

CSISA Socio-Economics Working Paper

Agricultural Service Providers in Odisha: Characterization of Mechanized Agricultural Service providers for Technology Targeting and Business Development

Bidhan K. Mohapatra, Sampriti Baruah and Takashi Yamano

July 2014



The Cereal Systems Initiative for South Asia (CSISA) is a regional initiative to sustainably increase the productivity of cereal-based cropping systems, thus improving food security and farmers' livelihoods in Bangladesh, India and Nepal. CSISA works with public and private partners to support the widespread adoption of resource-conserving and climate-resilient farming technologies and practices. The initiative is led by the International Maize and Wheat Improvement Center (CIMMYT), implemented jointly with the International Food Policy Research Institute (IFPRI) and the International Rice Research Institute (IRRI), and is funded by the US Agency for International Development (USAID) and the Bill & Melinda Gates Foundation.

Table of Contents

Executive Summary.....	6
1. Introduction.....	9
2. Agriculture and Farm Mechanisation in Odisha.....	11
3. Sampling	16
4. Service Providers	19
5. Machines Owned and Used	23
6. Services Provided – cost, coverage, and business strategy	30
7. Business Constraints and Training Needs.....	43
8. Conclusion.....	50
Appendix	52

List of Tables

Table 1. Agro-ecological Indicators of CSISA Districts of Odisha	12
Table 2. Sample Service providers Interviewed by the Main Machine Type.....	16
Table 3. Sample Districts, Blocks, Villages, and Service providers.....	17
Table 4. Socio-economic Characteristics of Service Providers.....	19
Table 5. Social Network of Service Providers.....	22
Table 6. Agricultural Machines that Service providers Own.....	23
Table 7. Source of Information about the Machines	25
Table 8. Motivations for Purchasing the Machines	26
Table 9. Top Three Brands by Machine Type.....	27
Table 10. Debts and Potential Credit Constraints.....	28
Table 11. Machines for Own Use	29
Table 12. Basic Indicators of Business	30
Table 13. Service providers' Number of Years of Experience in Business	30
Table 14. Purchasing Costs and Subsidy Received.....	32
Table 15. Percentage of Service providers Providing Paid Service through Selected Machines.....	33
Table 16. Indicators on Paid Service	34
Table 17. Machine Operators for Paid Service	35
Table 18. Cost on Machine Operation for Service Provision ^A	36
Table 19. Fees for Paid Service	37
Table 20. Cost on Machine Operation at Others Field.....	38
Table 21. Cost on Machine Operation at Others Field.....	39
Table 22. Business Development Strategy by SPs	41
Table 23. Demand Aggregator for Business Development.....	42
Table 24. Credit/subsidy as Constraint to Mechanized Service Business.....	43
Table 25. Machine operator as Constraint to Mechanized Service Business.....	44
Table 26. Demand for Machine as Constraint to Mechanized Service Business	45
Table 27. Technology as Constraint to Mechanized Service Business.....	46
Table 28. Assessment of Machine Utilisation and Base of Assessment	47
Table 29. Training Taken by Service providers on Machines.....	47
Table 30. Organizer of Training and Training Quality	48
Table 31. Demand for Training and Type of Training Need.....	49

List of Figures

Figure 1 - A	Mechanisation in Odisha: Tractors, Power Tillers and Pump sets
Figure 1 - B	Farm Mechanisation in Odisha: Combine harvester and Self – Propelled Transplanters
Figure 1 - C	Farm Mechanisation in Odisha: Power – operated Implements, Manual Implements and Power Threshers
Figure 2	Service Provider Composition by Machine Type
Figure 3	Locations of Service Providers
Figure 4	Primary and Secondary Occupations of Service Providers
Figure 5	Income Sources and Expenditure of Service Providers
Figure 6	Service Provider’s information Sources about Machines
Figure 7	Service Provider’s Motivation Factors for Purchasing Machines
Figure 8	Credit Accessibility of Service Providers
Figure 9	Service Provider’s Business Strategy
Figure 10	Who should aggregate demand
Figure 11	Level of Machine Use

Acknowledgments

This study was conducted as part of the Cereal Systems Initiative for South Asia (CSISA) project, which is jointly funded by the Bill & Melinda Gates Foundation (BMGF) and the United States Agency for International Development (USAID).

CSISA is mandated to enhance farm productivity and increase incomes of resource-poor farm families in South Asia through the accelerated development and inclusive deployment of new varieties, sustainable management technologies, partnerships, and policies.

The views expressed in this report are those of the authors and do not necessarily reflect the views of USAID, BMGF, the International Rice Research Institute (IRRI), International Maize and Wheat Improvement Centre (CIMMYT), International Livestock Research Institute (ILRI), International Food Policy Research Institute (IFPRI), or the CSISA project.

The authors express their deepest appreciation and thanks to several people for their support in various stages of this study. The authors wish to thank the Department of Agriculture, Government of Odisha, for providing support in the form of conducting surveys and providing secondary information.

Acronyms

BMGF	Bill & Melinda Gates Foundation
CBO	Community Based Organisation
CH	Combine Harvester
CIMMYT	International Maize and Wheat Improvement Center
CSISA	Cereal Systems Initiative for South Asia
GSDP	Gross State Domestic Product
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
INR	Indian Rupees
IRRI	International Rice Research Institute
KVK	Krishi Vigyan Kendra
MPS	Mechanised Service Provision
MTR	Mechanical Transplanted Rice
NGO	Non-Government Organisation
OBC	Other Backward Class
OUAT	Orissa University of Agriculture & Technology
PT	Paddy Transplanter
Pvt.	Private
SC	Scheduled Caste
SD	Seed Drill
SPs	Service providers
ST	Scheduled Tribe
USAID	United States Agency for International Development

Executive Summary

In Eastern India, where farm mechanisation lagged behind other progressive states, state governments have put significant efforts to popularize agricultural machines and equipment among farmers through demonstrations and subsidies. Since 2012, the CSISA project has joined the efforts by working in three districts of Odisha: Bhadrak, Mayurbhanj and Puri. To scale-up the mechanization, it was recognized that agricultural service providers can play an important role since it is not economical for small and marginal farmers to own their own machines. However, little has been documented about agricultural service providers in Odisha. Thus, the main aim of this report is to characterize service providers and provide recommendations on how to assist them.

The data used in this report come from 281 service providers in the three mentioned Odisha districts. The service providers were randomly selected from a service provider list, which was provided by the State Government of Odisha. The list was categorized by the machines that the service providers own and included service providers who own at least one of the following six machines: Paddy transplanter, Thresher, Tractor, Seed Drill, Reaper and Combine harvester. The survey was conducted in April – May, 2014.

The results indicate that the service providers are mostly male, except for 21 female service providers. More than 80 percent of them have high school education or higher, and less than 10 percent of them belong to Scheduled Caste or Tribes. About 53 percent of the service providers are in the age group of 25-40 years. Farming is the primary occupation for about half of them, while service provision is the primary occupation for about 18 percent of them. On average, service provision contributes about 30 percent of their total income, while farm income covers about 43 percent. The service providers are active members of social groups: they are members of cooperatives (47%), political parties (43%), village committees (43%), and formal credit groups (38%).

Popular agricultural machines that the service providers own include tractors (45%), reapers (30%), power tillers (29%), paddy transplanters (22%), and cultivators (20%). They obtain information about the machines mostly from friends and neighbours, although dealers, government agencies, agricultural universities are also important information sources. Around 14 percent of the service providers find potential profits (cost and time saving) and so motivated to purchase machines. More than three fourth of them have loans from commercial banks. They rely much less on other credit sources such as microcredit organizations, government agencies, family, and friends.

The average years of experience in service provision is about 3 years among the service providers. Thus, the service providers are relatively new in the business. In 2013, they hired, on average, one permanent and two part-time employees and served about 95 farmers. Service providers with combine harvesters served farmers most, serving 188 farmers in 2013 over 45 working days. Service providers with other machines served less: tractors (107 farmers), seed drills (49 farmers), threshers (44 farmers), paddy transplanters (33 farmers),

and reapers (32 farmers). Fees that they charged range from Rs. 406 (USD 7) per hour of seed drills to Rs. 1,950 (USD 33) per hour of combined harvesters.

The Odisha government provides subsidy to purchase agricultural machines. The level of subsidy varies from 25 to 75 percent, with some upper limits, depending on the machines. About 87 percent of the service providers who were interviewed for this study received subsidy when they purchased, most recently, one of the six agricultural machines considered in the report. All service providers who purchased paddy transplanters or combine harvesters received subsidy. On average, the subsidy covered about 36 percent of the purchase cost among those who received subsidy. For paddy transplanters, the average price of the machines was about 2 Lakh (USD 3,333), and the subsidy covered about 62 percent of the cost. For combine harvesters, the subsidy covered only 25 percent of the purchase cost, although the absolute amount of the subsidy they received was high at about four lakh (USD 6,547) per machine. Service providers who used other machines also received subsidy.

Service providers who used combine harvesters earn the most: the average profit per year was found to be around 2.9 Lakh Rupees (USD 4,833), and it was about 0.9 Lakh Rupees for service providers who used tractors. The estimated profit was about 0.6 Lakh Rupees for those used paddy transplanters and was about 30 percent of the purchase price without subsidy. With subsidy, however, the profit was about 77 percent of the actual net payment for the machine. Thus, the service providers with paddy transplanters could recover about 77 percent of the initial investment, i.e., the net purchase cost after receiving subsidy, in one year. Without the subsidy, they would need more than three years to recover the cost. For service providers with combine harvesters and tractors, it would take more than five years to recover the purchase cost without subsidy but would take only four years with subsidy.

About one fourth of the service providers received formal training in the past. Close to 60 percent of the service providers with paddy transplanters received formal training. In general, the training was provided by private companies (74%), followed by government agencies (16%), NGOs (7%), and research organizations (3%). They are eager to take more training. More than 80 percent of the service providers with combined harvesters, paddy transplanters, reapers, and seed drills want to take more training, while the service providers with tractors and threshers are less enthusiastic. This could be because tractors and threshers were introduced in Odisha early, while combine harvesters (2009), seed drills (2008), and paddy transplanters (2002) were introduced recently.

To find customers, the service providers talk to their neighbours (47%) and conduct demonstrations (22%). The access to credit or subsidy, or lack of it, is not a major constraint for the service providers. They find that hiring machine operators as a constraint. Especially, more than 56 percent of the service providers who used combine harvesters find it as a strong constraint. The service providers who use seed drills, threshers, and reapers also find it as a strong or a very strong constraint. Demand for their service was not considered as a constraint for their business. Thus, it seems that there is adequate demand for their service, and the access to credit is not a constraint. However, hiring skilled operators of their machines appears to be an important constraint.

In sum, the lack of technical skills of newly introduced machines seems to be a major constraint among the service providers as the service providers with newly introduced machines find the lack of machine operators as a strong constraint to expand their business and tend to demand more training. Thus, the state governments may consider assisting technical training of private companies, government agencies, NGOs, or research organizations. Although service providers are promoting various technologies, most of them have inadequate knowledge about best-bet agronomic practices associated with their services with machines. Therefore, awareness programs through demonstrations and hand-holding support by extension workers should be scaled-up in the future.

Odisha agriculture is at a cross road toward achieving agricultural mechanisation in coming decades, and service providers need to play an imperative role to take the road. Assisting service providers, therefore, should be considered as a top priority for the Odisha government and other state governments in Eastern India.

Agricultural Service Providers in Odisha:

Characterisation of Mechanised Agricultural Service providers for Technology Targeting and Business Development

1. Introduction

Agricultural mechanisation advanced significantly in India, especially in areas that experienced high rate of agricultural growth due to Green Revolution in the 1970s and 1980s. Farm mechanization helped farmers reduce production and transport costs and increased returns from their agricultural investment, and it reduced drudgery of labour and helped farmers avoid waiting for farm workers during peak agricultural periods. In addition, it increased the demand for skilled workers who operate machines and has stimulated business interests around machines: trading, maintaining, and providing services to farmers who do not own machines.

Because Eastern India lagged behind in the process of farm mechanisation, significant efforts have been placed in recent years to popularize agricultural machineries among farmers through demonstrations and subsidies in the region. In Odisha, the Agriculture Engineering Wing of Directorate of Agriculture is the nodal department for agriculture mechanization and works in all the thirty districts of Odisha. It provides subsidies for farmers to buy certain types of agriculture machineries and engages in extension work, with active cooperation of farm machinery division of Orissa University of Agriculture & Technology (OUAT), Krishi Vigyan Kendra (KVK), and machine suppliers. Farmers in Odisha have started showing strong interests in mechanization mostly because of increasing labour costs.

In 2012, the CSISA project commenced its activities in three districts of Odisha directly and in collaboration with state government agencies, Non-Government Organizations/Community Based Organisations (CBOs), formal and informal groups (including women groups) and individual agri-entrepreneurs. The three districts fall in three different agro-climatic zones: Mayurbhanj in North-Central Plateau zone, Bhadrak in the North-Eastern Coastal Plain zone, and Puri in East & Southeast Coastal Plain zone¹. The CSISA project promotes technologies that are suitable to Odisha's agro-ecology. To scale-up the mechanization efforts, it was recognized that agricultural service providers could play an important role. However, little has been documented about the agricultural service providers in Odisha. It is not clear how many of service providers are actively providing agricultural services to farmers. Who are they? Do they make profits? Do they have interest in business expansion?

To answer such questions, this study was designed. The objectives of the study are:

1. to describe the socio-economic characteristics of service providers,

¹ Odisha Agriculture Statistics 2011-12.

2. to examines their business: type and number of machines they own, costs and returns to their services,
3. to identify constraints to their business expansion, and
4. to understand their training needs and business opportunities.

The report is based on a survey of 281 service providers who were randomly selected from a list of service providers, which was provided by the State Government of Odisha. The list was categorized by the machines that the service providers own. For this report, service providers who own at least one of the six machines (i.e., Paddy transplanter, Thresher, Tractor, Seed Drill, and combine harvester) that the CSISA project target for service provision in Odisha were chosen. The survey of the 281 service providers was conducted in April – May, 2014.

Because of the rising labour costs and improved access to dealers and mechanics of agricultural machines, Odisha agriculture is on the path toward achieving agricultural mechanisation in coming decades. However, because farmers in Odisha are mostly small and marginal, they need to rely on service providers to use agricultural machines, and the service providers need assistance not only purchasing machines in subsidy but also using their machines more effectively and hire skilled operators. Technical training of the service providers and their operators should be considered as an imperative component in the farm mechanization policy in Odisha and other states, as the results in this report show. Other recommendations are also discussed in the final section of this report.

The report is divided in eight sections. The next section describes agriculture and farm mechanization in Odisha. Section 3 explains sampling methods of the survey. The results from the survey are presented in the remaining sections. Section 4 shows the characteristics of the 281 service providers in the three target districts in Odisha. The business of the service providers is examined in Section 5. The next section investigates business constraints and training needs of the service providers. Finally, Section 8 summarizes the main findings from the report and discusses recommendations to assist service providers so that they can assist many small and marginal farmers in Odisha.

2. Agriculture and Farm Mechanisation in Odisha

2.1 Agriculture in Odisha

Odisha is an agrarian state. Almost 70 percent of the state population depends on agriculture, although the agriculture sector contributes only 16 percent of the Gross State Domestic Product (GSDP). Agriculture in Odisha is characterised by low productivity on account of various factors, which include less-favoured soil (acidic, saline and water logged), lack of assured irrigation, low seed replacement rate, low level of fertiliser consumption (63 kg/ha against the national average of 140 kg/ha), and low level of mechanisation. Low crop yields of the state, compared with yield potential, and the potential benefits from technology transfer provide an excellent opportunity to increase productivity and production substantially in the state. The state has about 64 lakh hectares of cultivable area out of total geographical area of 156 lakh hectares. About 40.2 lakh hectares of cultivable area has acidic soil and approximately 4 lakh hectares of area suffers from salinity. Nearly 3 lakh hectares of cultivable area is under water logging. The average size of land holding in the state is 1.25 ha per household. Small and marginal farmers constitute about 83 percent of all farm households in the state.

In Odisha, 47 percent of the total cultivated land is highland, 25 percent is lowland, and 28 percent is medium land. Only 35 percent of the total cultivated land is irrigated, and this indicates that a majority of the farmers in the state depend on rain as a source of water for cultivation. Even though the irrigation potential has been expanded to nearly 45.14 lakh ha, only 69 percent of the area is actually irrigated, indicating under use of irrigation potential in the state. Odisha receives an average normal annual rainfall of 1,498 mm, of which 80 percent is received during the monsoon season from June to September. Even though the quantity of rainfall seems high, its distribution is erratic and uneven during the monsoon period, thus affecting agricultural activities in the state. Apart from the erratic and uneven rainfall distribution, the state has a history of regular occurrence of floods, cyclones, and droughts of various intensity affecting primarily kharif crops and in some cases even affecting rabi crops².

The state is divided into 10 agro-climatic zones on the basis of soil structure, humidity, elevation, topography, vegetation, rainfall and other agro-climatic factors. The average rainfall in the state is 1452 mm, of which about 80 percent is confined to monsoon months (June-September). The total irrigation potential is 31 lakh hectares in Kharif, the main agricultural season, and 15.0 lakh hectares in Rabi. Rice is the main staple crop of the state. The total paddy production in the state during 2012-13 is estimated to be 144 lakh tons.

In terms of area coverage, rice is the major crop in Odisha. Out of total area of 8267.75 thousand hectares under various crops, the area covered under some major crops like rice, mung, vegetables³, biri, maize, groundnut, sesamum, kulthi, ragi and mustard is 4004.54 thousand hectares, 799.68 thousand hectares, 596.93 thousand hectares, 590.56 thousand

² Characterization of CSISA Odisha Hub Districts for Technology Development and Targeting, CSISA Report, 2013

³ Excluding area under sweet potato, potato and onion

hectares, 262.05 thousand hectares, 255.14 thousand hectares, 235.68 thousand hectares, 230.15 thousand hectares, 169.22 thousand hectares and 126.67 thousand hectares respectively⁴.

Table 1. Agro-ecological Indicators of CSISA Districts of Odisha

Agro-ecological parameters	Unit	District			State (Odisha)
		Mayurbhanj	Puri	Bhadrak	
Annual normal rainfall	mm	1,600	1,408	1,427	1,451
Geographic area	000 ha	1042	348	250	15,571
Cultivated area	000 ha	437	189	176	6,180
Net area sown	000 ha	335	131	156	5292
Gross cropped area	000 ha	479.2	283.2	239.5	8,801.1
Cropping intensity	%	143	216	154	166
Kharif cropped area	000 ha	369.8	127.7	180.7	5,792.6
Rabi cropped area	000 ha	79.6	131.3	48.6	2,475.1
Total cropped area	000 ha	449.5	259.0	229.4	8,267.7
Total irrigation area (irrigation potential)	000 ha	252.8	246.0	190.5	4,592.5
Gross irrigated area	000 ha	164.0	166.4	123.1	3,088.2
Fertilizer consumption	kg/ha	50.2	69.3	121.2	62.2
Current fallow	'000 ha	98	54	16	759
Other fallow	'000 ha	13	1	5	229

Source: Odisha Agriculture Statistics, 2011-12, Government of Odisha

2.2 Agricultural Mechanization in Odisha

The graphs below show the trend of farm mechanisation for various agricultural machines in Odisha. Farm mechanisation started with tractors and power tillers (Figure 1-A), but the numbers of these machines started increasing only after 2008. In 2012, the number of tractors increased to more than 5,000 in Odisha. Please note that this is the number of registered tractors. Thus, this should be treated as a conservative estimate of the number of tractors available in Odisha. The number of power tillers is around 13,000, more than double the number of tractors. The number of pumps is not recorded before 2008. After 2008, the number of pumps jumps above 25,000 in 2009/10 and jumps again in 2012/13 to above 40,000. According to the CSISA Key Informant Survey (2013), about 25 and 13 percent of households used diesel and electric pumps, respectively, in Puri district. The percentages were 16 and 9 percent in Bhadrak, and 15 and 2 percent in Mayrubanj. Thus, the pumps were much more popular in Puri than in other two CSISA target districts. The percentage of farmers who own pumps is much lower than that of users. In Puri, the percentage of farmers who own pumps was 9 percent for diesel pumps and 1 percent for electric pumps. In Bhadrak, the percentage was 3 and 2 percent for diesel and electric pumps, respectively. In Mayurbhanj, it was 4 and 1 percent.

⁴ Odisha Agriculture Statistics 2011-12

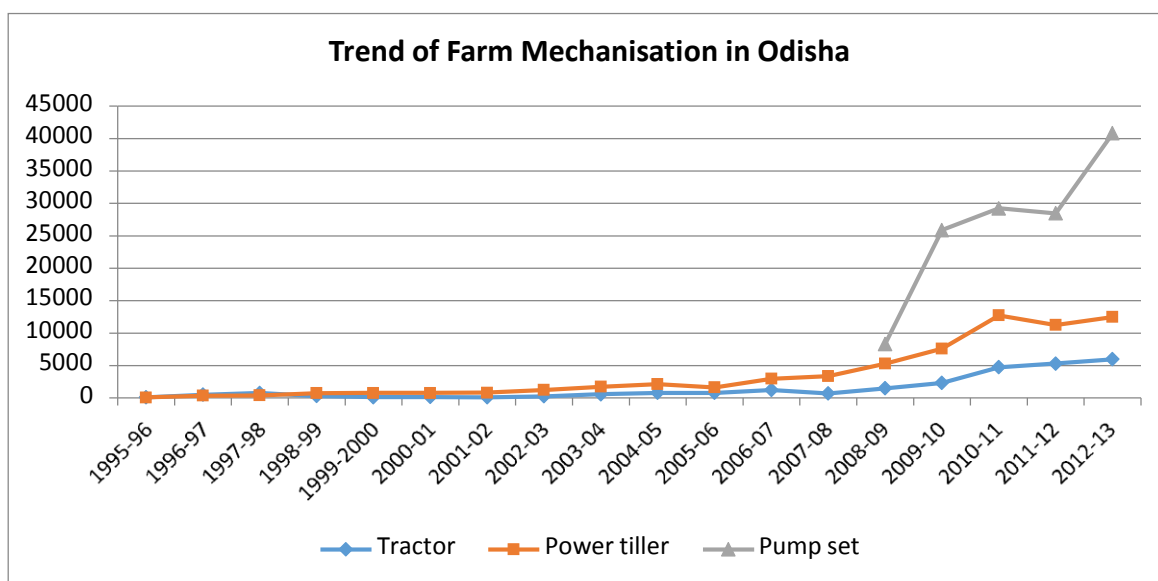


Figure 1-A. Farm Mechanization in Odisha: Tractors, Power Tillers, and Pump sets

Combine harvesters and paddy transplanters are new in Odisha. The total number of self-propelled paddy transplanter is just more than 150 in 2012/13, and the number of combine harvesters is just above 100 (Figure 1-B). There is no doubt that these numbers will increase significantly in coming years. Because of clear popularity of these machines in the fields.

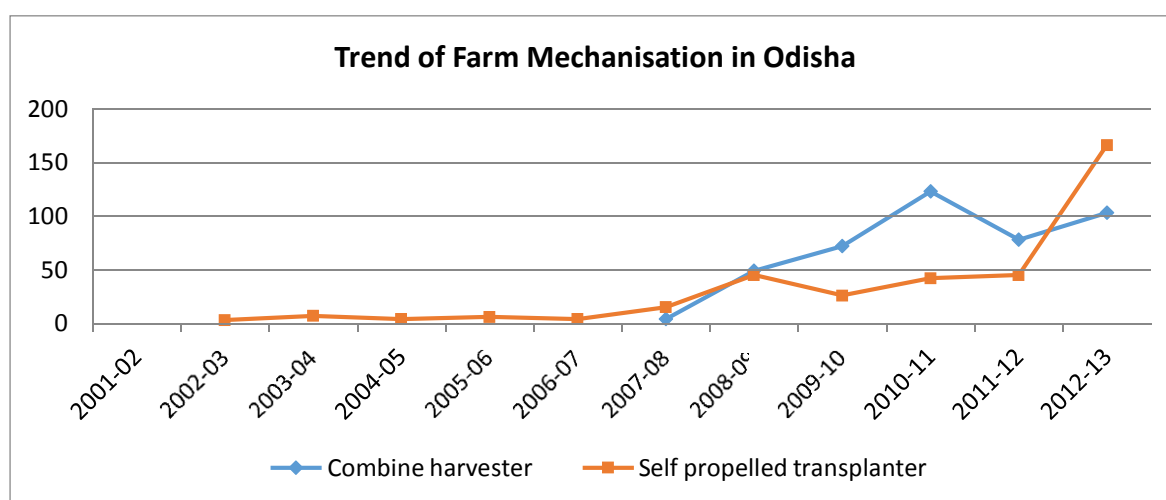


Figure 1-B. Farm Mechanization in Odisha: Combine Harvester and Self-propelled Transplanters

Power-thresher is another machine that has become very popular in recent years. The number of power-thresher increased from less than 1,000 in 2008/09 to about 5,000 in 2012/13. According to the CSISA Key Informant Survey (2013), it is particularly popular in Puri

district. More than 54 percent of the households were considered by the key informants to be users of Power-threshers. The ownership of the power-thresher was less than 1 percent in Puri district, suggesting that most of the users relied on service providers.

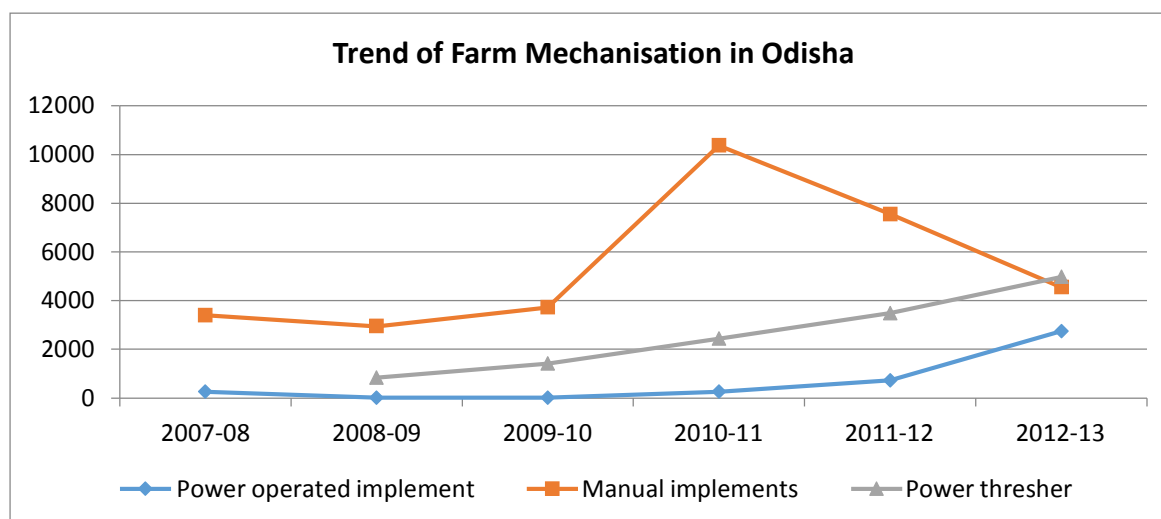


Figure 1-C. Farm Mechanization in Odisha: Power-operated Implements, Manual Implements, and Power Threshers

CSISA Key Informant Survey in Odisha in 2013

In May 2013, a survey of key informants from randomly selected 120 villages of the three CSISA targeted districts, Puri, Bhadrak, and Puri, in Odisha was conducted (CSISA, 2013). The results of the key informant survey show that the sample villages and households in the three districts share similar socio-economic characteristics, although they belong to different agro-ecological zones. The average distance from the sample villages to the nearest market is about 6 km for all three districts. On average, 63 percent of population was reported to be below Poverty Line (BPL) card holders. About 12 percent of the households were female-headed households. On average, 46 percent of the households belonged to Scheduled Castes or Tribes. The percentage is high in Mayurbhanj at 74 percent.

The average daily wage rate for male agricultural workers during the kharif season was about Rs. 159. For female agricultural workers, it was about Rs. 135. Female workers were mostly involved in transplanting rice seedlings and weeding. The survey also asked about the daily wage rates 10 years ago and found that it was Rs. 71 for male and Rs. 55 for female workers. Thus, in the nominal term, the wage rates doubled over the last 10 years. However, the rice output price and other prices also increases. By using the wage-output price ratio, the survey finds that the ratio increased by about 30 percent for male workers and about 41 percent for female workers over the last 10 years.

The survey showed different levels of machine use across states. The machines that farmers commonly used included diesel and electric pumps, 4-wheel tractors, pesticide sprayers, and rice threshers. Farmers in Puri used more machines than farmers in Bhadrak and Mayurbhanj.

Except pesticide sprayers, few farmers owned agricultural machines. Instead, they rented machines or relied on service providers. Rice threshers were becoming popular as they were less labour intensive than manual threshing. In 22 percent of the sample villages, farmers used rice threshers.

In about 43 percent of the sample villages, the key informants indicated that it was very difficult to hire male agricultural workers during the kharif season. The percentage for hiring female agricultural workers was about 36 percent. The percentages were higher in Puri at 63percent for male workers and 57 percent for female workers. In Bhadrak, the labour availability was better: only in 20 percent of the sample villages in Bhadrak, farmers face difficulties in hiring male as well as female agricultural workers.

Therefore, it is clear that farmers are relying on service providers to use machines on their farms. The rest of the report describes how service providers in Odisha serve farmers and identifies constraints that they face in their business.

3. Sampling

To randomly select service providers, a list of agricultural service providers⁵ was obtained from State Government of Odisha for three CSISA districts. The list was categorized/stratified on the basis of machines (paddy transplanter, seed drill, axial flow thresher, reaper, combine harvester, tractor, etc.) that the service providers own. Six major machines, through which services were provided by machine owners, were chosen for sampling. The six machines were chosen because they are targeted in the CSISA project for service provision. The six machines under study include paddy transplanter, thresher, tractor⁶, reaper, seed drill and combine harvester.

As seen in Table 2, from each of stratified list of service providers, sixty samples were randomly selected for each the following four machine type: paddy transplanters (60 out of 83), threshers (60 out of 109), tractors (60 out of 376), and reapers (60 out of 213). For combine harvesters and seed drills, however, the total number of the samples in each group was less than sixty. Thus, all listed service providers, forty-three for combine harvester and eight for seed drills, were chosen. As a result, a total of 291 machine owners/service providers were selected for the present study. Out of the 291, 10 service providers were not available, reducing the number of service providers interviewed to 281 (Table 2).

Table 2. Sample Service providers Interviewed by the Main Machine Type

Major Machine for Service Provision	Total No. of Machine Owners/SPs	Sample (service providers) selected for interview	Number of service providers interviewed
Paddy Transplanter	83	60	58
Thresher	109	60	59
Tractor	376	60	56
Reaper	213	60	59
Seed drill	8	8	8
Combine harvester	43	43	41
Total	832	291	281

⁵Not all farmers listed as service providers worked as service providers for other farmers. Some of them use their machines for their production only. But all are machine owners.

⁶ It was assumed and observed by the scientists and technicians that although there are many tractors available in field, many of those are not used for agriculture purposes and during agriculture pick season, on time availability of tractors is very difficult. Although the CSISA project promotes technologies that require machines that are not included in the list of six, such as laser land levelling, they were excluded because very few or no SPs provide such services in Odisha.

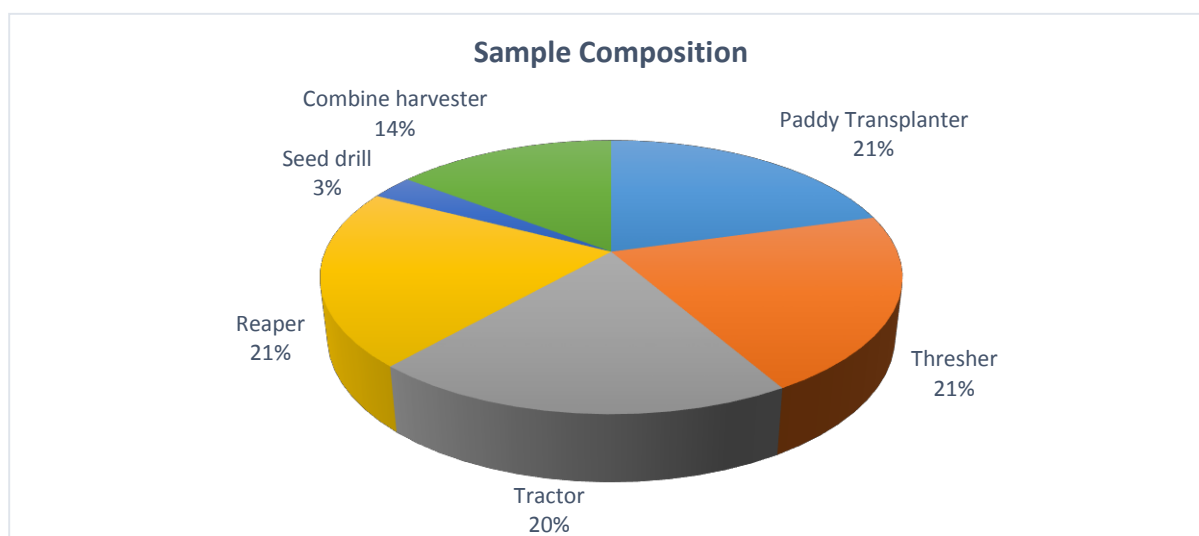


Figure 2. Service Provider Composition by Machine Type

The samples are spread over two hundred twenty-two villages of forty-one blocks in three districts (Figure 3). We covered all the 11 blocks of Puri district and 7 block of Bhadrak district. Out of 26 blocks in Mayurbhanj district 23 blocks were covered (Table 3).

Table 3. Sample Districts, Blocks, Villages, and Service providers

District	Block	Village	Service providers
Puri	11	104	133
Bhadrak	7	46	54
Mayurbhanj	23	72	94
All	41	222	281

Mapping of sample service providers:

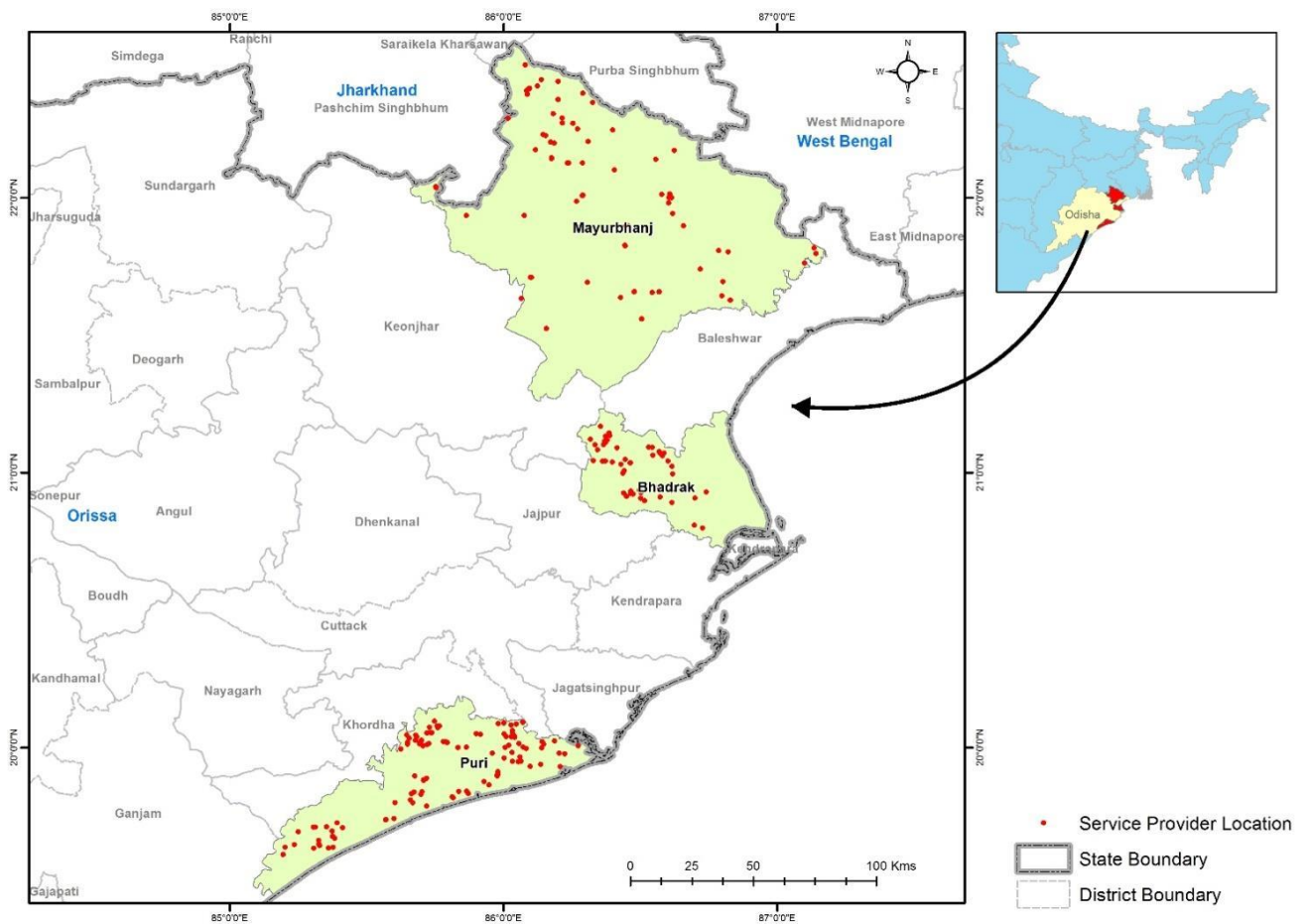


Figure 3. Locations of Service providers

A structured questionnaire was developed for computer assisted personal interview software, called *Surveybe*, for data collection. The questionnaire was divided into several sections to capture the study objectives. Six enumerators were trained for 3 days to collect data in April 2014. The questionnaire was pre-tested, and mock sessions for data collection were held simultaneously before finalizing the questionnaire. During the interview practice and pretesting, unclear questions were clarified and revised, and unnecessary questions were eliminated. To make the interview process easier and short, word typing and open-ended questions were avoided as much as possible. Instead, pre-coded answers presented in drop-down menus were used. Care was taken to improve enumerators' understanding of the questions and the philosophy behind the questions.

The interviews were conducted in four weeks, from the last week of April to the third week of May 2014. Because most of the service providers were busy during the survey period, enumerators needed to make efforts to set appointments with sample service providers. At the end, interviews with 281 service providers were successfully implemented.

4. Service Providers

Socio-economic Characteristics

Out of the 281 sample service providers, 7.5 percent of them are female service providers. This suggests that women have entered into mechanized service providing business in agriculture. About 53 percent of the service providers are in the age group of 25-40 years. Young service providers are expected to provide services for many years to come. Most of the service providers are reasonably educated: 76 percent of the service providers are qualified from high school to graduate (high school 33.5 percent, higher secondary 21 percent and graduate 21.7 percent). Thus, educated people (around 23 percent graduates) are engaged in mechanized service business in agriculture. Only one percent of the service providers have no schooling, and 1.8 percent of them have attended adult literacy programs. The latter shows their curiosity towards education despite their lack of formal education. Regarding caste of the service providers, about 10 percent of the service providers are from scheduled category (SCs and STs). Awareness among them is required to take the advantages of various schemes for mechanized service for their socio-economic development. The majority of the service providers, about 61 percent, belong to the general category, while the remaining 29 percent belongs to the Other Backward Class (OBC).

Table 4. Socio-economic Characteristics of Service Providers

Indicator	Description	Figure (%)
Gender	Male	92.5
	Female	7.5
Age Group	25 years old or younger	2.5
	Between 25 and 40	52.7
	Between 40 and 60	38.4
	60 years old or older	6.4
Education	No schooling	1.0
	Primary	7.1
	Upper Primary	9.3
	High School	33.5
	Higher Secondary	21.0
	Graduate	21.7
	Post Graduate	4.6
	Adult literacy Program	1.8
Religion	Hindu	98.9
	Muslim	1.1
	Christian	0
	Sikh	0
	Other	0
Caste	General	60.9
	SC	4.6
	ST	5
	OBC	28.8
	No caste	0.7

Major Occupation

Figure 3 shows that the primary occupation is agriculture for 51 percent of the service providers. Only 18 percent of them indicate that their primary occupation is the service provision. The rest has other occupations as their primary occupation. About 53 percent of them indicate that their secondary occupation is the service provision. In summary, the majority of the Service providers are farmers first and provide machine-based services to other fellow farmers by using their machines. This makes sense because their average land size is about 4 ha (about 10 acres), which is not large enough to use their machines full time. Thus, farmers who own machines use the machines to serve other farmers. This suggest that there is a scope for scaling-up mechanized service provision in Odisha because few farmers are large-scale farmers who can use machines full time on their own farm. Many farmers interviewed for this study indicated that they primary occupation was farming but gradually made the service provision as the primary occupation as they expanded their service provision.

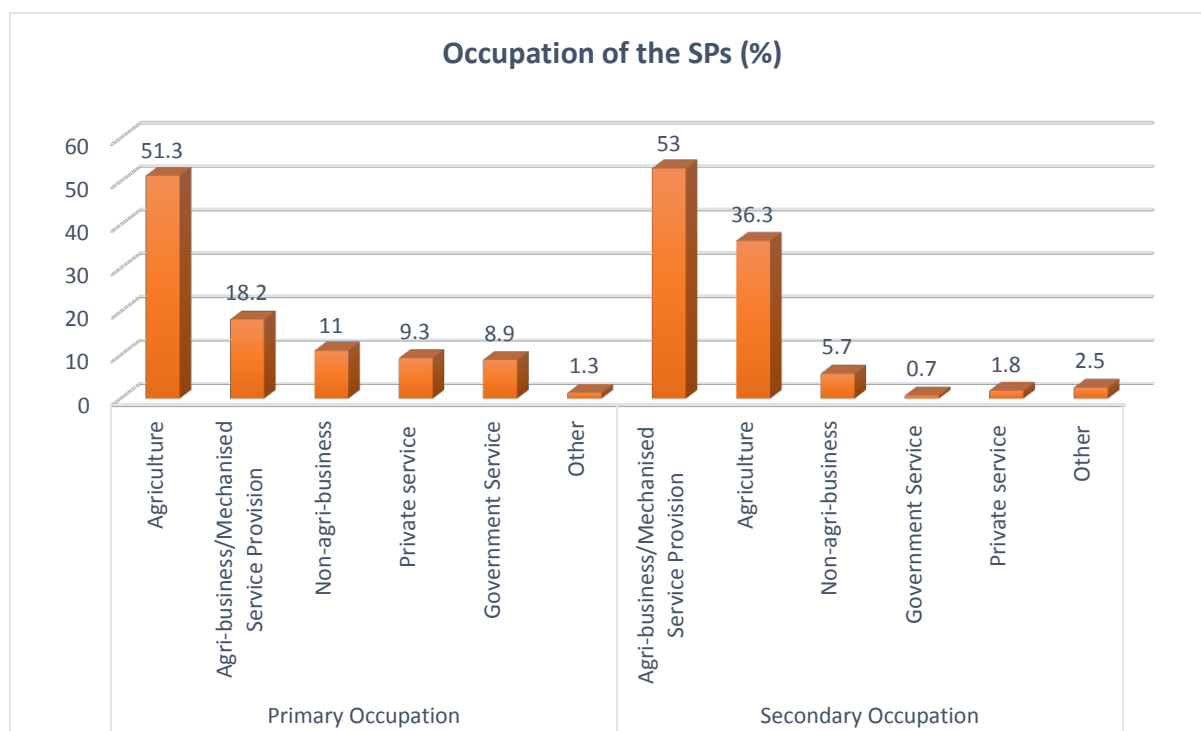


Figure 4. Primary and Secondary Occupations of Service providers

Income and Expenditure

It was found that mechanized service provision contributes about 30 percent to the income of the SP. This indicates that the service provision provide a significant share of their income. Still, agriculture provides the basic livelihood of the service providers: 43 percent of the total income comes from agriculture. They are also involved in some sort of business – non-agriculture which contributes around 12 percent. So far as expenditure is concerned, consumption expenditure is around 3/4th of total outflow. Unlike normal consumption practice of spending fairly more on food, service providers have shifted their consumption practice from food to non-food. Still food consumption is around 43 percent. About 1/4th of total outflow is saved and invested.

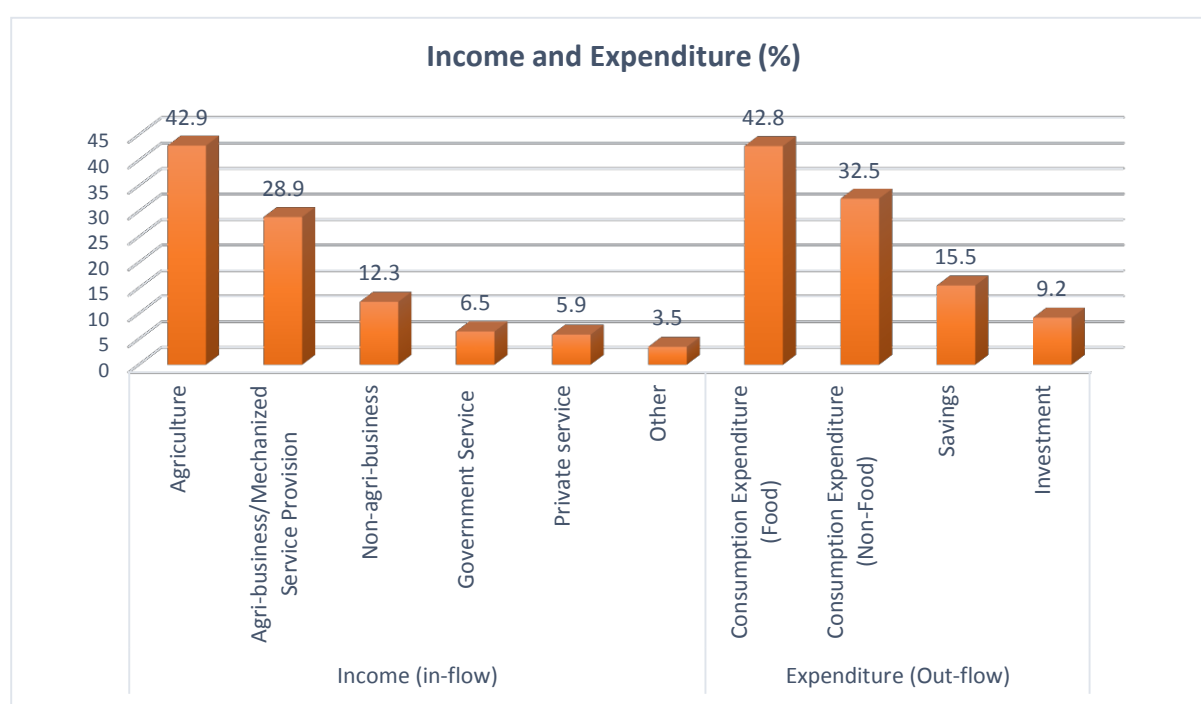


Figure 5. Income Sources and Expenditure of Service providers

Social Networking: The SPs are actively engaged in social networking (Table 5). The active social network may help them to conduct their service provision business and cope with hard times. Percentage of service providers associated with cooperatives, political parties, village committee, formal credit group, is high at 47.3, 43.4, 43.3, and 38.4 percent, respectively. Understandably, many service providers who are associated with cooperatives, village committees, and farmer unions are active members in these groups. But they have only informal associations with political parties.

Although the over-all percentage of the service providers who are associated with Youth Union and Women Union is low, most of those who are associated with these unions are either leaders or active members. Thus, this indicates that young and women service providers are leading their age and gender groups.

Some of the service providers are also active members of formal and informal credit groups. However, as the report shows later, they borrow money from commercial banks, and only a fraction of the service providers borrow from credit groups. This may be because they need to borrow a large amount to buy machines, and only commercial banks can offer such loans. The service providers may consider the formal and informal credit groups as secondary credit sources for small credits.

Table 5. Social Network of Service Providers

Type of organization	Percentage of SPs associated	Type of association			
		Leader	Active member	Passive member	Informal association
	%	%	%	%	%
Cooperatives	47.3	0	57.9	36.1	6
Political Party	43.4	0.8	21.3	10.7	67.2
Village committee	43.3	2.5	57.4	28.7	11.4
Formal Credit group	38.4	0	53.7	41.7	4.6
Farmer Union	28.1	7.6	67.1	22.8	2.5
Informal Credit group	26.0	0	27.4	54.8	17.8
Youth Union	18.9	7.6	71.7	20.7	0
NGO	10.0	3.6	25	25	46.4
Women Union	2.1	33.3	66.7	0	0

5. Machines Owned and Used

Owning of Agriculture Machines

In Table 6, all machines that the service providers have are listed. Popular machines include tractor (45.2%), reaper (30.3%), power tiller (29.2%), paddy transplanter (22.4%), cultivator (20.3%), and combine harvester (15.3%). Among threshers, Tractor-powered axial flow threshers (18.2 %) and Power tiller-powered axial flow threshers (11.7 %) are popular. Open drum threshers are not popular, although they are popular in other countries. Regarding pumps, both electric pumps (22.8 %) and diesel pumps (28.5 %) are popular.

Table 6. Agricultural Machines that Service providers Own

Machine	% of Service providers who own	% of Service providers who own more than 2 machines of the same category	Year own for first time (earliest among the owners)
	%	%	Year
Tractor	45.2	26	1971
Reaper	30.3	4.7	1999
Power tiller	29.2	8.5	2000
Paddy Transplanter	22.4	12.7	2002
Cultivator	20.3	24.6	1971
Combine harvester	15.3	13.9	2009
Winnowing	13.8	0	1985
Rotavator	11.0	12.9	2000
Seed drill	5.3	13.3	2008
Weeder	3.9	9.1	2010
MB plough	2.9	0	1996
Drum Seeder	1.8	20	2008
Reaper-cum-binder	0.7	10	2007
Bed Seeder	0	n.a.	n.a.
<i>Threshers</i>			
Axial flow thresher (Tractor)	18.2	9.8	2002
Axial flow thresher (Power-tiller)	11.7	12.1	2003
Open drum thresher (Electric)	11.4	9.4	1980
Open drum thresher (Pedal)	1.4	50.0	1980
Open drum thresher (Diesel)	1.4	0	2004
<i>Pumps</i>			
Pump Set (Electric)	22.8	14.1	1980
Pump Set (Diesel)	28.5	18.8	1985

The table also shows the earliest year that the service providers owned the machine for the first time. According to the table, tractors and cultivators were first owned in 1971. Winnowers were first owned in 1985. Power tillers and paddy transplanters were owned in the early 2000s. Seed drills and drum-seeders are among the newest machines owned by the Service providers. Among threshers, open drum threshers were owned first in the 1980s. But axial flow threshers which were owned later in the early 2000s become more popular.

Source of Information about the Machines

For the service providers, the main information source is farmers, friends, and neighbours: 67 % of the service providers indicate that this is the main information source, followed by dealer/marketing bodies (12.5%), agricultural universities/KVK (6 %), government agencies (6 %), and others (8%). For paddy transplanter around 25 percent of the service providers have got information from government sources. For combine harvester dealer/marketing bodies and exhibitions are also providing information to farmers. Agriculture universities and KVKs are the main information source of seed drills.

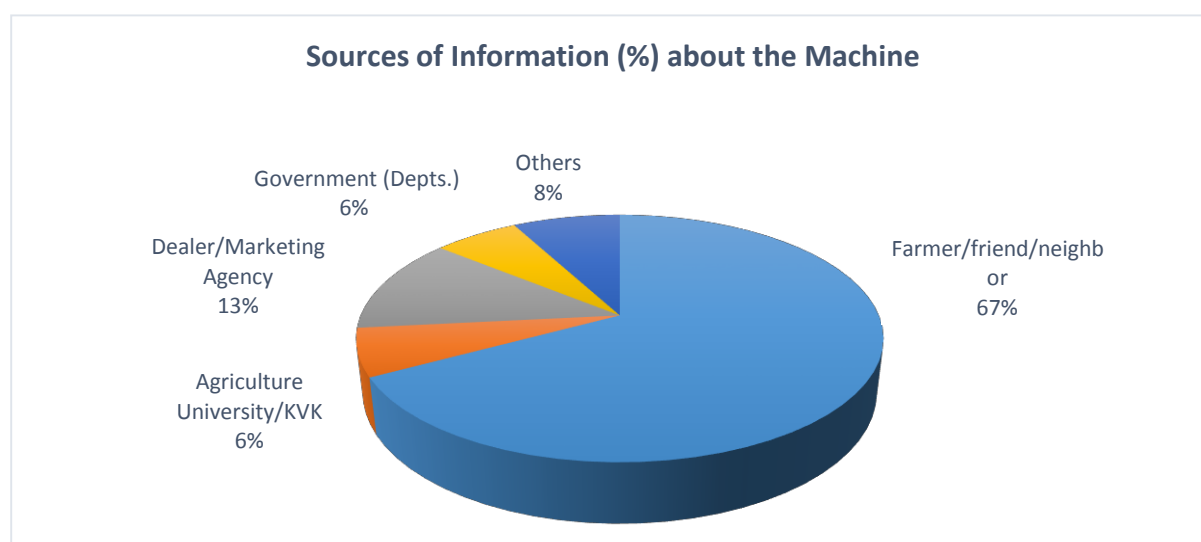


Figure 6. Service providers' Information Sources about Machines

Table 7. Source of Information about the Machines

Machine	Source of Information - you first get to know about the machine				
	Farmer friends or neighbors	Agriculture University	Dealer Marketing	Government	Others
	%	%	%	%	%
Paddy Transplanter	61.9	12.7	7.94	12.7	4.76
Seed Drill	71.43	21.43	7.14	0	0
Combine Harvester	60.47	4.65	16.28	0	18.6
Thresher	65.05	2.91	9.71	10.68	11.65
Tractor	73.17	4.07	22.76	0	0
Reaper	67.44	6.98	3.49	9.3	12.79
Overall	67.13	6.25	12.5	6.25	7.87

Note: Others include Exhibition, Newspaper, Kisan Mela, and others.

Motivating Factors for Purchasing Machines

Overall, around half of the service providers have purchased machines to start new business, as an alternative livelihood option (Figure 7 and Table 8). About 16.4 percent of the service providers indicate that they wanted to diversify their income sources. Around 14 percent of the service providers find potential profits (cost and time saving) and so motivated to purchase machines. About 13.4 percent of the service providers learned that others were doing the business using agricultural machines successfully so they purchased machines. Only 3.7 percent of the service providers have purchased machines because of subsidy. This finding contradicts with a popular view among agricultural experts, that rich farmers purchase agricultural machines because of subsidy.

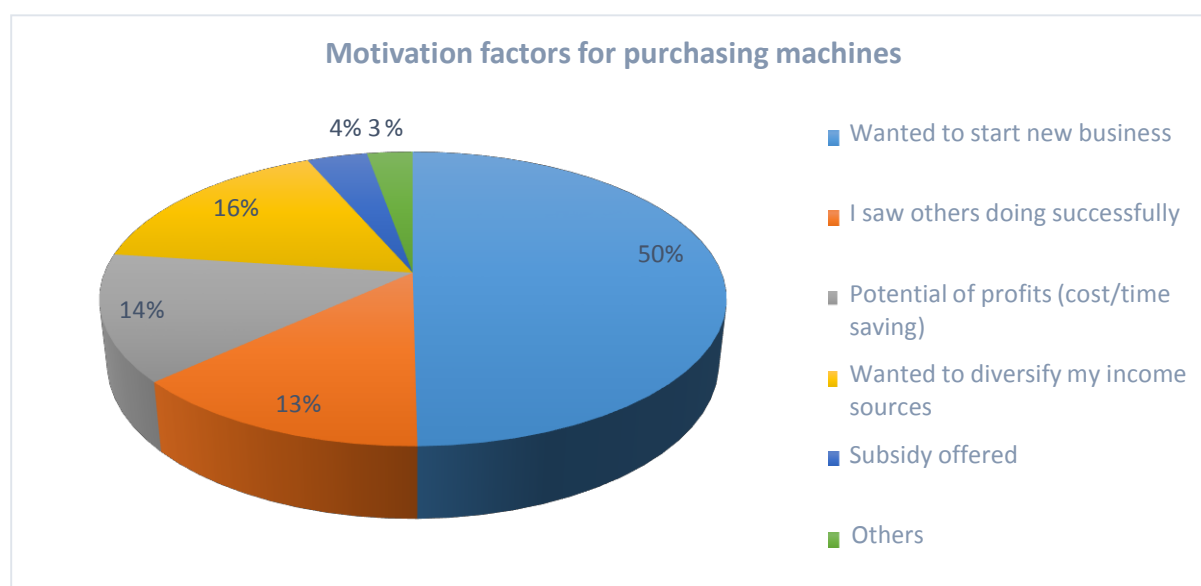
**Figure 7. Service providers' Motivation Factors for Purchasing Machines**

Table 8. Motivations for Purchasing the Machines

Machine	Motivation Factors for Purchasing Machines (%)					
	Wanted to start new business	I saw others doing successfully	Potential of profits (cost/time saving)	Wanted to diversify my income sources	Subsidy offered	Others
Paddy Transplanter	50.8	23.8	15.9	4.8	0.0	4.8
Seed Drill	35.7	42.9	14.3	7.1	0.0	0.0
Combine Harvester	76.7	7.0	2.3	7.0	4.7	2.3
Thresher	37.9	17.5	17.5	16.5	7.8	2.9
Tractor	61.0	4.9	9.8	22.0	1.6	0.8
Reaper	36.1	11.6	19.8	23.3	4.7	4.7
Overall	49.8	13.4	13.9	16.4	3.7	2.8

Top Brands

VST Tillers Tractors Limited (VTTL) is the most popular brand among the service providers for machines like paddy transplanter (73%), seed drill (63%) and reaper (43%). Kubota (25%), Mausam (38%) and Kerala Agro Machinery Corporation Limited (KAMCO) (26%) are the second preferred brands as paddy transplanters, seed drills, and reapers, respectively. Prachi (55%) is the first preferred brand for thresher followed by local make (17%). Mahindra (40%), New Holland Fiat, India (26%) and John Deere (9%) are the popular brand for tractor. Balkar⁷ is the most preferred brand (44%) of combine harvester for service providers. Standard combine⁸ and Gahir⁹ have taken second and third position by present service providers for combine harvester.

⁷Balkar Combines, is an organization engaged in manufacturing and exporting Agriculture Implements. Apart from this, it is also engaged in offering A.C cabin Combines, Tractor Driven Combines and Thresher & Back Hoe. It offers Agricultural Implement that includes Agricultural Harvester, Agricultural Rotavator, Waste Collectors and Straw Reaper.

⁸Standard Combine is in Agriculture Sector in India Since 1990. The company is manufacturing Agriculture products as per latest trend and the requirements in market.

⁹Gahir Agro Industries Limited has introduced a Combine Harvesters equipped with advanced technology and technical expertise, it has developed a range of Tractor Driven Combine Harvester and Self Propelled Combine Harvesters

Table 9. Top Three Brands by Machine Type

Machine	First Brand	Second Brand	Third Brand
Paddy Transplanter	VTTL (73%)	Kubota (25%)	Others (2%)
Seed Drill	VTTL (63%)	Mausam (38%)	n.a.
Combine harvester	Balkar (44%)	Standard (15%)	Gahir (12%)
Thresher	Prachi (55%)	Others-local (17%)	VST (10%) John
Tractor	Mahindra (40%)	New Holland (11%)	Deere (9%)
Reaper	VTTL (43%)	KAMCO (26%)	Kubota (10%)

Credit Accessibility

Access to credit is very important for service providers to start and run the business. All the service providers have borrowed some amount from some sources. At the time of the interview, most of the service providers (76.5%) had outstanding debts, borrowed from bank with an average loan of Rs.319,649 (about USD 5,300). About 56.2 percent of the service providers expect they can borrow more than the current average loan amount from the same source. Next to bank, friend (13.9%) and family (13.2%) are the dependable sources of credit. But the borrowing amount is not high, even less than Rs.50,000 (about USD 833). The service providers have not preferred microcredit organization for loan. But some service providers (10%) say they can borrow from this source in difficult situation.

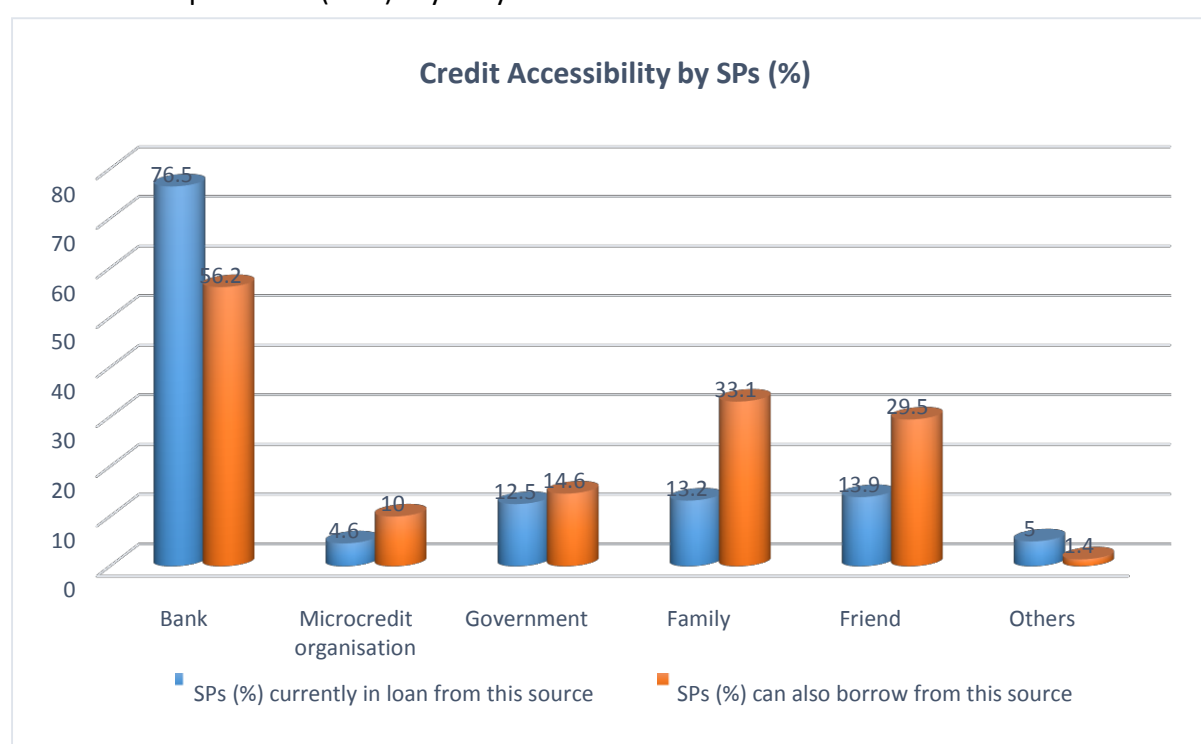
**Figure 8. Credit Accessibility of Service providers**

Table 10. Debts and Potential Credit Constraints

Source	Current Loan		Can borrow for business investment (anticipation)	
	SPs currently in loan (%)	Average loan amount (INR) among those who have loans	SPs (%) can also borrow from this source	Average loan amount (INR)
Bank	76.5	₹ 319,649	56.2	₹ 464,050
Microcredit organisation	4.6	₹ 32,692	10.0	₹ 70,178
Government	12.5	₹ 56,314	14.6	₹ 422,560
Family	13.2	₹ 42,594	33.1	₹ 94,139
Friend	13.9	₹ 37,615	29.5	₹ 93,337
Others	5.0	₹ 127,514	1.4	₹ 381,250

Machines for Own Use

Besides serving others, the service providers use machines on their own fields. Overall, 24 percent of the service providers use their machines on their own fields. Even for their own use, 73.8 percent of the service providers hire machine operators. About 13.6 percent of the service providers manage to operate their machines, while 12.6 percent of the service providers operate the machines themselves and let the hired operators operate the machines. Overall, for own use, the service providers use the machines for 10 days on average. The percentage of the service providers who use their machines on their own fields is 42 percent for tractors, 38.8 percent for threshers, 27.8 percent for reapers, 21.4 percent for paddy transplanters, and 15.3 percent for combine harvesters (Table 11). Through the interviews, some service providers indicated that they prefer to serve other farmers first and operate the machines on their own fields during free times. This suggests that the service provision has a higher return than their own agricultural production and that the service provision can be a successful business for others.

Table 11. Machines for Own Use

Machine	SPs using machine in own field (%)	Machine operator (%)			Average no. of days machine used in own field
		Self	Hired	Both	
Tractor	42.0	11.9	75.4	21.7	8.9
Thresher	33.8	15.8	70.5	13.7	10.5
Reaper	27.8	19.2	65.4	15.4	8.2
Overall	24.0	13.6	73.8	12.6	9.3
Paddy Trans Planter	21.4	16.7	66.7	16.6	10.5
Combine Harvester	15.3	0	97.7	2.3	6.6
Seed Drill	3.9	9.1	90.9	0	15.1

6. Services Provided – cost, coverage, and business strategy

General Business Practice

Among the service providers, a typical service provider has about 3 years of experience, employs one full-time employee, and 2 part-time employees (Table 12). A typical service provider serves about 95 farmers in a year. Thus, the business can be considered as a micro-enterprise. However, there are also some large scale service providers.

Table 12. Basic Indicators of Business

Item	Average Number
No. of years in business	3.1
No. of full time employees	0.8
No. of part time employees	2
No. of farmers served last year	95.1

Years in Business

When the service providers are disaggregated by the type of machines, it is found that the majority of the service providers have less than 2 years of experience (Table 13). For instance, 57 percent of the paddy transplanter service providers have less than 2 years of experience. The percentage goes up to 82.5 percent if the cut-off point is increased to 5 years (columns 1-2). the service providers who use other machines are mostly less experienced than the paddy transplanter service providers. The data indicate that the mechanical service provision in agriculture is a relatively new profession in the Odisha.

Table 13. Service providers' Number of Years of Experience in Business

Machines	Percentage of service providers and years in business			
	1-2 years	2-5 years	5-10 years	more than 10 years
Paddy Transplanter	57.1	25.4	12.7	4.8
Seed Drill	78.6	7.1	7.1	7.2
Combine Harvester	69.8	20.9	2.3	7
Thresher	48.5	31.1	8.7	11.7
Tractor	57.7	26.8	8.9	6.6
Reaper	60.5	27.9	8.1	3.5
Overall	57.9	26.6	8.6	6.9

Purchase and Subsidy

As explained in Section 2, the Odisha government provides subsidy to farmers to buy agricultural machines. Subsidies are specified for different machines, covering a fixed share of the total purchase cost with an upper limit for a specific type of machines. Here is the summary of the subsidy schedules for the six machines that are examined in this report (see Appendix for other machines):

Paddy Transplanters (riding type): 75 % limited to Rs. 5,00,000

Paddy Transplanters (walk behind): 75 % limited to Rs. 1,50,000

Seed Drills: 75 % limited to Rs. 45,000

Combine Harvesters (Self-propelled): 50 % limited to 6 Lakh

Threshers (Axial flow threshers): 50 % limited to Rs. 70,000

Power Threshers (All types): 50 % limited to Rs. 24,000

Tractors: 50 % limited to Rs. 90,000

Reapers (paddy): 50 % limited to Rs. 80,000

In the service provider survey, questions were asked about their purchase of the machine that they purchased most recently and the subsidy that they received on the purchase. Regarding the six types of the machined focused in this report, the survey finds that 87 percent of the service providers received subsidy when they purchased the latest machine (Table 14). On average, the subsidy covers about 36 percent of the purchase cost among those who received the subsidy. However, the coverage ranges from 20 percent for tractors to 62 percent of paddy transplanters. Thus, the data need to be disaggregated by the type of the machines.

For paddy transplanters, the average price of the machines is about 2 Lakh (USD 3,333). All of the service providers who purchased paddy transplanters received subsidy. The subsidy covers about 62 percent of the cost, although the subsidy is allowed for 75 percent of the cost limited to Rs. 5,00,000 for riding types and Rs. 1,50,000 for walk behind types. Thus, it seems that some machines are more expensive than these limits. The average amount of the subsidy they received is about 1.2 Lakh (USD 2,023).

All of service providers who purchased combined harvesters also received subsidy, although the subsidy covers only 25 percent of the purchase cost. However, in terms of the absolute amount, the amount they received is high at about four lakh (USD 6,547) per machine because the cost of the machine is high at about 16 Lakh (about USD 27,000).

Threshes and reapers cost about one lakh or less, and more than 90 percent of the service providers received subsidy. Seed drills are cheaper than other machines considered in this report. The average cost is Rs. 35,857 (about USD 600). The proportion of service providers who received subsidy is low at 43 percent, and the subsidy covers 47percent for those who received the subsidy.

Table 14. Purchasing Costs and Subsidy Received

Major Machine for Service Provision	Average Purchase Price of the machine	Percentage of SPs received subsidy	Percentage that the subsidy covers among those who received subsidy	Amount of subsidy received among those who received subsidy	Net payment among those who received subsidy
	Rs.	%	%	Rs.	Rs.
Combine Harvester	15,71,290	100	25.3	3,97,536	11,73,754
Tractor	5,35,963	71.5	19.7	1,05,585	4,30,378
Paddy Transplanter	1,96,419	100	61.8	1,21,387	75,032
Reaper	99,056	97.7	41.1	40,712	58,344
Thresher	90,954	89.3	34.8	31,656	59,298
Seed Drill	35,857	42.9	46.7	16,745	19,112
Total	377,450	87.0	36.3	1,37,014	2,40,436

Note: Exchange rate: USD 1 = Rs. 60 in 2013.

Service providers Providing Paid Service

By using machines they purchase with subsidy, the service providers serve other farmer. Some service providers provide services by using multiple machines probably because one machine is used in a specific period during the agricultural season. They use different machines over an agricultural season to provide services for different activities. For instance, a service provider who uses a paddy transplanter may provide transplanting service during a planting season but uses a combine harvester during a harvesting season.

In Table 15, it is confirmed that the service providers provide paid-services to other farmers: 90 percent of the transplanter service providers provided paid service, and so did 100 percent of the service providers who own Seed drill and Combine Harvester, 81 percent of the service providers who own Thresher, 92 percent of the service providers who own Tractor, and 78 percent of the service providers who own Reapers.

Table 15. Percentage of Service providers Providing Paid Service through Selected Machines

Major Machine for Service Provision	Paid Service through the machine for which selected as sample
	%
Combine Harvester	100
Tractor	92.9
Paddy Transplanter	89.7
Reaper	78.0
Thresher	81.4
Seed Drill	100

Coverage under Paid Service

On an average, a transplanter SP has given paid service to 33 farmers with 70.3 acres land last year (Kharif plus Rabi). A paddy transplanter usually works for a month in a year. The smallest plot that the paddy transplanter service providers served is 0.26 acre on average. Thus, the result suggests that the service providers provide transplanting services even on small plots. This suggests a large potential for expanding this business in Odisha where farmers cultivate small plots. In case of combine harvesters, the business covers a large area. The machine works for one and half months and serves about 188 farmers with 361 acre of land. Regarding the service providers with threshers, they operate for a month in a year providing service to only 44 farmers per SP and threshes paddy only in 109 acres of land. There is a huge scope for spread of post-harvest activities where combine harvester has not reached or finds it difficult to reach. Although few service providers have provided service through seed drill, still farmers served per SP is good. Overall, one SP has served about 49 farmers with 78.8 acres of land.

Smallest Plot Size for Machine Operation

Our data shows that the smallest plot of land where the sample service providers have operated their paddy transplanter, seed drill, combine harvester, tractor and reaper have been in average plot sizes of 0.26 acre, 0.17 acre, 0.21 acre, 0.23 acre and 0.93 acre respectively (Table 16). This depicts that for adoption of technology small plot holding is not a big constraint. For reaper, the sampled service providers indicated that the farmers do not prefer to take the service of a reaper for their small plots rather they prefer to harvest paddy manually by themselves or by using labour.

Mechanized Service Taken by Women Farmers

In this study we also tried to understand, how women farmers accessed mechanised service from service providers. Although it is found that about 7.5 percent of service providers are female¹⁰, only 2 women farmers have taken service from a service provider last year. It is believed that the using the paddy transplanter can reduce drudgery (by escaping the manual transplanting process), therefore it was expected that more women would be interested to avail service of a paddy transplanter. But on the contrary it was found that, as compared to other machines, least number of women farmers, 0.6 women farmers on average, have taken paid service (Table 16). More women farmers have taken paid service for combine harvesters and tractors.

Table 16. Indicators on Paid Service

Machine	Days machine in operation per year	Total area treated in last year	No. of farmers served in last year	No. of women farmers served in last year	Smallest plot served
	(A)	(B)	(C)	(D)	(E)
	Days	Acre	number	number	Acre
Combine Harvester	45	361.0	187.7	4.2	0.21
Tractor	45	246.4	107	2.8	0.23
Paddy Transplanter	28	70.3	32.5	0.6	0.26
Reaper	25	63.0	31.7	0.5	0.93
Thresher	31	108.6	43.9	0.9	-
Seed Drill	38	78.8	48.8	1.4	0.17

¹⁰Mostly the machine is in the name of female but the service is managed by male.

Machine Operators

As seen in Table 17, 77 percent of the service providers engage hired operators for machine operation at others field. Farmers also demand skilled¹¹ operators for their field. Hired operators have been found more for operation of machines like combine harvester (97.6%), seed drill (87.5%) and tractor (81.3%). It can also be seen that none of the sampled service providers chose to operate combine harvester by himself/herself whereas 22.6 percent of the sampled service providers tried self-operating paddy transplanter.

Table 17. Machine Operators for Paid Service

Machine	Machine operator (%) for service provision		
	Self	Hired	Both
Combine Harvester	0.0	97.6	2.4
Tractor	8.9	81.3	9.8
Paddy Transplanter	22.6	62.3	15.1
Reaper	12.3	67.7	20
Thresher	14.3	76.2	9.5
Seed Drill	12.5	87.5	0.0
Overall	11.9	76.9	11.2

¹¹ farmers assume hired operators are more skilled

Cost on Machine Operation

The total cost incurring on usage of a machine, depended on various factors like fuel cost, labour cost for its operation and maintenance cost etc. The estimated costs of hired labour use, fuel, and maintenance are presented in Table 18. In this table, however, we have excluded the cost estimates for seed drills because the number of the service providers who use seed drills is 8 and is too small to obtain reliable cost estimates.

The average labour cost (per machine per year) for operation of combine harvesters is Rs. 1,07,393, which is much higher than the labour costs of the other machines. The average labour cost of the other machines ranges from Rs. 18,000 (Paddy Transplanters) to Rs. 23,748 (Tractors). The high labour cost for combine harvesters is due to high wages for hired labours, i.e., operators. The average daily wage for combine harvester operators is about Rs. 1,060, while the average daily wage for the other machines is about Rs. 250.

The average fuel cost is also high for combine harvesters at Rs. 1,40,690 (51.8 liters of diesel per a service day for 45 service days). It is also high for tractors, at Rs. 71,884 (28.2 liters of diesel per a service day for 45 service days). These are large machines that require large amounts of fuel. The average fuel cost is lower for smaller machines such as paddy transplanters, threshers, and reapers. Their daily consumption of diesel is about 5.5, 11.3, and 6.6 liters per a service day, respectively.

The average maintenance cost is also high for combine harvesters and tractors. It is Rs. 43,170 for combine harvesters and Rs. 12,351 for tractors, while it is about Rs. 4,000 for other machines.

In sum, the total operational cost per season is very high for combine harvesters at 2.9 Lakh for combine harvesters and about 1.1 lakh for tractors. It is low for reapers at Rs. 30,738 and for paddy transplanters at Rs. 31,424. For threshers, the average total cost is Rs. 44,525.

Table 18. Cost on Machine Operation for Service Provision^A

Machine	Hired Labour Cost (Average per Machine per Year)	Fuel Cost (Average per Machine per year)	Maintenance Cost (Average per Machine per year)	Total Operational Cost per Year (Average)
	(A)	(B)	(C)	(A+B+C)
Combine Harvester	₹ 1,07,393	₹ 1,40,695	₹ 43,170	₹ 2,91,258
Tractor	₹ 23,748	₹ 71,884	₹ 12,351	₹ 1,07,984
Thresher	₹ 18,695	₹ 21,579	₹ 4,252	₹ 44,525
Paddy Transplanter	₹ 18,000	₹ 9,918	₹ 3,506	₹ 31,424
Reaper	₹ 16,275	₹ 9,978	₹ 4,485	₹ 30,738
Seed Drill	n.a. ^B	n.a.	n.a.	n.a.

Note: A) Exchange rate: USD 1 = Rs. 60 in 2013. B) The number of the service providers who use seed drills is 8 and too small to obtain reliable estimates of the costs.

Fees and Payment

The average fees charged by the service providers for Paddy Transplanter is Rs.1,505 per acre of land. The average fees charged for other machines like combine harvester, tractor, thresher, reaper and seed drill is on hourly basis and that is: Rs.1,950, Rs.520, Rs.419, Rs.411, Rs.406 per respectively (Table 19). For all listed machines, except for the combine harvester, the fees include both the machine and the machine operator. For the combine harvester, apart from the operator another person is required for assistance, therefore the SP charges extra. To get more business, service providers also provide service on credit. Overall the sample reflects that 95 percent of the service providers provide service on credit on zero interest. On an average, 47.4 percent customers pay after harvest i.e. after selling the products and the rest keeps paying from time of service to harvesting on irregular intervals

Table 19.Fees for Paid Service

Machine	Average fees charged	SPs providing service on credit	Customer Paid after harvest	Interest charged for credit
	(A)	(B)	(C)	(D)
	Rs/hour	%	%	Rs.
Combine Harvester	₹ 1,950	100	36.8	Nil
Tractor	₹ 520	98.2	48.4	Nil
Thresher	₹ 419	91.7	53.5	Nil
Paddy Transplanter	₹ 757	90.6	43.9	Nil
Reaper	₹ 411	95.4	47.7	Nil
Seed Drill	₹ 406	100	48.7	Nil
Overall	-	95.3	47.4	Nil

Estimated Revenues and Profits

By using the fees in Table 19 and total areas covered by the service providers, total revenues are calculated for all service providers (Table 20). The service providers who use combine harvesters earn most: about 5.8 Lakh Rupees (USD 9,667). By subtracting the total operational cost in Table 18, the average profit is found to be 2.9 Lakh Rupees (USD 4,833). The service providers who use tractors earn just below 2 Lakh Rupees, and the estimated cost is about 1.1 Lakh Rupees. Thus, the estimated profit is about 0.9 Lakh Rupees.

For the service providers who use paddy transplanters, the estimated revenue is about 0.9 Lakh Rupees and the estimated profit is about 0.6 Lakh Rupees. Service providers who use threshers and reapers make less than the other service providers.

Table 20. Cost on Machine Operation at Others Field

Machine	Total Revenue (Average)	Total Operational Cost (Average)	Estimated Profit
	(A)	(B)	(C)
Combine Harvester	₹ 5,77,600	₹ 2,91,258	₹ 2,86,342
Tractor	₹ 1,97,120	₹ 1,07,984	₹ 89,136
Paddy Transplanter	₹ 91,390	₹ 31,424	₹ 59,966
Thresher	₹ 76,020	₹ 44,525	₹ 31,495
Reaper	₹ 50,400	₹ 30,738	₹ 19,662
Seed Drill	n.a.	n.a.	n.a.

Investment Returns

The estimated profits are interesting, but the different machines require different investments. Service providers who use combine harvesters may earn more, but they needed to make large investments also. What is important to examine returns compared to the investment. At the beginning of this sub-section, the average purchase price of a combined harvester was 16 Lakh and the average net payment (after receiving subsidy) was 12 Lakh. Therefore, we find that the one year profit is about 18 percent of the average price of a combined harvester and 24 percent of the net payment (Table 21). Simply put, it would take more than 5 years to recover the purchase cost without subsidy but would take only about 4 years with subsidy. Similarly, the estimated profit is about 17 percent of the machine price without subsidy but about 21 percent of the net purchase. For both machines, the subsidy in Odisha covers 50 percent of the purchase price with some upper limits.

On paddy transplanters, the subsidy covers 75 percent of the purchase cost, and all of the service providers interviewed for our study received the subsidy. Without the subsidy, the estimated profit per year is about 30 percent of the purchase price. However, with the subsidy, it is about 77 percent of the actual net payment for the machine. Thus, with the subsidy, the service providers can recover about 77 percent of the initial investment to buy the machine.

Within 2 years, they can recover the purchase cost. Without the subsidy, they would need more than 3 years to recover the cost. Thus, the high return is due to the subsidy.

With subsidy, the service providers with threshers can recover 53 percent of the net payment. Thus, they also enjoy a high return. Compare with them, the service providers with reapers have a lower return. From this table, it is clear that the subsidy makes a large difference especially for those with paddy transplanters and threshers.

Table 21. Cost on Machine Operation at Others Field

Machine	Average Purchase Price of the machine	Net payment after subsidy	Estimated Profit per season	Purchase Price over Estimated Profit (A)/(C)	Net Payment after subsidy over Estimated profit (B)/(C)
	(A)	(B)	(C)	(D)	(E)
	Rs. (₹)	Rs. (₹)	Rs. (₹)	Ratio	Ratio
Combine Harvester	15,71,290	11,73,754	2,86,342	0.18	0.24
Tractor	5,35,963	4,30,378	89,136	0.17	0.21
Paddy Transplanter	1,96,419	75,032	59,966	0.30	0.77
Thresher	90,954	59,298	31,495	0.34	0.53
Reaper	99,056	58,344	19,662	0.20	0.33
Seed Drill	35,857	19,112	n.a.	n.a.	n.a.

Note: Exchange rate: USD 1 = Rs. 60 in 2013.

Business Development Strategy for MPS by Service Providers

About 84 percent of the sampled service providers have expressed their interest to expand their business by adding more customers (Table 22); rest either have no time or are satisfied with their current business. The service provider having seed drill, paddy transplanter and combine harvester shows more interest of expansion. As usage of Seed drill is new to the state of Odisha, not many farmers demand for its service (line sowing through seed drill) . The service providers indicated that the demand for service of mechanical transplanting is picking well.

The service providers have planned their own business strategies to get better business. But as reflected in the study, overall, 47 percent of the service providers strategize, directly talking to the neighbours about the benefit of their servicing technology. They want to cover the farmers in their own village and their neighbouring villages. About 21 percent of the service providers favour organising demonstration for fellow farmers. Around 15 percent service providers prefer the strategy of 'community take-up' of their servicing machines.

Interestingly, for paddy transplanter, about 32 percent of the sampled Service providers strategize to opt for ‘backward and forward linkages’. They are planning to be with the farmers before and after the service. They will help farmers in availing inputs and advise them for better package of practices. Also help them in marketing their product. For seed drill there are only two strategies opted: demonstration to fellow farmers (87.5%) and talking to neighbour farmers (12.5%) on benefit of technology.

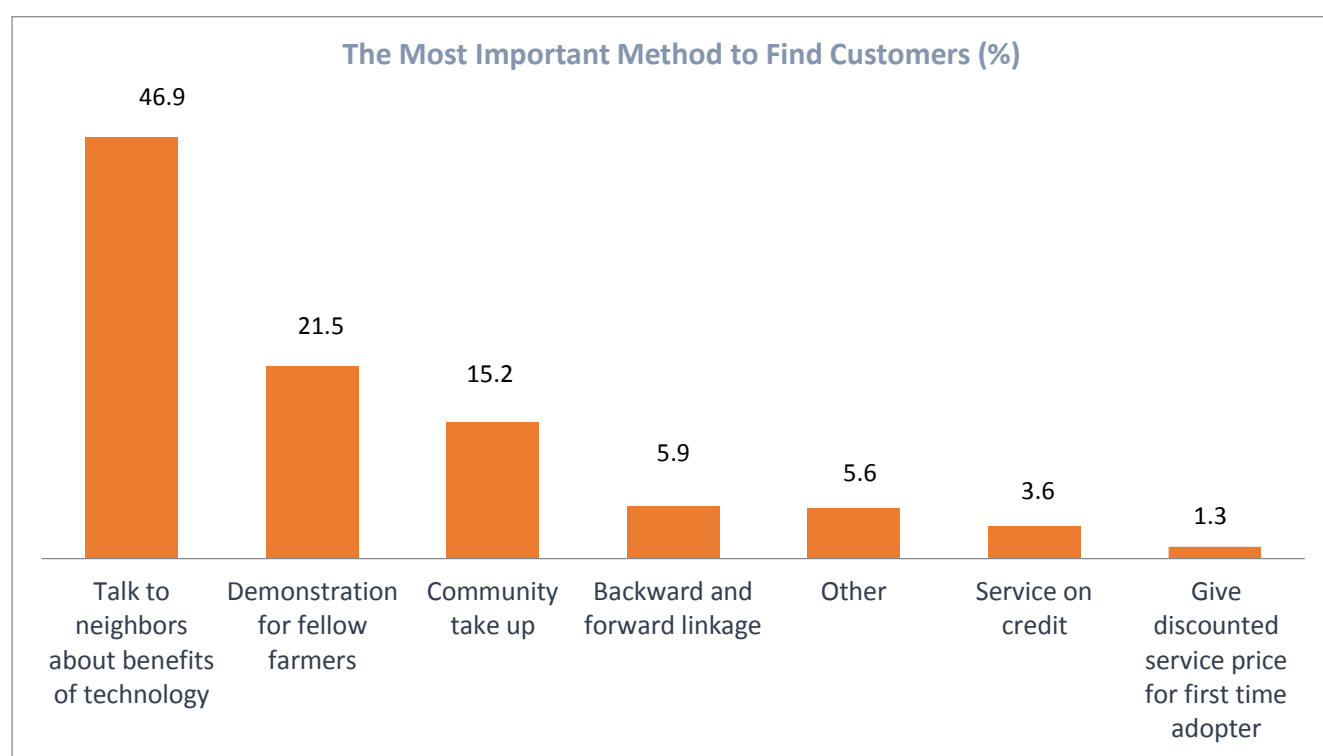


Figure 9. Service Providers’ Business Strategy

Table 22. Business Development Strategy by SPs

Machine	SPs interested to serve more farmers	Strategies for business development (%)				
		Demonstration for fellow farmers	Talk to neighbours about benefits of techn	Community take up	Backward and forward linkage	Other
		A	B	C	D	E
Paddy Transplanter	94.3	28	28	2	32	10
Seed Drill	100	87.5	12.5	0	0	0
Combine Harvester	90.2	32.4	32.4	16.2	0	19.0
Thresher	77.4	13.9	63.1	12.3	1.5	9.2
Tractor	78.6	11.4	44.3	28.4	1.1	14.8
Reaper	84.6	23.6	63.6	10.9	0	1.9
Overall	83.5	21.5	46.9	15.2	5.9	10.5

Demand Aggregator for Business Development

The service providers were asked about how a demand aggregator could be helpful in developing their business. The results show, overall 43 percent of the service providers are in favour of using a demand aggregator. Within the 43 percent (who favour using an aggregator), 87 percent of them want to use them for promoting the Seed drill technology, 76 percent for combine harvester and 41 percent for both paddy transplanter and reaper. When asked about who could be the better demand aggregator, 46 percent of the service providers indicated about fellow farmers, 35 percent indicated about unemployed youth with good networking skills and 15 percent indicated about (Table 23). But the service providers servicing Seed Drill machines opined that, unemployed youth with good networking skills could be the most successful demand aggregator.

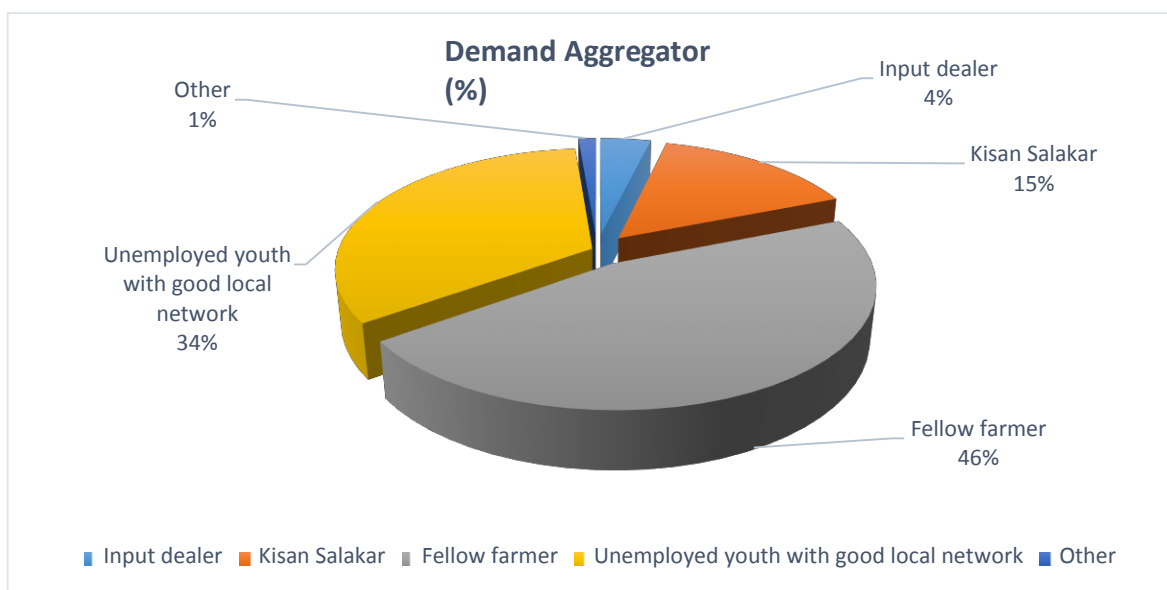


Figure 10. Who should aggregate demand?

Table 23. Demand Aggregator for Business Development

Machine	SPs in favour of demand aggregator (%)	Who should be the Demand Aggregators (%)				
		Input dealer	Kisan Salakar	Fellow farmer	Unemployed youth with good local network	Other
PT*	41.5	0	18.2	59.1	22.7	0
SD*	87.5	0	0	42.9	57.1	0
CH*	75.6	12.9	6.5	45.2	32.3	3.1
Thresher	36.9	0	22.6	38.7	38.7	0
Tractor	35.7	2.5	5	52.5	37.5	2.5
Reaper	41.5	3.7	33.3	37.1	25.9	0
Overall	43.5	3.8	15.2	46.2	33.5	1.3

* PT- Paddy Transplanter, SD- Seed Drill, CH- Combine Harvester

7. Business Constraints and Training Needs

To identify constraints to expand their business, the service providers were asked to rate possible constraints in a five point scale (1= No constraint, 2= Less mild constraint, 3= Mild constraint, 4= Strong constraint and 5= Very strong constraint). The possible constraints included in the survey are credit/subsidy, demand for machine, technological issues and machine operators. In addition, the survey also asked the service providers about their use of the machines and training that they received in the past.

Credit/subsidy Constraint: The Odisha government provide subsidy to farmers and service providers for purchasing machines (Appendix 1). For instance, the state government subsidises 75 percent of the cost, or up to Rs. 5,00,000 (USD 8,333), for buying a sit-on type paddy transplanter or 50 percent of the cost, or up to Rs. 90,000 (USD 1,500), for buying a tractor. The list of the machines that the state government of Odisha subsidise is provided in Appendix 1.

Despite the subsidy, or because of it, the service providers does not find Credit/Subsidy, or lack of it, as a binding constraint. About three fourth of the service providers find it as No Constraint (Table 24). Around 20 percent of the service providers find it as Mild or Less Mild constraint. For conducting the service provision with tractors and combine harvesters, however, they find Credit/Subsidy as a more constraining. Less than 52 percent of the service providers who operate tractors find it as No Constraint. For the service providers who use combined harvesters, this number is 75 percent. These numbers are much lower than the numbers for paddy transplanters, threshers, and reapers. This could be because combined harvesters and tractors are expensive yet the subsidy is limited to 50 percent of the cost of buying a new machine. For the paddy transplanters, which is as expensive as tractors and combined harvesters, the subsidy covers 70 percent of the cost.

Table 24. Credit/subsidy as Constraint to Mechanized Service Business

Machine	Credit/subsidy: Rating of Constraint (1-5 scale)				
	1= No constraint	2= Less mild constraint	3= Mild constraint	4= Strong constraint	5= Very strong constraint
	%	%	%	%	%
Paddy Transplanter	88.7	7.6	1.9	1.8	0
Seed Drill	75.0	0	0	12.5	12.5
Combine Harvester	65.9	22.0	9.8	2.3	0
Thresher	88.1	9.5	2.4	0	0
Tractor	51.8	18.8	12.5	6.3	10.6
Reaper	84.6	7.7	7.7	0	0
Overall	73.6	13	7.2	2.8	3.4

The different coverages across machines may reflect the government policy to promote new types of machines because paddy transplanter is still new in Odisha, while tractors have been in the state since 1970s.

Availability of Machine Operators as a constraint

More than half of SPs indicate that finding machine operators is a constraint (Table 24). About 34.7percent of the service providers have rated this constraint either as Strong or as Very Strong Constraint. This is especially a strong constraint for the service providers who use combine harvesters (63.4% combined for Strong and Very Strong Constraint), threshers (47.6%), and reapers (43.0%). Some service providers have indicated that they provide advance to operators before a busy season to assure that they would be available during the busy season.

Finding operators is not a major constraint for the service providers who use paddy transplanters and tractors. About 70 percent of the service providers who use paddy transplanters and 58percent of those who use tractors have rated this as No Constraint. This could be because operation of these machines are not difficult, and it is not difficult for them to find operators.

In general, however, increasing a number of skilled operators is a major constraint for service providers, and the shortage of skilled operators will become more serious as more farmers start operating as service providers.

Table 25. Machine operator as Constraint to Mechanized Service Business

Machine	Machine operator: Rating of constraint (1-5 scale)				
	1= No constraint	2= Less mild constraint	3= Mild constraint	4= Strong constraint	5= Very strong constraint
	%	%	%	%	%
Paddy Transplanter	69.8	11.3	7.6	5.7	5.6
Seed Drill	50.0	12.5	0	37.5	0
Combine Harvester	0	19.5	17.1	56.1	7.3
Thresher	41.7	9.5	1.2	13.1	34.5
Tractor	58.0	16.1	5.4	11.6	8.9
Reaper	32.3	18.5	6.2	7.7	35.3
Overall	44.6	14.6	6.1	16.0	18.7

Demand for machine as a constraint: Possibly because of rising labour costs or increased awareness of agricultural machines through media and extension work, the demand for service provision seems high. About half of the service providers suggest that demand is not a constraint to expand their business at all. Combined with Less Mild Constraint, the percentage increases to higher than 73 percent. The demand for Paddy Transplanters seems very high. Higher than 96 percent of the service providers with paddy transplanters indicate that Demand is Less Mild or No Constraint. Combined harvesters also have a high demand.

Table 26. Demand for Machine as Constraint to Mechanized Service Business

Machine	Demand for machine: Rating of constraint (1-5 scale)				
	1= No constraint	2= Less mild constraint	3= Mild constraint	4= Strong constraint	5= Very strong constraint
	%	%	%	%	%
Paddy Transplanter	60.4	35.9	1.9	0	1.8
Seed Drill	62.5	25	0	12.5	0
Combine Harvester	46.3	36.6	17.1	0	0
Thresher	48.8	15.5	21.4	11.9	2.4
Tractor	45.5	29.5	18.8	4.5	1.7
Reaper	35.4	21.5	32.3	9.2	1.6
Overall	47.1	26.5	18.7	6.1	1.6

Technology constraint: Service providers face technical problems (Table 27). In some cases, they have difficulties in finding technicians who can maintain or repair machines or obtaining missing parts. This is especially true for machines that are new in their locations. Seed drills are new in some parts of Odisha. Possibly because of this, about 38 percent of the service providers who use seed drills find Technology as Very Strong Constraint. Combine harvester is not only new but also highly sophisticated. Thus, about half of the service providers who use combine harvesters find Technology as either Mild or Strong Constraint. Technology is not a major constraint for machines that are popular and wide-spread, such as tractors and paddy transplanters.

From discussion with SPs it was found that although SPs are promoting various technologies, most of them do not have much knowledge on best-bet agronomic practices associated with those technologies. So they demand massive awareness programs through demonstrations, hand-holding support by extension workers, and propagation through mass media and other effective modes should be made.

Table 27. Technology as Constraint to Mechanized Service Business

Machine	Technology issues: Rating of constraint (1-5 scale)				
	1= No constraint	2= Less mild constraint	3= Mild constraint	4= Strong constraint	5= Very strong constraint
	%	%	%	%	%
Paddy Transplanter	47.1	34.0	15.1	0	3.8
Seed Drill	62.5	0	0	0	37.5
Combine Harvester	26.8	24.4	34.2	14.6	0
Thresher	34.5	40.5	13.1	7.1	4.8
Tractor	52.7	33.0	8.9	1.8	3.6
Reaper	13.9	43.1	23.1	15.4	4.5
Overall	38.0	35.0	16.0	6.6	4.4

Assessment of Machine Utilization and Base of Assessment

We have also discussed with the service providers whether they have made an assessment on the level of their machine use and the base of that assessment. We learn from the data that around 90percent of the service providers have made an assessment of their machine utilisation levels. Overall, 63 percent of the sampled survive providers claim to have made the optimum use of their machines, 30 percent reflected under-utilisation and 7percent claimed of making over utilisation.

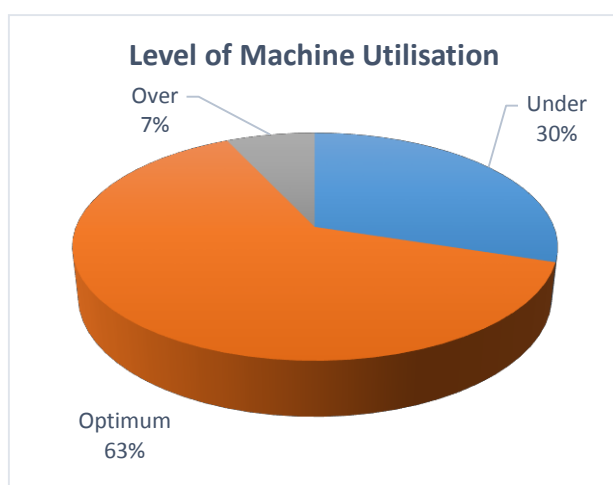
**Figure 11. Level of Machine Use**

Table 28. Assessment of Machine Utilisation and Base of Assessment

Machine	SP has assessed the level of their machine utilization	Level of machine utilized			Base of assessment		
		Under	Optimum	Over	Income getting	Time giving	Capacity of the machine
	%	%	%	%	%	%	%
PT*	77.4	26.8	63.4	9.8	29.3	39.0	31.7
SD*	75.0	16.7	83.3	0	16.7	16.7	66.6
CH*	92.7	26.3	65.8	7.9	10.5	50.0	39.5
Thresher	89.3	34.7	60.0	5.3	24.0	49.3	26.7
Tractor	93.8	22.9	66.7	10.4	10.5	47.6	41.9
Reaper	92.3	41.7	56.7	1.6	21.7	50.0	28.3
Overall	89.5	29.9	63.1	7.0	18.2	47.1	34.7

* PT- Paddy Transplanter, SD- Seed Drill, CH- Combine Harvester

Training Taken by Service providers

Service provider's knowledge on technology and management adds to his business. Overall, only 24.8 percent Service providers have taken training on machines whereas 58.5 percent service providers have attended training on paddy transplanter. Generally Service providers (95.6%) have taken technical training. Only 3.4 percent have attended business management training. Among trained service providers, 67.7 percent have given training to others on machines. One trained SP has given training to 6-7 persons. The training spill over effect is more for paddy transplanter (1:9) and least for seed drill (1:2).

Table 29. Training Taken by Service providers on Machines

Machine	SPs have taken training on machines	Type of training attended			SPs trained others	No. of persons trained by SPs
		Technical	Managerial	Entrepren. development		
	%	%	%	%	%	(Average)
PT*	58.5	93.6	3.2	3.2	67.7	8.5
SD*	12.5	100	0	0	100	2
CH*	22	88.9	11.1	0	44.4	3.8
Thresher	20.2	94.1	5.9	0	70.6	7.4
Tractor	8.9	100	0	0	80	4.3
Reaper	33.9	100	0	0	63.6	4.4
Overall	24.8	95.6	3.37	0.54	66.7	6.3

* PT- Paddy Transplanter, SD- Seed Drill, CH- Combine Harvester

Training Organizer and Quality of Training

It was found that it is mostly private company (74.4%) who organizes training programmes followed by government (15.6%) and NGOs (6.7%) for Service providers on machines. Service providers (as trainees) have rated the quality of training as good (76%), poor (11.1%), very poor (6.7%), very good (5.6%) and excellent (1percent). Service providers say training by private companies is comparatively better.

Table 30. Organizer of Training and Training Quality

Machine	Organizer of training				Quality of training				
	Pvt. Companies	Research organization	Govt.	NGO	Very poor	Poor	Good	Very good	Excellent
	%	%	%	%	%	%	%	%	%
PT*	77.4	6.5	6.5	9.7	3.2	9.7	77	6.5	3
SD*	100	0	0	0	0	0	100	0	0
CH*	100	0	0	0	11.1	22.2	67	0	0
Thresher	70.6	0	29.4	0	5.9	5.9	88	0	0
Tractor	90	10	0	0	10	0	80	10	0
Reaper	54.6	0	31.8	13.6	9.1	18.2	64	9.1	0
Overall	74.4	3.3	15.6	6.7	6.7	11.1	76	5.6	1

* PT- Paddy Transplanter, SD- Seed Drill, CH- Combine Harvester

Training Needs

About 79.3percent of Service providers have shown their interest for new training on using paddy transplanter (Mechanical Transplanting of Rice). Among interested Service providers, more than 80percent of the service providers are interested for technical training on MTR - seed treatment, mat nursery, machine calibration /operation, machine repairing, etc. The rest of the service providers mostly established, demand training on entrepreneurship development. About three fourth of the seed drill service providers have expressed their interest to attend training on machine and 83.3 percent from them also needs technical training. Among various service providers, the highest demand for training has come from the combine harvester users (90.2%). And amongst this 90 percent interested service providers using combine harvesters, 81 percent requires technical training and 16 percent requires entrepreneurship development (training). Comparatively less number of thresher Service providers (58.3%) have interest on new training. Quite a good number of Service providers (32.7%) have insisted for training on entrepreneurship development.

Table 31.Demand for Training and Type of Training Need

Machine	SPs interested for new training on machines (%)	Technical	Entrepreneurship development	Other
		%	%	%
Paddy Transplanter	79.3	81	19	0
Seed Drill	75	83.3	16.7	0
Combine Harvester	90.2	81.1	16.2	2.7
Thresher	58.3	65.3s	32.7	2
Tractor	56.3	88.9	7.9	3.2
Reaper	81.5	64.2	35.8	0
Overall	68.9	76.4	22	1.6

8. Conclusion

The results in this report describe characteristics of service providers in Odisha. They are mostly male and highly educated. Their primary income source is still agricultural production, but service provision provides 30 percent of the income. This share may increase as they expand their business in the future because most of them have just started the business less than three years ago. They obtain information about the machines mostly from friends and neighbours, and more than three fourth of them have loans from commercial banks.

The service providers employ workers who operate machines. However, finding skilled operators seems to be a constraint. The lack of skilled machine operators was cited as a major constraint for their business in the report. The service providers also stimulate local business as they buy machines from local dealers and hire local technicians for maintenance of their machines. The expansion of their business, therefore, may contribute to the economic development in rural areas in Odisha.

The report finds that close of 90 percent of the service providers who were interviewed for the report received subsidy to purchase agricultural machines used for service provision. Because of the subsidy, the service providers can recover their initial investment quickly. In the case of service providers with paddy transplanters, they can recover about 77 % of their net payment, after receiving subsidy, for a paddy transplanter within one year. Service providers who use combine harvesters can recover the net payment for the machine within four years, instead of more than five years without subsidy. Thus, the subsidy plays an important role in encouraging more farmers to become service providers.

Possibly due to the availability of the subsidy, the access to credit/subsidy was not found to be a binding constraint. Instead, the lack of skilled workers was cited as a major constraint. Therefore, it is recommended that the Odisha government provides assistance to technical trainings which are conducted by private companies, government agencies, NGOs, or research organizations in addition to providing subsidy to machine purchases.

Odisha agriculture is at a cross road toward achieving agricultural mechanisation in coming decades, and service providers need to play an imperative role to take the road. Assisting service providers through easy supply of machines, assured post sale service, provision for their capacity building in understanding technologies and best-bet agronomic practices associated with these, troubleshooting and maintenance knowledge, training on successful business development models, etc., therefore, should be considered as a top priority for the Odisha government and other state governments in Eastern India.

References:

Characterization of CSISA Odisha Hub Districts for Technology Development and Targeting, CSISA India, 2013

Economic Survey 2012-13, Planning & Coordination Department, Government of Odisha

Farm Mechanisation in Odisha, Odisha Farm Machinery Research & Development Centre

Odisha Agriculture Statistics, 2012-13, Government of Odisha

Odisha Agriculture Statistics, 2011-12, Government of Odisha

Odisha Agriculture Statistics, 2011-11, Government of Odisha

Odisha Agriculture Statistics, 2009-10, Government of Odisha

Orissa Agriculture Statistics, 2008-09, Government of Orissa

Orissa Agriculture Statistics, 2007-08, Government of Orissa

Orissa Agriculture Statistics, 2006-07, Government of Orissa

State Agriculture Policy 2013, Government of Odisha

Appendix

1. Year-wise Progress of Farm Mechanisation in Odisha

Farm Equipment	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03	2003-04
Tractor	103	512	774	303	143	168	102	251	585
Power tiller	76	345	393	748	783	775	822	1242	1734
Self-propelled reaper							210	68	75
Self-propelled transplanter								3	7
Rotavator								10	24
Power operated implement									
Power thresher									
Special power operated implements									
Manual implements									
Hydraulic trailer									
Pump set									
Combine harvester									

Farm Equipment	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Tractor	788	800	1247	705	1500	2325	4750	5317	5977
Power tiller	2125	1631	2974	3364	5280	7615	12742	11257	12503
Self propelled reaper	79	50	107	93	292	454	869	695	1076
Self propelled transplanter	4	6	4	15	45	26	42	45	166
Rotavator	29	27	32	47	38	36	311	498	
Power operated implement				253	13	13	254	725	2748
Power thresher					831	1412	2437	3480	4972
Special power operated implements				215	396	492	805	537	1189
Manual implements				3399	2946	3721	10373	7553	4552
Hydraulic trailer				201	536	451	1407	2091	1943
Pump set					8331	25877	29255	28490	40816
Combine harvester				4	49	72	123	78	103

Sources: Odisha Agriculture Statistics 2012-13, Odisha Agriculture Statistics 2011-12, Odisha Agriculture Statistics 2010-11, Odisha Agriculture Statistics 2009-10, Orissa Agriculture Statistics 2008-09, Orissa Agriculture Statistics 2007-08, Orissa Agriculture Statistics 2006-07

2. District wise Progress under Farm Mechanisation under Work plan during 2012-13

Sl.	District	Tractor	Power Tiller	Self-propelled		Power Opetd. Implt.	Power Thresher	Spl. Power Opetd. Impl.	Hyd. Trailer	Combine Harvester	Pump sets			Manual Implements
				Reaper	Trans-planter						NFSM	RKVY	Total	
1	Balasore	226	1214	40	31	374	700	13	10	14	1593	50	1643	300
2	Bhadrak	141	410	13	4	49	230	3	26	2	1268	76	1344	100
3	Balangir	291	157	50	4	31		30	36		490	500	990	100
4	Subarnapur	252	461	16	8	40		6		11	419	100	519	50
5	Cuttack	206	627	49	11	89	750	47	140	2	3894	75	3969	250
6	Jagatsingpur	179	296	69	6	78	450	10	133	1	2440	252	2692	150
7	Jajpur	205	295	13	5	75	296	7	61	1	1629	1006	2635	100
8	Kendrapara	164	806	33	9	50	300	4	94	2	1934	227	2161	155
9	Dhenkanal	162	314	19	4	69	90	101	39			778	778	90
10	Angul	176	68	23	1	4	76	28	6		1003	589	1592	40
11	Ganjam	293	967	83	3	533	9	49	175		1814	75	1889	160
12	Gajapati	95	9	18		69		17	9		760		760	60
13	Kalahandi	206	618	13	15	213		72	149	1	153	1201	1354	100
14	Nuapada	134	52	11	2	37		9	46	5		157	157	80
15	Keonjhar	205	662	21	3	68	100	22	90			699	699	200
16	Koraput	201	156	1	1	11	5	36	191		796	8	804	100
17	Malkangiri	96	129	1				11	95		1002	357	1359	100
18	Nabarangpur	416	32	1	1	73		8	109		393	575	968	100
19	Rayagada	234	44	5		36		5	101	1	402	510	912	90
20	Mayurbhanj	250	1082	89	2	146	605	17	88	1	1897	74	1971	1262
21	Kandhamal	82	14		1	21	3		46		116	283	399	60
22	Boudh	67	29	21	3	3		19	24		499	262	761	40
23	Puri	338	326	136	13	141	850	21	115	13	2641	165	2806	100
24	Khordha	251	200	52	2	58	250	124	53	5	2156	60	2216	25
25	Jayagarh	164	137	31	5	86	233	112	72			943	943	25
26	Sambalpur	197	940	78	3	93		91	27	9	716	80	796	180
27	Bargarh	250	1378	23	2	7		290	1	32	1012	50	1062	300
28	Deogarh	58	79	13	4	15		16	2		143	294	437	50
29	Jharsuguda	76	463	58	3	159		3	1	2	676	150	826	50
30	Sundargarh	362	538	96	20	120	25	18	4	1	694	680	1374	135
STATE TOTAL		5977	12503	1076	166	2748	4972	1189	1943	103	30540	10276	40816	4552

Source: Odisha Agriculture Statistics, 2012-13, Govt. of Odisha

3. Pattern of Assistance under State Agriculture Policy (2013)

Sl. No.	Scheme	Pattern of Assistance
1	Capital Investment Subsidy for Commercial Agri Enterprises (CAE)	
	Capital Investment Subsidy for Commercial Agri Enterprises (CAE)	40% of the fixed capital (excluding the cost of land) subject to a limit of Rs.50.00 lakh (50% limited to Rs.50.00 lakh for SC/ ST/ Women/ Graduate of Agriculture and allied discipline)
2	Private Lift Irrigation Projects (Jalanidhi)	
	i) Shallow tube well	50% of the project cost subject to a limit of Rs.20,000/-. In addition, in case of Cluster of 10 nos or more STWs the cost of electrification on will be borne by the Government subject to a ceiling of Rs.4 lakh per cluster.
	ii) Dug well	75% of the project cost subject to a limit of Rs.75000/-
	iii) Deep bore well	75% of the project cost subject to a limit of Rs.50000/- (excluding cost of electrification) In addition 75% of Genset / electrification cost subject to a limit of Rs.50000/- (for energisation)
	iv) River lift/ Surface lift project	75% of the project cost subject to a limit of Rs.60000/- Community-based/ Regd. Bodies to get 90% subsidy provided the minimum coverage is 40 ha.
3	Farm Mechanization (Including Central Assistance if any)	
	i) Tractor	50% of the cost, limited to Rs.90,000/- Tractors up to 40 PTO HP
	ii) Power Tiller	(a) Power Tiller of 8 BHP & above.@ 50% Of the cost, limited to Rs.75,000/-. (b) 50% of the cost, limited to Rs.40,000/- Light weight power tiller below 8 BHP for hill regions.

	<p>iii) Self propelled Reaper, paddy transplanter and other similar self propelled machines.</p>	<p>Self propelled –</p> <p>a) Paddy Reaper- @ 50 %of the cost limited to Rs.80,000/-</p> <p>b) Paddy Reaper cum binder- @ 50 % limited to Rs.1,50,000/-</p> <p>c) Walk behind type Transplanter - @ 75% of the cost limited to Rs.1,50,000/-</p> <p>d) Riding type Transplanter - 75% of the cost limited to Rs.5,00,000/- to be paid in 3 instalments in 3 years in the ratio of 2:2:1 which can be availed by Individual/ Agro Service Centres/ PACS/ LAMPS etc.</p> <p>e) Seedling raising machine for transplanting mat preparation @ 75% of the cost limited to Rs.2,00,000/- (other self propelled machines will be included in the subsidy fold with approval of SLTC)</p>
	<p>iv) Specialized power driven equipments</p>	<p>Special power driven equipment like –</p> <p>a) All type Axial flow threshers (tractor & power tiller operated) @ 50% of the cost limited to Rs.70,000/-.</p> <p>b) Rotavator / Rotary tillers 75 % of the cost limited to Rs.80,000/- .</p> <p>c) Others like ground nut digger, potato planter, potato digger, all type of power weeders, brush cutter, post hole digger, straw reaper etc - 50 % of the cost limited to Rs.60,000/-</p> <p>d) Post harvest machineries like Rubber roll Sheller, Mini oil mill, Mini Dal Processing Unit, all type of cleaner cum graders, Power ground nut decorticator, Maize Sheller and other related machines-75 % of the cost limited to Rs.2,00,000/- (other self propelled machines will be included in the subsidy fold with approval of SLTC)</p>

	v) Power driven equipment (Tractor/ power tiller operated / Conventional implements)	Power driven equipment like all type of Tractor / power tiller drawn implements like – a) Disc ploughs / harrows, all type of MB ploughs, all type of tillers, ridgers, levellers, power tiller trailer, etc. @ 50 % of the cost limited to Rs.25,000/- b) All type of seed cum fertilizer drills, Zero till cum seed drills, etc. @ 75 % of the cost limited to Rs.45,000/- (other self propelled machines will be included in the subsidy fold with approval of SLTC)
	vi) a) Manually operated implements / tools b) Animal operated implements / tools	@ 75% of the cost, limited to Rs.6,000/-
	vii. Animal driven tool carrier	50% of the cost limited to Rs.12,000/- Animal driven specialized implements viz. (a) Multi tool bar / carrier / tropicultor (with minimum four attachments). (b) Pre-germinated paddy seeder.
	viii) Power Threshers (All types)	50% of the cost, limited to Rs.24,000/-
	ix) Diesel/ Electric/ petrol/ kerosene pump sets up to 10 BHP/ 7.5 KW	Diesel/ Electric/ petrol/ kerosene centrifugal monobloc pump sets from 1 KW up to 7.5 KW @ 50% of the cost limited to Rs.15,000/-
	x) Laser Guided Leveller	75% of the cost, limited to Rs.3.00 lakh
	xi) Plant Protection Equipment	
	a. Manual	50% of the cost, limited to Rs.1,600/-
	b. Power operated	50% of the cost, limited to Rs.4,000/-
	c. Tractor mounted	50% of the cost, limited to Rs.8,000/-
	d. Aero-blast sprayer	50% of the cost, limited to Rs.50,000/-
	xii) Combine Harvesters	
	(a) Self propelled track type	50% of the cost, limited to Rs.6.00 lakh
	(b) Self propelled wheel type	50% of the cost, limited to Rs.6.00 lakh

	(c) Tractor mounted combine	50% of the cost, limited to Rs.5.00 lakh (Subsidy will be provided for combine only exclusive of tractor)
	xiii) Miscellaneous if any	Any suitable machine/ implement will be included with approval of SLTC.