginal farmers. It was observed from the survey that 42% transplanter owners have not extended custom hiring service to other farmers and have used the transplanters in their own land only. Among the planter owners, who have extended custom hiring service, there was a bias towards medium and large farmers. Among the total farmers covered, the percentage coverage of small and marginal farmers was 53%, while 92% of farmers are small and marginal in the state of Odisha. Besides the above, there are other bottlenecks in the program also. The transplanters were promoted / sold through PPP mode without imparting proper training to operator and educating the owners the techniques of raising of mat type nursery. As a consequence, 58% of the owners are of the opinion that, the machine is underutilized during the season. Timely supply of canal water helps in timely planting. But, the farmers, who depend on supply of canal water for preparation of main field, were of the opinion that they did not get canal water in time. About 92% of the owners complained against timely supply of spare parts and prompt after sales service and all the owners were of the opinion that there is need for training on raising mat type nursery.

Table 8 Observation on after sale service and training needs (for transplanters as well as raising mat type nursery)

Figures in % of farmers

Zone	Requirement of after sale service for repair & maintenance	Training needs
Eastern Ghats	87	100
Cental Table Land	88	100
Northern Plateau	100	100
Coastal Plains	100	100
Odisha	92	100

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