

Custom Hiring Services of Farm Machinery in Punjab: An Economic Analysis

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Abstract

The present study has been carried out to analyze the use of custom hiring services of farm machinery in Punjab. The study has been conducted in Ludhiana and Fazilka districts of the state during 2018-19 by taking a sample of 120 farmers comprising 60 beneficiaries (availing custom hiring services) and 60 non-beneficiaries (using owned machinery). The non-beneficiaries were having more operational area as compared to beneficiaries. Paddy and wheat were the dominant crops grown by both beneficiaries and non-beneficiaries. The cost incurred by non-beneficiaries on fixed capital was around 80 per cent higher than that of beneficiaries. The beneficiaries, in spite of lower gross returns, earned relatively higher net income as compared to non-beneficiaries. Among different problems faced by the farmers in availing custom hiring services of farm machinery, non-availability of machines in peak season, non-availability of required machinery in cooperative societies and lack of independence in terms of efficient use of hired machinery and high hiring charges in peak season by private custom hiring centers were the major problems faced by the farmers. There is need to strengthen cooperative societies by providing more farm machinery to make them available to farmers at nominal charges. The private custom hiring agencies also needs to be encouraged to open more custom hiring centers in villages for proper penetration of farm machinery. Individual farmers may also be motivated and trained to form groups and establish custom hiring centers. It will also generate additional employment and help in increasing their income.

Keywords: Punjab, agricultural, machinery, custom hiring, beneficiary

JEL Classification: O13, O17, Q13

Introduction

Agriculture has undergone significant developments since the time of the earliest cultivation, namely in terms of irrigation, crop rotation, fertilizers, pesticides and mechanization. The rapid rise in mechanization enabled the farming tasks to be completed at a pace and speed on a scale previously impossible. Agricultural mechanization not only removes the drudgery and inhumane nature of the work in agriculture, but also raises productivity and employment through its positive relationship with cropping intensity and labour intensiveness. In India, around 70 per cent of the population depends on agriculture and approximately one third of our national income comes from agriculture. About 80 per cent of the land holdings in the country

are operated by small and marginal farmers owning less than 1 and 1-2 hectares land, respectively. Punjab is one of the leading states in Indian agriculture. Punjab agriculture that has undergone a remarkable change after independence is now the most mechanized one in India. Punjab is mainly characterized by abundance of small holdings, but is highly mechanized. The farm holdings are getting smaller and smaller due to subdivision and fragmentation in successive generations. Out of ten lakh land holdings, three lakhs are having small and marginal holdings. (Anonymous 2016).

Growth rates in agricultural production and productivity in Punjab state are stagnating and profitability in farming is progressively getting reduced. The significant increase in fixed costs endangered the economic viability of farming, especially in the case

of small and marginal farmers (Sidhu and Vatta, 2012). Besides slowdown in agricultural growth, this escalation in costs of production and falling profitability is being blamed to the over capitalization of Punjab agriculture, particularly on the front of farm mechanization. The high level of over capitalization of Punjab's agriculture was evident from owning of a tractor (Singh *et al*, 2007). Over the years, owning a tractor has become a symbol of prestige and honour and the farmers ironically have even been selling land to buy the machines (Tiwana *et al*, 2007). Single farm ownership and use of heavy and costly machinery on these farms is not economically viable. An alternative to overcome this constraint and at the same time to get the advantages of mechanization is to custom hire the needed machinery and implements. Custom hiring is a popular method of gaining short term control over various farm operations particularly during the peak season such as sowing, harvesting, etc. Custom hire has several benefits, over other methods of acquiring machine services such as the reduced responsibility of owning and operating the machine, no long term capital commitment, easier planning of a farm budget and providing the farmers with the leverage of time for accomplishing other tasks. In order to provide farm machines on custom hiring basis to the farmers, the Punjab government has encouraged the Primary Agricultural Co-operative Societies to establish the Agro Machinery Service Centres (Singh *et al*, 2015). The present study is being undertaken to make a comparative analysis of custom hiring services vis-a-vis use of owned machinery.

Data Sources and Methodology

The present study was conducted in two districts of Punjab i.e. Ludhiana and Fazilka. Ludhiana district was selected for having maximum number of co-operative societies providing custom hiring services of farm machinery and Fazilka district was selected for having a good number of organized private firms providing custom hiring services of farm machinery. From each selected district, a cluster of villages, where custom hiring services of farm machinery and implements are undertaken by the farmers was selected by consulting the officials of co-operative societies, state agriculture department and organized private firms. From each selected cluster, 30 farmers availing custom hiring services (beneficiaries) and 30 farmers using owned machinery (non-beneficiaries) for cultivation were selected randomly making a total sample of 120 farmers

comprising 60 beneficiaries and 60 non-beneficiaries.

Analysis of Data

Apart from simple average method, percentages, Mann-Whitney U test and T-test (independent samples) were used to interpret the results.

T-test is used when the samples are drawn independently from the populations. The test statistics is as follows:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{S^2 \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

$$S^2 = \frac{\sum_{i=1}^{n_1} (x_i - \bar{x}_1)^2 + \sum_{j=1}^{n_2} (x_j - \bar{x}_2)^2}{n_1 + n_2 - 2}$$

where,

\bar{x}_1 = Mean value of different attributes of beneficiaries such as socio economic profile, farm inventory etc.

\bar{x}_2 = Mean value of different attributes of non-beneficiaries such as socio economic profile, farm inventory etc.

n_1 = number of beneficiaries

n_2 = number of non-beneficiaries

s^2 = Combined standard deviation

Independent t-test was applied to compare the farm size of these two categories taking into consideration the following hypotheses:

Null hypothesis (H_0): Average operational land holdings of beneficiary and non-beneficiary do not differ significantly from each other.

Alternative hypothesis (H_1): Average operational land holdings of beneficiary and non-beneficiary differ significantly from each other.

It is also assumed that the severity of the problems faced by the beneficiaries in terms of custom hiring services do vary between cooperative societies and private agency. Mann-Whitney u-test was applied to compare the severity level of problems faced by the farmers using custom hiring services from cooperative societies and private agency. This test is nonparametric test that compares independent groups. The test statistics is as follows:

$$U_1 = n_1 n_2 + \frac{n_1 (n_1 + 1)}{2} - R_1$$

$$U_2 = n_1 n_2 + \frac{n_2(n_2 + 1)}{2} - R_2$$

$$U = \min. (U_1, U_2)$$

Where, n_1 = number of beneficiaries availing services of cooperative societies (group 1)

n_2 = number of beneficiaries availing services of private agencies (group 2)

R_1 = adjusted sum of ranks for group 1

R_2 = adjusted sum of ranks for group 2

Null hypothesis (H_0): There is no significant difference between the level of severity of problems faced by farmers availing custom hiring services from cooperative societies and private agencies.

Alternative hypothesis (H_1): There is significant difference between the level of severity of problems faced by farmers availing custom hiring services from cooperative societies and private agencies.

Results and Discussion

Operational land holding

The operational land holding of sample farmers is depicted in Table 1. The results revealed that an average operational land holding of sample households came to be 4.28 hectares in case of beneficiary. Out of the total operational area, owned land, leased-in and leased-out land was 3.32, 0.99 and 0.03 ha accounting for 77.57, 22.81 and 0.69 percent of the operational area respectively. Similarly, the average operational area in the case of non-beneficiary worked out to be 6.72 hectares. Out of the total operational land, the

proportion of owned land and leased-in land came out to be 91.81 and 8.18 per cent, respectively. It is seen that the land inventory i.e. operational farm size observed to be varied among beneficiary and non-beneficiary farm households.

Investment on farm machinery

The perusal of Table 2 revealed that the level of capital investment on farm machinery, farm buildings and irrigation structure was quite low in case of beneficiaries as compared to non-beneficiary. Total capital investment on an average farm came out to be Rs 103197 and Rs 535252 in case of beneficiaries and non-beneficiaries. In case of beneficiaries, among different components; submersible pumps, cattle shed, electric motors, storage shed and diesel engine were emerged as the main components of investment under the head irrigation structure and farm buildings occupying 32.75, 29.33, 11.20 3.77 and 3.74 per cent share in total investment, respectively. On the other hand, in case of non-beneficiaries tractor, trolley disc harrow, cultivator, seed drill, rotavator and laser land leveller were the main components of investment on farm machinery and implements. The highest share i.e. 42.20 in the total investment was occupied by the tractor, while the share of trolley, disc harrow, cultivator, seed drill, rotavator and laser land leveller turned out to be 8.03, 4.45, 2.00, 2.49, 1.15 and 2.22 per cent, respectively. The share of all other implements was less than one percent. So, it can be concluded that the capital investment level was significantly higher among non-beneficiaries as compared to beneficiaries.

Table 1. Operational land holdings of beneficiaries and Non-beneficiaries in Punjab, 2018-19

Particulars	Beneficiaries		Non-beneficiaries		Mean Difference	t-statistic
	Ha/farm	Percent to TOP	Ha/farm	Percent to TOP		
Owned area	3.32	77.57	6.17	91.81	2.85 (86.15)	5.299*
Leased-in	0.99	22.81	0.55	8.18	0.44	1.201
Leased-out	0.03	0.69	0.00	0.00	0.03	1.426
Total operational area	4.28	100.00	6.72	100.00	3.32 (57.24)	4.334*

* Significant at one per cent level of significance

Figures in the brackets indicate the per cent increase to beneficiary

Table 2. Capital investment by the beneficiary and non-beneficiary respondents in Punjab, 2018-19

Particulars	Beneficiary	Non-beneficiary	Mean Difference	t-statistic	Sig. (two-tailed)
Farm machinery and implements					
Tractor	13840 (13.41)	225900 (42.20)	212056	8.88*	0.00
Trolley	2312 (2.24)	42987 (8.03)	40676	8.22*	0.00
Disc Harrow	500 (0.48)	23811 (4.45)	23311	9.09*	0.00
Cultivator	455 (0.44)	10679 (2.00)	10225	10.14*	0.00
Seed Drill	0 (0.00)	13343 (2.49)	13343	7.25*	0.00
Leveller	0 (0.00)	1693 (0.32)	1693	3.50*	0.00
Planker	302 (0.29)	3564 (0.67)	3262	7.22*	0.00
Ridge maker	0 (0.00)	2612 (0.49)	2612	3.50*	0.00
Laser land leveller	0 (0.00)	6167 (1.15)	6167	1.37	0.18
Tractor Sprayer	0 (0.00)	2278 (0.43)	2278	2.19**	0.03
Rotavator	0 (0.00)	11877 (2.22)	11877	2.98*	0.00
Bullock Cart	1686 (1.63)	458 (0.09)	1228	1.89	0.06
Small Tools	625 (0.61)	619 (0.12)	6	0.04	0.97
Irrigation Structure					
Electric Motor	11559 (11.20)	9560 (1.79)	1999	0.62	0.54
Submersible	33798 (32.75)	58838 (10.99)	25040	2.59**	0.01
Generators	0.00 (0.00)	7716 (1.44)	4764	2.19**	0.02
Diesel Engine	3959 (3.74)	0 (0.00)	1007	1.94	0.06
Farm Buildings					
Implement Sheds	0 (0.00)	38596 (7.21)	38596	6.68*	0.00
Storage Shed	3895 (3.77)	24514 (4.58)	20620	3.44*	0.00
Cattle Shed	30266 (29.33)	50040 (9.35)	19774	2.79**	0.01
Total Investment	103197 (100.00)	535252 (100.00)	432055	12.51*	0.00

*, ** Significant at one and five per cent level of significance

Figures in parentheses are per cent to total

Operation-wise cost of machine used

It is very obvious that compared to hired machinery, the use of own farm machinery for crop cultivation is relatively more economical in absolute terms.

Cost of machine used for paddy cultivation

A perusal of Table 3 reveals that total cost incurred by the beneficiaries for hiring farm machinery for cultivating one hectare of paddy was Rs 14998 and in case of non-beneficiaries it was only Rs 10586. For non-beneficiaries machine cost has been calculated by accounting the cost of fuel used while using their own farm machinery. Paddy crop needs special attention at the time of field bed preparation. Therefore, out of different components of field operations, beneficiaries have been spending the highest cost i.e. Rs 6273 per hectare which constituted about 42 per cent share to the total cost. Compared to beneficiaries, non-beneficiaries were relatively cost-effective on account of using their own farm machinery. The pattern of machine cost on different field operations indicated that non-beneficiaries incurred the highest cost on two components i.e. harvesting of paddy (Rs 3180/ha) and preparatory tillage (Rs 3163/ha) which together occupied nearly 60 per cent share to the total cost. The comparative analysis revealed that there was significant difference in the average machine cost used by beneficiaries and

non-beneficiaries. The beneficiaries incurred Rs 4412 as an additional cost over non-beneficiaries. Operation-wise, the cost of machine used for all operations was significantly different among beneficiaries and non-beneficiaries, respectively.

Cost of machine used for wheat cultivation

A perusal of Table 4 indicates that total machine cost incurred by the beneficiaries for hiring farm machinery for the cultivation of one hectare of wheat was Rs 15378, while it was only Rs 10275 in case of non-beneficiaries using their own farm machinery. The pattern of machine cost on different field operations indicated that non-beneficiaries incurred the highest cost i.e. Rs 3725 on straw making operation which occupied 36.25 per cent share to the total cost as this operation is generally performed by hired machinery.

The comparative analysis revealed that there was significant difference in the average machine cost used by beneficiaries and non-beneficiaries. The beneficiaries have been using Rs 5103 as an additional cost over non-beneficiaries which is statistically highly significant. Operation-wise, except straw making, the cost of machine used for all other operations differ significantly among beneficiaries and non-beneficiaries, respectively. It was noticed that harvesting cost is relatively lower in case of non-beneficiaries, this happened due to better

Table 3. Comparative cost of machine used for paddy cultivation on farm of beneficiary and non-beneficiary in Punjab, 2018-19

Field operation	Cost (Rs./ha)		Mean Difference	t-statistic	Sig. (two tailed)
	Beneficiary	Non-beneficiary			
Preparatory tillage	6273 (41.83)	3163 (29.88)	3110	10.31*	0.00
Irrigation (Tractor+generator/ diesel engine)	925 (6.17)	2313 (21.85)	-1388	2.53**	0.01
Combine used for harvesting	3400 (22.67)	3180 (30.04)	220	3.83*	0.00
Stubble clearance	1625 (10.83)	1210 (11.43)	415	2.52**	0.01
Transportation	2775 (18.50)	720 (6.80)	2055	12.53*	0.00
Total machine used	14998 (100.00)	10586 (100.00)	4412	3.54*	0.00

*and ** Significant at one and five per cent level of significance
 Figures in parentheses are per cent to total

Table 4. Comparative cost of machine used for wheat cultivation on farms of beneficiary and non-beneficiary in Punjab, 2018-19 (Rs/ha)

Field operation	Beneficiary	Non-beneficiary	Mean Difference	t-statistic	Sig. (two tailed)
Preparatory tillage	4658 (30.29)	1763 (17.16)	2895	12.642*	0.00
Sowing	890 (5.79)	545 (5.30)	345	6.57*	0.00
Ridge Making	246 (1.60)	177 (1.72)	69	6.34*	0.00
Harvesting	3217 (20.92)	2992 (29.12)	225	4.30*	0.00
Straw making (Reaper)	3663 (23.82)	3725 (36.25)	-62	0.77	0.44
Transportation	2704 (17.58)	1073 (10.44)	1631	9.45*	0.00
Total machine used	15378 (100.00)	10275 (100.00)	5103	13.78*	0.00

* Significant at one per cent level of significance
 Figures in parentheses are per cent to total

bargaining in terms of dealing with large farm size as compared to small farm size.

Comparative cost and returns structure

This section basically highlights the economic viability of beneficiaries and non-beneficiaries in terms of net profitability from the cultivation of paddy and wheat crop by considering the fixed as well as variable cost. The results are discussed as under:

Comparative cost and returns structure of paddy cultivation

The data given in Table 5 shows that per hectare cost of cultivation for paddy crop was Rs 38228 in case of beneficiaries and Rs 41573 in case of non-beneficiaries. Out of the total cost, major share was occupied by the variable cost. The share of fixed cost and variable cost to the total cost came out to be 5.42 and 94.58 per cent in case of beneficiaries, while the respective figures in case of non-beneficiaries were 19.85 and 80.15 per cent respectively. In case of beneficiaries, among all the components of variable cost, the share of machine use was the highest i.e. 39.23 per cent to the total cost followed human labour (27 %).

In case of non-beneficiaries, among different components of variable cost, the machine and labour

cost together constituted about half of the total cost. The share of expenses on seed, urea, zinc, plant protection measures, and irrigation accounted for 2.16, 4.78, 1.44, 14.70 and 4.81 per cent, to the total cost, respectively. The results showed that per hectare gross returns and net returns obtained from the paddy crop in case of beneficiaries came out to be Rs 121122 and Rs 82884, while the respective figure in case of non-beneficiaries were Rs 122661 and Rs 81088, respectively. Although the gross returns received by beneficiaries were relatively lesser as compared to non-beneficiaries, the net returns received by them were on higher side due to lesser total cost.

Comparative cost and returns structure of wheat cultivation

The per hectare cost of cultivation of wheat crop has been presented in Table 6. It was Rs 38673 in case of beneficiaries and Rs 39309 in case of non-beneficiaries. Out of the total cost, major share was occupied by the variable cost. The share of fixed cost and variable cost to the total cost came out to be 5.36 and 94.64 per cent in case of beneficiaries and 17.28 and 82.72 per cent respectively in case of non-beneficiaries. Due to use of hired machinery for various operations, the share of machine cost among different components of variable

Table 5. Comparative cost and returns structure of Paddy cultivation on farms of beneficiary and non-beneficiary respondents in Punjab, 2018-19

Cost items	Beneficiary	Non-beneficiary	Mean Difference	Percent change over non-beneficiary
Fixed cost				
Interest on capital investment @ 10 per cent	1206 (3.15)	3980 (9.57)	-2774	-69.70
Annual depreciation	777 (2.03)	3980 (9.57)	-3203	-80.48
Repair & maintenance	88 (0.23)	293 (0.70)	-205	-69.97
Total Fixed cost	2071 (5.42)	8253 (19.85)	-6182	-74.91
Variable cost				
Seed	938 (2.45)	900 (2.16)	38	4.22
Urea	2163 (5.66)	1988 (4.78)	175	8.80
Zinc	563 (1.47)	600 (1.44)	-37	-6.17
Plant protection measures	5625 (14.71)	6113 (14.70)	-488	-7.98
Irrigation	925 (2.42)	2000 (4.81)	-1075	-53.75
Human labour	10323 (27.00)	10560 (25.40)	-237	-2.24
Machine used	14998 (39.23)	10586 (25.46)	4412	41.68
Interest @ 7 % for half the period of the crop	622 (1.63)	573 (1.38)	49	8.55
Total variable cost	36157 (94.58)	33320 (80.15)	2837	8.51
Total cost	38228 (100.00)	41573 (100.00)	-3345	-8.05
Gross returns	121112	122661	-1549	-1.26
Net returns	82884	81088	1796	2.21

Figures in parentheses are per cent to total

cost in case of beneficiaries was the highest i.e. 39.76 percent to the total cost. It was followed by cost on plant protection measures (16.48%), while the expenses on seed, urea, DAP, other fertilisers, human labour, and irrigation accounted for 8.73, 5.16, 10.51, 1.29, 10.30 and 0.78 per cent, of the total cost, respectively. In the case of non-beneficiaries, the share of machine used

was the highest i.e. 26.13 percent among different cost components of variable cost followed by cost of plant protection measures (17.17%). The expenses on other inputs like seed, urea, DAP, other fertilisers, human labour, and accounted for 8.01, 5.01, 11.16, 1.75, 10.95 and 1.02 per cent, of the total cost, respectively. The gross returns and net returns obtained by beneficiaries

Table 6. Comparative cost and returns structure of wheat cultivation on farms of beneficiary and non-beneficiary respondents in Punjab, 2018-19 (Rs/ha)

Inputs	Beneficiary	Non-beneficiary	Mean Difference	Percent change over non-beneficiary
Fixed cost				
Interest on capital investment @ 10 per cent	1207 (3.12)	3979 (10.12)	-2772	-69.67
Annual depreciation	777 (2.01)	2407 (6.12)	-1630	-67.72
Repair & maintenance	89 (0.23)	406 (1.03)	-317	-78.08
Total Fixed cost	2073 (5.36)	6792 (17.28)	-4719	-69.48
Variable cost				
Seed	3375 (8.73)	3150 (8.01)	225	7.14
Urea	1995 (5.16)	1995 (5.08)	0	0.00
DAP	4063 (10.51)	4388 (11.16)	-325	-7.41
Others	500 (1.29)	688 (1.75)	-188	-27.33
Plant protection	6375 (16.48)	6750 (17.17)	-375	-5.56
Irrigation	300 (0.78)	400 (1.02)	-100	-25.00
Human labour	3985 (10.30)	4305 (10.95)	-320	-7.43
Machine used	15378 (39.76)	10273 (26.13)	5105	49.69
Interest @ 7 % for half the period of the crop	629 (1.63)	568 (1.44)	61	10.74
Total variable cost	36600 (94.64)	32517 (82.72)	4083	12.56
Total cost	38673 (100.00)	39309 (100.00)	-636	-1.62
Gross returns	97452	97971	-519	-0.53
Net returns	58779	58662	117	0.20

Figures in parentheses are percent to total

from wheat crop came out to be Rs 97452 and Rs 58779 per hectare, while the respective figure in case of non-beneficiaries were Rs 97971 and Rs 58662, respectively. The beneficiaries obtained marginally higher net income as compared to non-beneficiaries.

Problems faced by the farmers in availing custom hiring services

In order to improve the custom hiring structure in the state, it is very important to study the problems faced by the beneficiaries. The results pertaining

to various types of problems faced by respondent farmers in availing custom hiring services from different agencies is given in Table 7. Among different problems, non-availability of farm machinery in peak season was the major problem reported by sampled farmers hiring machinery from cooperative societies. This problem was reported by 94.44 per cent of the farmers. The other important problems faced by the sample farmers dealing with cooperative society for availing custom hiring services were non-availability of required machinery, which was reported by about 89 per cent of the farmers, followed by bad condition of machinery (61.11%), lack of independence in terms of efficient use of hired machinery (41.67%), rude attitude of cooperative management (30.56%), inexperienced operators (13.89%) and high charges (5.56%).

In the case of farmers hiring machinery from private agencies, lack of independence in terms of efficient use of hired machinery was the major reported problem. This problem was reported by 83.33 per cent of the total farmers. The other important problems faced by the sample farmers in dealing with private sources for availing custom hiring services were non-availability of farm machinery in peak season, high hiring charges, rude attitude of agency owner, inexperienced operators, non-availability of required machinery and bad condition of machinery reported by 45.83, 29.17, 20.83, 12.50, 8.33 and 8.33 per cent of the total sample farmers, respectively.

Severity of problems faced by the farmers in availing custom hiring services

It is also assumed that the severity of the problems

faced by the beneficiaries in terms of custom hiring services do vary between cooperative societies and private sources. The responses of the respondents were obtained on the basis low, medium and high incidence of the problems. Severity of the problems was estimated on the basis of average score obtained for different problems faced by the farmers i.e. higher is the mean score, more severe is the problem. The agency-wise percent distribution of the sample respondents according to incidence of problems and the mean score is presented in Table 8.

The highest mean score i.e. 2.69 was estimated for non-availability of machine in peak season in the case of cooperative society. This indicates that the incidence of non-availability of machine in peak season was the most prevalent problem. The next important problems faced by the sample farmers dealing with cooperative society for availing custom hiring services in terms of severity were non-availability of required machinery, bad condition of machinery, lack of independence in terms of efficient use of hired machinery, rude attitude of cooperative management, inexperienced or poor operators and high hiring charges.

Whereas, the incidence of lack of independence in terms of efficient use of hired machinery was the most severe problem in the case of private agency with mean score of 2.33 for this problem. The next important problems faced by the sample farmers dealing with private sources for availing custom hiring services in terms of severity were non-availability of farm machinery in peak season (1.50), high hiring charges (1.46), rude attitude of agency owner (1.29), inexperienced operators (1.17), non-availability

Table 7. Major Problems faced by the farmers in availing custom hiring services in Punjab, 2018-19

Problems	Cooperative society (n=36)		Private agency (n=24)		Overall (n=60)	
	Number	Percent	Number	Percent	Number	Percent
Non-availability of machine in peak season	34	94.44	11	45.83	45	75.00
Bad condition of machinery	22	61.11	2	8.33	24	40.00
High hiring charges	2	5.56	7	29.17	9	15.00
Non availability of required machinery	32	88.89	2	8.33	34	56.67
Inexperienced operators	5	13.89	3	12.50	8	13.33
Lack of independence	15	41.67	20	83.33	35	58.33
Rude attitude of agency owner/cooperative management	11	30.56	5	20.83	16	26.67

Table 8. Distribution of beneficiary according to severity of problems (%) in Punjab, 2018-19

Problems	Cooperative society (n=36)				Private (n=24)			
	Low	Medium	High	Mean score	Low	Medium	High	Mean score
Non-availability of machine in peak season	5.56 (2)	19.44 (7)	75.00 (27)	2.69	36.11 (13)	27.78 (10)	36.11 (1)	1.50
Rude attitude of cooperative management/Private agency/Owner	69.44 (25)	8.33 (3)	22.23 (8)	1.53	79.17 (19)	12.50 (3)	8.33 (2)	1.29
Bad Condition of machinery	38.89 (4)	44.44 (16)	16.67 (16)	1.78	91.67 (22)	4.17 (1)	4.17 (1)	1.13
High hiring charges in peak season	94.44 (34)	2.78 (1)	2.78 (1)	1.08	70.83 (17)	12.50 (3)	16.67 (4)	1.46
Non-availability of required machinery	11.11 (4)	55.56 (20)	33.33 (12)	2.22	91.67 (22)	4.17 (1)	4.17 (1)	1.13
Inexperienced operators	86.11 (31)	11.11 (4)	2.78 (1)	1.17	87.50 (21)	8.33 (2)	4.17 (1)	1.17
Lack of independence	58.33 (21)	16.67 (6)	25.00 (9)	1.67	16.67 (4)	33.33 (8)	50.00 (12)	2.33

of required machinery (1.13) and bad condition of machinery (1.13), respectively.

Further, a comparison has been also been made to assess the severity differentials of the problems faced by farmers using custom hiring services from cooperative societies and private agency. Mann-Whitney U test has been applied for this purpose and the results are presented in Table 9. The perusal of table indicate that except two problems namely rude attitude of cooperative management/owner and inexperienced

operators, the level of incidence of all other problems faced by beneficiary with regard to availing custom hiring services from cooperative society and private agency differ significantly from each other.

Conclusion and Policy Implications

There is need to strengthen co-operative societies by providing more farm machinery, so that maximum number of farmers can avail there services at nominal charges during peak season. Further, suitable policy

Table 9. Severity of different problems faced by beneficiary with regard to availing custom hiring services from cooperative society and private agency(Mann-Whitney-U test)

Problems	Mean Rank		Mann-Whitney U	Sig. (2-tailed)
	Cooperative society (n=36)	Private agency (n=24)		
Non-availability of machine in peak season	39.99	16.27	90.50*	0.00
Rude attitude of cooperative management/owner	31.92	28.38	381.00	0.32
Bad Condition of machinery	36.69	21.21	209.00*	0.00
High hiring charges in peak season	27.65	34.77	329.50*	0.01
Non-availability of required machinery	40.06	16.17	88.00*	0.00
Inexperienced operators	30.64	30.29	427.00	0.90
Lack of independence	25.50	38.00	252.00*	0.00

* Significant at one per cent level of significance

measures are required to encourage private custom hiring agencies to establish more custom hiring centres in the village for proper penetration of farm machinery.

Government may encourage small and marginal farmers to use hired machinery by providing subsidy. Benefits of hiring machinery instead of purchasing own machinery needs to be explained to the farmers at training camps, kisan melas, through social media etc. Specialized trainings may be organized for operators of machinery of the cooperative societies for proper operation and maintenance of the same. Farmers may also be motivated and trained to form groups and establish custom hiring centres. It will help the farmers to generate additional employment and income.

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