

# Entrepreneurship Development through Promotion of Custom Hiring of Paddy Transplanter: A Case Study

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## ABSTRACT

Rice is staple food of millions of people which is grown in many countries of the world. In the Punjab state 2.81 million ha area is under paddy cultivation. In the state most of the paddy transplanting is done by migrant labourers. From the last few years farmers are facing labour crunch and transplanting charges have gone upto Rs 5500-6000/- per ha. One farmer Shri Parmjit Singh S/o S. Surinder Singh, village Powat, District Ludhiana, Punjab has come forward to run walk behind type paddy transplanter on a custom hiring basis. He transplanted nursery on farmers' fields by charging Rs 6250/- per hectare on an area of 56 ha. The operating cost of a transplanter (fixed + variable cost) was found to be Rs. 2465/- per ha. The total cost for raising mat type nursery for one hectare was Rs. 2055/- . Net profit from custom hiring enterprises was found to Rs. 1730/- per hectare. Payment for replacement came out be Rs. 6040.27/- per year. As the monetary gains were realized by the service provider (Rs. 96880/- per year net annual income), the customer also got the benefit of Rs.550/- per hectare as compared to the manual transplantation of paddy along with other benefits like timely transplanting and more plant population. Thus, the custom hiring of walk behind type paddy transplanter has a potential to become viable option for entrepreneurship development.

**Keywords:** Custom hiring, walk behind paddy transplanter, entrepreneurship.

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## INTRODUCTION

Rice is staple food of millions of people which is grown in many countries of the world. In India conventionally the crop is transplanted manually in puddled fields. The total area under rice cultivation is about 44.79 million ha, the largest in the world (Singh 2009). In the Punjab State 66 lakh acres area is under paddy cultivation. In the state according to a study conducted by PAU, Ludhiana, 90 per cent of the paddy transplanting is done by migrant labourers from Bihar and UP States. From the last few years the labourers are not migrating in the same number as they were earlier, that is because of the development of these areas is on the rise and secondly because of the programmes like MGNREGA are running successfully in these states. A high labor demand during peak transplanting period is further adding to the woes of the farmers as the transplanting charges has gone upto Rs 5500-6000/- per ha. As a result manual transplantation of paddy has become tedious and a costlier affair. Even the number of seedling transplanted by the labourer per m<sup>2</sup> is very less (17 plants) than recommended (33 plants) by the Punjab Agricultural University, Ludhiana resulting into lower yield. The average rice yield in India is only 2.09 t/ha, as compared to 6.58 t/ha in Japan and world average of 3.91 t/ha (Dinesh and Shivay, 2007). Singh *et al* (1985) reported that transplanting takes about 250-300 man hours/ha which is roughly 25 per cent of the total labour requirement of the crop. Some ergonomic studies suggest that the manual work for paddy

transplantation is taking toll on human body. The Work related Musculoskeletal Disorders (WMSDs) have also become a major problem in many country (Hagberg et al. 1995) including India as these disorders have caused a considerable human suffering due to unbalancing of body with heavy workloads. Musculoskeletal disorders are common among these workers especially lower and upper back disorders due to bending and squatting body posture in manual rice transplanting and uprooting activity. Because of these problematic issues, there is a need for mechanized transplanting of rice which is less labor-intensive and can ensure optimum plant population. The State is at the verge of making a gradual shift from dependence on human power for paddy transplantation to mechanical power. It is therefore, mechanical power can become more economical and indispensable to meet targets of timeliness, better crop stand to obtain higher yield. But due to lack of awareness about the machine and difficulty of raising mat type nursery are the major constraints in adoption of this technology. Secondly the purchase of these machines is not economically viable for every small and marginal farmer due to meager resources. The only solution to address this issue seems that the farmers can resort to custom hiring of machines from cooperatives or from the farmer who is involved in custom hiring enterprise or from any agency providing such facilities. It is therefore, providing custom hiring services of paddy transplanter can become an entrepreneurial venture for rural un-employed youth or for a small and marginal farmer having very small holding. A very small area is required to raise mat type nursery e.g. in an acre a mat type paddy nursery can be raised for 100 acres area. Where this would result in higher gains within a shorter period say one-two months, later on the same area can be used for sowing a *kharif* crop of a season. A custom hire service would constitute a reliable tool for implementing specific farming practices and is only way to keep the operating cost of machine at a reasonable level.

In the district 4-5 farmers have purchased paddy transplanters out of them, one farmer Shri Parmjit Singh S/o S. Surinder Singh, village Powat, District Ludhiana, Punjab has come forward to run this on a custom hiring basis. For this purpose in the year 2013 he took the training on Entrepreneurship development through custom hiring of paddy transplanter from Krishi Vigyan Kendra Samrala and has bought his own paddy transplanter. He also started raising mat type nursery at his farm for his own as well as for other farmers. To make this venture a further success the KVK has used his large clientele system and convinced the farmers to go for mechanized paddy transplanting. The farmer has raised a mat type nursery of paddy varieties (PR 121 and PR 122) for an area of 40 ha and for Basmati (Pusa Pb 1509 and Pusa 1121) for 16 ha. He transplanted this nursery on farmers' fields by charging Rs 6200-6300/- per hectare.

The present study was focusing on the efforts made by the Krishi Vigyan Kendra Samrala, Ludhiana for promoting a custom hiring of paddy transplanter as an entrepreneurship development option and to study the economic feasibility of self propelled paddy transplanter for transplanting of paddy.

### METHODS AND MATERIAL

#### Data Collection:

A primary data in form of case history was collected from the farmer through interview schedule designed for this purpose. The detailed technical specifications of self propelled paddy transplanter used by the farmer is shown in Table 1.

**Table 1. Technical specification of Walk behind self propelled paddy transplanter**

Sr.No.	Parameters	Specifications
1.	Name of machine	Paddy transplanter
2.	Model	Walk-behind type (NSP-4W)
3.	Overall dimension L x W x H (cm)	214x163x91
4.	Weight (kg)	160
5.	Power unit	Air-cooled, 4-cycle, OHV gasoline engine
6.	Type of fuel used	Unleaded gasoline for automobile
7.	Planting speed (m/s)	0.34-0.77
8.	Number of rows	4
9.	Row spacing (cm)	30
10.	Hill space ( cm )	12,14,16,18,21
11.	No. of seedlings transplanted/m <sup>2</sup>	30,28,26
12.	Width of seedling mat (cm)	58x28
13.	Planting depth (cm)	0.7-3.7
14.	Operational efficiency/day	1.5-2 ha
15.	Fuel consumption/ hr	4-5 lt
16.	Cost of the machine (Rs)	2.5 lakh

### Transplanter operation cost

Transplanter operation cost consists of (a) fixed cost - depreciation, interest on invest, taxes, insurance and housing; (b) variable cost - labour, fuel, oil, repair and maintenance. Three assumptions were considered during calculation operating cost (OC), which are (1) The cost was calculated using database of a single year; (2) Inflation rates were ignored in the calculation; (3) The interest rate is equal to 10%.

### Fixed cost

Fixed cost is defined as one, which does not change when level of output alter (i.e., it applies to a resource that is fixed in quantity). In calculation of fixed cost, a straight-line depreciation is assumed and the following equation was used for calculating the annual depreciation:

$$D = \frac{P-S}{L}$$

where,  $D$  = Depreciation (Rs/yr);  $P$  = Principal amount of the transplanter (Rs);  $S$  = Salvage value of transplanter (Rs); and  $L$  = Life of transplanter (yr).

The interest on investment in a transplanter is included in fixed cost estimation. Even if the investment money is not actually borrowed, a charge is made since that money cannot be used for some other interest paying enterprises. The following equation was used for calculating the interest on invest:

$$I = \frac{P+S}{2} \times i$$

where,  $i$  = interest rate,

### Variable cost

The variable cost is one, which changes when the level of output alters. Variable cost includes labour cost, fuel, repair and maintenance cost. The cost of operator/labour was calculated as the labour rate in Rs/hr. The fuel and oil cost was estimated from consumption rate and multiplied by their respective prices.

### Operating cost (OC)

Annual OC of transplanter was divided into fixed cost and variable cost. All calculated fixed cost and variable cost was converted into Rs/ha and then summation of fixed and variable cost had given OC in Rs/ha.

### Payment for replacement

It is the amount and interest which have accumulated to purchase another transplanter when the economic life of old transplanter expires. The payment for replacement (PFR) was calculated as follows:

$$\text{Payment for replacement (Rs/yr): } PFR = (P-S) \times \frac{i}{[(1+i)^L]-1}$$

Where,  $P$  = Principal amount of transplanter (Rs),  $S$  = Salvage value of transplanter (Rs);  $i$  = Interest rate; and  $L$  = Life of transplanter (yr).

## RESULTS AND DISCUSSION

### Operating cost of a transplanter

The operating cost of a transplanter was found to be Rs. 2877/- per hectare. The fixed cost of the transplanter was 12.5 per cent of the principal amount. The variable cost of the machine was Rs. 2319/- per hectare of the area.

**Table 2: Estimation of operating cost of the transplanter**

<b>Fixed Cost</b>	
Depreciation (salvage value = 10% of purchase price)P	=P-0.1P/15 =0.06P
Interest on investment (i= 10%)	=P+0.1P/2×0.1 = 0.055P
Taxes, insurance and housing(1% of purchase price)	= 0.01P
<b>Total</b>	<b>=0.125P</b>
<b>Variable Cost</b>	
Fuel (Rs/hr)	306
Repair and maintenance cost (Rs/hr)	7.81
Cost of operator including helper (Rs/hr) (Operator charged Rs. 750/ ha for transplanting & transporting mats to the machine)	150
Total variable cost (Rs/hr)	463.81
Average working hours per year (hr/yr)	280
Annual use in area (ha/yr)	56
<b>Total</b>	<b>Rs /ha 2319 ( 463.81×280/56)</b>

The total operating cost of machine was calculated with following expression:

$$\begin{aligned}
 \text{Transplanter OC} &= \text{Fixed cost (Rs/ha)} + \text{Variable cost (Rs/ha)} \\
 &= 12.5\% \text{ of purchase price/annual use of tractor in hectare} + 2319\text{Rs/ha of the area} \\
 &= 0.125 \times 250000 / 56 + 2319 \\
 &= 2877\text{Rs/ha}
 \end{aligned}$$

#### Payment for replacement

The entrepreneur has to save Rs 6975/- per year in a bank account so that he can buy a new transplanter when the economic life of old machine expires. The PFR was calculated with following expression:

$$\begin{aligned}
 \text{Payment for replacement (Rs/yr): PFR} &= (P-S) \times \frac{i}{[(1+i)^L]-1} \\
 \text{PFR (Rs/yr)} &= (250000-25000) \times 0.1 / \{(1+0.1)^{15}-1\} \\
 \text{PFR (Rs/yr)} &= 6975/-
 \end{aligned}$$

#### Expenditure on raising mat type paddy nursery

The total cost for raising mat type nursery for one hectare was found to be Rs. 2055/- . The expenditure on various items has been shown in Table 3.

**Table 3: Total cost for raising mat type nursery**

<b>Item</b>	<b>Rs.</b>
Expenditure on plastic Sheet <b>Plastic sheet (50-60 gauge) = 875 gm/ha</b>	350
Expenditure on Seed ( <b>27-30 Kg/ha</b> )	750
Labour cost till transplanting ( <b>25 hours</b> )	780
Seed treatment and fertilizer ( <b>50 g Bavistin 50 WP + 2.5 g streptocycline</b> )	175
<b>Total</b>	<b>2055</b>

**Net profit (NP) from custom hiring**

Net profit was calculated by subtracting transplanter operational cost and cost of raising mat type nursery from the total returns from custom hiring. Net profit from custom hiring enterprises was found to Rs. 1318/- per hectare. Net profit was calculated with the following expression:

$$\text{Net Profit} = \text{Total return} - \text{Total expenditure (Transplanter OC + Cost for raising Mat nursery)}$$

$$\begin{aligned} \text{NP} &= 6250 - (2877+2055) \\ \text{NP} &= 1318/- \end{aligned}$$

**Net Average Income of the farmer from custom hiring enterprise**

The farmer transplanted 56 hectares area of paddy in single season by charging Rs. 6250/- per hectare. The net annual income of the farmer was found to be Rs. 73808. The net annual income was calculated with the following expression:

$$\begin{aligned} \text{Net average annual income (Rs)} &= \text{area transplanted (ha)} \times \text{net profit/ha} \\ &= 56 \times 1318 \\ &= 73808/- \end{aligned}$$

**Customer gain from the custom hiring of paddy transplanter**

The material and labour costs involved in nursery rising for mechanical transplanting and actual transplanting were compared with the conventional method. The data given in Table 4 shows that the customer also gets the benefit of Rs. 550/- per hectare as compared to the manual transplantation of paddy. Although it seems a small amount of saving but benefits realized by the customer are much more than the quantification. In addition to monetary gains following are benefits realized by the customer farmer :

- Under mechanical transplantation of paddy one can be free from burden of raising paddy nursery
- Custom hiring service gives option to the customer for selecting desired quality nursery
- Customer enjoys the saving three important resources i.e. Time, money and energy

**Table 4: Comparative cost bore by the customer farmer in manual v/s mechanical transplantation of paddy**

Item	Manual (Rs)	Mechanical
<b>A. Expenditure on nursery raising</b>		
Expenditure on Seed (27-30 Kg/ha)	750	Nil
Labour cost till transplanting (12 hours)	375	
Seed treatment and fertilizer (50 g Bavistin 50 WP + 2.5 g streptocycline)	175	
<b>Total</b>	<b>1300</b>	
<b>B. Expenditure on transplantation</b>	5500	6250
<b>C. Net Expenditure (A+B)</b>	<b>6800</b>	<b>6250</b>

**CONCLUSIONS**

The performance of the mechanical transplanter was quite satisfactory and the labour requirement was 3 man days per hectare as against 22 man days per hectare in case of manual transplanting. Thus, a saving of 19 man days of labour per hectare was observed. Taking into consideration one season per year with 35 days of transplanting period and taking 8 hours of working per day, the maximum area on which transplanter was operated in a year is 56 hectares. As the monetary gains were realized by the service provider (73808/- per year) as well as the customer (Rs. 550/- per ha + qualitative gains), the custom hiring of paddy transplanter have potential to become viable option for entrepreneurship development.



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