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Improving Economic Viability of Farming: A Study of Cooperative Agro Machinery Service Centres in Punjab

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Abstract

The study has evaluated the contribution of Cooperative Agro Machinery Service Centres (AMSCs) towards improving the economic viability of farming in Punjab. The study has found the operations of the AMSCs economically viable as the service centres have been generating profits to the extent of 2-30 per cent of the annualized costs. The hiring-in of the machinery services from the machinery centres has been found comparatively cheaper by 16 per cent and 35 per cent when compared to the hiring-in from private operators and self-owning of machinery, respectively. The successful AMSCs have brought a significant reduction in the burden of capital investments of the farmers on farm machinery and implements. The study has highlighted the need to strengthen the existing AMSCs, establish new AMSCs and increase in the government support in the form of subsidies to address the issues of timely non-availability of services during the peak season and to reduce price differentials between AMSCs and private operators. The success of the AMSCs in the state will help in reducing debt-burden of the farmers by bringing down costs of operations and improving economic viability of farming.

Key word: Agro machinery service centres, custom hiring, economic viability, Punjab agriculture

JEL Classification: O13, O17, O43

Introduction

The introduction of high-yielding varieties of wheat and rice during mid-1960s and early-1970s, coupled with assured irrigation, and increased use of fertilizers and agro-chemicals resulted in a significant increase in farm productivity in Punjab. Rising productivity, increase in cropping intensity and resultant higher demand for labour necessitated fast mechanization of farm operations. A fairly high level of over-capitalization of Punjab agriculture was witnessed as was evident from owning of a tractor by more than 30 per cent of the small farmers (operating less than 2 ha) (Singh *et al.*, 2007). This led to a significant increase in the fixed costs, endangering the

economic viability of farming, especially in the case of small and marginal farmers. While there was a decline in the variable costs of production of rice and wheat in Punjab during 1980s and 1990s, the fixed costs showed a gradual increase during this period (Sidhu *et al.*, 2005). Stagnation in yields and rising fixed costs of production caused a fall in the real farm business income after late-1990s, bringing distress amongst the farming community. The extreme outcomes of dwindling economic viability of farming in Punjab, especially of marginal and small farmers, are visible from two important facts. First, almost two lakh marginal and small farmers in Punjab have left farming in the recent years (Singh *et al.*, 2009). Second, almost 1800 farmers have committed suicides in two districts of Punjab during the period of 2000-2008, of which around 80 per cent belonged to the marginal and small farming categories (Sidhu *et al.*, 2011). The

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small and marginal farmers are under economic and financial duress due to higher expenditure and low market surpluses.

While there is hardly any difference in input use and productivity across various farm-size classes, small and marginal farmers face economic hardships due to their small operational units and consequent inability to manage the fixed farm expenses efficiently. With almost every farm operation in rice and wheat cultivation (except rice transplantation) getting mechanized, the levels of investment on Punjab farms are very high with the average use of machinery not exceeding around 25 per cent of their economic threshold level. These investments are largely financed through borrowings, leading to indebtedness amongst the farmers as reflected by the fact that the extent of indebtedness of a tractor-owning farm household in Punjab is almost 2.5-times than of other farming households (Singh *et al.*, 2007).

With a view to discourage unnecessary accumulation of capital on small farms with huge excess capacity, the idea of establishing the Agro Machinery Service Centres (AMSCs) at various Primary Agricultural Cooperative Societies (PACSS) was initiated during the early-2000s in Punjab. These AMSCs purchased heavy farm machinery such as tractors, trolleys, laser levellers, etc. out of their own savings, institutional loans and subsidy support from the government to provide timely services to the farmers, especially to small and marginal farmers, at reasonable rates. These AMSCs have successfully catered to the farmers' needs, thereby reducing their investment burdens, and costs of farm operations with consequent improving of economic viability of these farms. However, the long-term sustainability of the AMSCs is possible only if these units are able to provide services of the farm machinery to the desired extent and at the right time, apart from being economically viable at the unit level.

Hence, apart from evaluating the economic viability of overall functioning of the AMSCs, the present study has made a comparison of the costs of various farm operations through machinery hiring from AMSCs with such costs from owned machines and custom hiring from the private operators. The study has also elicited the perceptions of farmers about the performance of AMSCs and has suggested ways for their further strengthening.

Data and Methodology

The evaluation of the economic viability of the operations of AMSCs was carried out on the basis of data collected on investments, expenses and returns of two AMSCs, namely Noorpur Bet and Sudhar in the Ludhiana district of Punjab. The complete details about various farm machines owned and rented-out by these units were prepared along with the rates of their services. Various fixed costs (interest on fixed capital, depreciation, etc.) and variable costs of operations (costs on repair and maintenance, fuel, labour, etc.) for these units were computed and examined in relation to their returns.

Further, to compare the costs of hiring farm machinery through cooperatives and other alternatives, the primary data were collected from the farmers using the machinery services from AMSCs, other private owners of the machines and using self-owned machinery. In order to have a sample of all such farming categories, four villages were selected; two with AMSCs (Noorpur Bet and Sudhar) and two without AMSCs (Akalgarh and Rjapur) but located near to the AMSCs villages where the farmers were dependent either on the self-owned machinery or were hiring the machinery services from other farmers. In all, a sample of 88 farmers belonging to these three categories was selected for the study, as given in Table 1. It is evident from the sample that the services of the AMSCs were being availed by all the categories of the farmers. While small and marginal farmers were largely dependent upon hiring-in services and large farmers owned such machines. The average size of the operational holding was 1.80 acres for marginal farmers, 3.29 acres for small farmers, 9.18 acres for medium farmers and 35.31 acres for large farmer with an average size of 12.10 acre.

The data were collected from the farmers on the types of machinery owned, the extent of capital investments on the machinery, extent of hiring-in of the machinery and their perceptions about the AMSCs. The study pertains only to two major crops, wheat and paddy, as they occupy almost 80 per cent of the gross cropped area in the state. Also, most of the machinery services in the selected AMSCs pertained to the above two crops.

Table 1. Details of the study sample

(Number)

Farm holder type	User category			Total
	AMSCs	Private operators	Own machinery	
Marginal farmers (below 2.5 acre)	8	12	-	20
Small farmers (2.5 to 5 acre)	8	15	-	23
Medium farmers (5 to 15 acre)	11	3	10	24
Large farmers (15 acre and above)	2	-	19	21
Overall	29	30	29	88

Table 2. Income-expenditure details of Agro Machinery Service Centres: 2010-11

(₹)

Item	Noorpur Bet	Sudhar
Total amount of capital investments	4095240	1662700
Depreciation on capital investment (@ 10% per annum)	409524	166720
Interest on fixed capital (@ 11% per annum)	450477	182897
Insurance	34089	8000
Wages for farm machinery operator	132310	85000
Repairs and maintenance	204762	90000
Expenses on fuel	813854	400000
Total annualized expenditure	2045016	932167
Total income	2674095	949000
Net returns	629079	16833
Net returns as per cent of annualized expenditure	30.76	1.81

Viability of Agro Machinery Service Centres

Though there is a need to free farming community from the clutches of huge and unproductive investments on farm machinery through AMSCs, the economic viability of these centres is equally important to ensure their sustainability over a longer period. This is possible only if the AMSCs are able to easily cover their fixed as well as variable costs. Such an analysis has been carried out for selected two AMSCs. A variety of machines are owned by these centres such as tractors, laser levellers, seed drills, rotavators, discs and tillers, etc. (Appendix 1). These machines are hired-out in different combinations for various farm operations such as land preparation, land levelling, sowing of crops, harvesting, threshing and transportation of the produce.

The details about the income and expenditure of the machinery centres are given in Table 2. The total investments on farm machinery for the year 2010-11 amounted to ₹ 40,05,240 for Noorpur Bet and ₹ 16,62,700 for Sudhar centres, while the total annual

fixed and variable expenses amounted to ₹ 20,45,016 for Noorpur Bet and ₹ 9,32,167 for Sudhar. Both the AMSCs were able to cover their expenditures, though there was a huge difference in their yearly profits, which were 30.76 per cent and 1.81 per cent of their annualized expenditures, respectively. Such economic viability of the machinery centres is being demonstrated across a large number of cooperative societies in Punjab due to which the number of AMSCs in the state has increased significantly in the recent years, reaching the current number to more than 1200. The success of these centres will attract farmers towards these services and will ultimately reduce their burden of capital investments as has been explained in the forthcoming sections of the paper.

Farm Level Benefits of Agro Machinery Service Centres

In this section, a comparison has been made of the costs of machinery hiring services to the farmers

Table 3. Average expenditure on the use of farm machinery from various sources

(₹/acre)

Farm operation	Wheat			Paddy			Wheat+Paddy		
	AMSC	Private owner	Self-owned	AMSC	Private owner	Self-owned	AMSC	Private owner	Self-owned
Land preparation	1455	1612 (10.8)	1300	1350	1883 (39.5)	458	2805	3495 (24.6)	1758
Sowing/Transplantation	330	319 (-3.3)	200	-	-	-	330	319 (-3.3)	200
Threshing	1886	2005 (6.3)	750	-	-	-	1886	2005 (6.3)	750
Transportation	317	393 (24.0)	182	378	412 (9.0)	219	695	805 (15.8)	401
Total cost*	3988	4329 (8.6)	2432	1728	2295 (32.8)	677	5716	6624 (15.9)	3309
Fixed costs for self-owned machinery	-	-	-	-	-	-	-	-	4427
Total cost of using self-owned machinery	-	-	-	-	-	-	-	-	7736 (35.3)

Notes: * The average value of farm machinery for the above operations has been estimated at ₹ 558638. The depreciation has been estimated @10 per cent per annum and the interest on fixed capital @ 11 per cent per annum. The total fixed costs thus turned out to be ₹ 117313 per farm per annum and ₹ 4427 per acre (average size of farm of the machinery owning farmers = 26.5 acre).

Harvesting operation has been excluded from the total costs as this hiring service is not available from AMSCs and through self-owned machines.

Figures within the parentheses are percentages by which the costs are higher than the cost of hiring from AMSCs.

through private owners and self-owned machines with the costs of hiring from the AMSCs. The economic viability of hiring of farm machinery may be assessed in two different manners. First, the cost of hiring farm machinery from the AMSCs may be compared with the cost of its use from self-owned machinery. Second, a comparison of the costs of farm machinery services from AMSCs with that from the private owners will also reveal whether such services are competitive. This comparison has been given in Table 3. The cost of hiring machinery from AMSCs for wheat and paddy was estimated to be ₹ 5716 per acre. Though the variable cost of such operations with the self-owned machinery was much less at ₹ 2909 per acre, the inclusion of fixed cost of the farm machinery raised the total cost of these operations through self-owned machinery to ₹ 11604 per acre, which was more than double the cost of hiring through the AMSCs. It clearly reveals that the AMSCs provide a viable option to reduce the cost of using farm machinery by almost half

on the Punjab farms. Even the cost of hiring-in such services from the private operators was around 16 per cent more than that of AMSCs.

These machinery units have further scope to expand their hiring services is evident from the price differentials between the services of AMSCs and private owners. The cost of almost all machinery services hired from the private owners was higher than that of the AMSCs. The cost of hiring machinery from private owners was higher between 9 and 40 per cent as compared to the machinery hiring from the AMSCs. The non-availability and inadequacy of the AMSCs hiring services compel farmers to resort to availing the services from the private owners by paying higher rentals. The informal discussions with the farmers further revealed that the farm machinery centres provide a tough competition to the private owners due to which they also provide the machinery services at competitive rentals. However, the price differentials

Table 4. Pattern of ownership of and capital investments on important farm machines and implements across different farms

Particulars	Farmers using machinery services from		
	AMSCs	Private owners	Self-owned machines
Percentage of farmers owning tractor	6.9	3.4	90.0
Percentage of farmers owning trolley	-	-	54.4
Percentage of farmers owning discs	6.9	3.4	83.3
Percentage of farmers owning rotavator	-	-	3.3
Percentage of farmers owning generator	-	-	23.3
Average amount of capital investment on machinery (₹/farm)	16768	42152	558638

increase with the decrease in such a competition (in the form of inadequate service from and non-existence of AMSCs in the village). Hence, there is need to strengthen the existing machinery centres and introducing such centres in the un-served areas to bring in more competitive hiring pricing.

The success of the AMSCs will help in reducing the burden of capital investments on the farms, thereby reducing the fixed costs of farming and ultimately leading to improvement in farm profitability. To strengthen this argument, data on the ownership of some important farm machines and implements along with the total amount of capital investments across various categories of farmers were collected and have been presented in Table 4. Less than 7 per cent of the farmers using the machinery services from the AMSCs owned any big machinery in the form of a tractor or discs. None of them owned a generator, trolley or other machines which could be easily and economically hired from the AMSCs. The ownership of machinery was even less for the farmers resorting to the machinery hiring from the private owners. It may be due to the fact that these farmers have smaller holdings and cannot afford to buy the costly machinery. They usually hire these machines for farm operations at higher rates from the private owners. On the other hand, almost 90 per cent of the farmers using self-owned machinery, owned a tractor, discs, etc. and a significant proportion of them also owned generators. The capital investments of the farmers using the self-owned machines are 12 to 31 times higher than those hiring the machinery services from the AMSCs and the private owners.

In nutshell, the reduction in production costs of wheat and paddy in Punjab will ultimately translate into an increase in the farm profits and will help in

contributing towards the economic sustainability of small and marginal farmers. The reduction in fixed costs will also reduce fixity of assets in farming and may help farmers to switch over to other crops and enterprises. It may ultimately help in bringing crop diversification in the Punjab agriculture. Incurring of huge losses on selling the farm machinery, otherwise, discourages the farmers from switching to other crops and enterprises. The successful machinery centres can reduce the burden of operation and maintenance of the farm machinery at the individual farm level and may shift it to the aggregate and more economical level of AMSCs. It has already been demonstrated by the successful AMSCs through their profitable functioning achieved by optimal utilization of their farm machinery. These centres can also help reduce incidence of indebtedness in the state, which is becoming alarming, causing severe economic distress among the marginal, small and semi-medium farmers.

Perceptions about Agro Machinery Service Centres

This section highlights the farmers' perceptions on some important indicators relating to the performance of the AMSCs. These perceptions have been presented in Table 5. The 'timely availability' of the services from machinery centres is an important issue, which needs to be tackled, as only 46 per cent of the farmers reported that these services were available on time. It could be a reason for the significant presence of the private owners in the market providing their services at higher rentals. The farmers resort to the private players consequent to their inability to access the services from the AMSCs. It is evident from the fact that only 40 per cent of the farmers reported the private owners as the solution of untimely availability of machinery services

Table 5. Farmers' perceptions on agro machinery service centres in Punjab

Particulars	Farmers' response [#] (%)
Timely availability of machinery through service centres	46
Private owners provide a solution for the untimely availability of machinery through AMSCs	40*
Ownership of farm machines is a solution for timely non-availability of machinery through AMSCs	0*
Satisfied with the functioning of AMSCs	89
Satisfactory with the hiring charges of machinery renting service by the cooperatives	96
Willingness on further strengthening of the AMSCs	100
Suggestions on strengthening of AMSCs:	
- Training of manpower for operating machinery more efficiently	8
- Increase the number of machines in AMSCs	73
- Increase in government support	19

Notes: [#] The responses were obtained from the farmers using the hiring-in services from the AMSCs.

*Though the farmers expressed these options, they also felt that it was much costlier than from the cooperatives.

and they perceived it to be a costlier option. None of the farmers reported that owning of the farm machines rather than hiring them through the AMSCs would provide a viable solution, as they believed it to be the costliest option.

Despite some problems, most of the farmers expressed satisfaction on the overall functioning (89%) and pricing of machinery services (96%) of the AMSCs. All the farmers desired strengthening of these machinery centres to solve the problem of inadequacy and timely non-availability of machines, especially to the small and marginal farmers. While 73 per cent of the farmers desired increase in the number of machines owned by the centres, 19 per cent suggested increase in the government support in the form of subsidies and 8 per cent emphasized on the training of manpower for efficient handling of farm machinery. Due to significant contribution of AMSCs towards improving economic viability, especially of the small and marginal farms, increased support by the government in the form of subsidies to expand the scope and extent of the machinery hiring services of the existing machinery centres and encouraging the establishment of more such machinery centres in the other villages of Punjab will go a long way towards improving the cost-effectiveness of farm machinery operations.

Summary and Conclusions

The agriculture sector in Punjab is characterized by over-mechanization, resulting in a significant

increase in the fixed costs of farming, declining profitability, and relatively high levels of farmer indebtedness. At a time, when most of the farm operations in major crops like wheat and rice have been mechanized, comparatively high costs of farm machinery are endangering the economic viability of farmers, especially of small and marginal farmers.

The Agro Machinery Service Centres (AMSCs) were started to provide the custom hiring services of various machines to the farmers at appropriate times and at reasonable rates so as to reduce the fixed costs of farm operations and reduce the burden of capital investments. The majority of small and marginal farmers and a significant proportion of medium and large farmers are resorting to availing such custom hiring. The operations of the AMSCs are economically viable, as both the machinery centres have been found to be able to recover their costs and generate profits from such operations. The cost of farm operations could be reduced to almost half by custom hiring of the machinery services through the AMSCs. Even the custom hiring from the private owners was comparatively cheaper than the use of self-owned machinery, though it was relatively expensive when compared to the cost of AMSCs. The contribution of the AMSCs towards reducing the burden of capital investments on farms is evident from the significantly lower incidence of the ownership of large machinery and implements by the farmers using the custom hiring

services as compared to the farmers who were using their own machinery for various farm operations.

There is a need to strengthen the Agro Machinery Service Centres in Punjab by increasing the number of farm machinery. It will solve the problem of timely non-availability of machinery services to the farmers, particularly during the peak season, especially to the small and marginal farmers. More AMSCs must be established in the state, especially in the villages where such service is not available currently. The expansion of the machinery centres will bring more competition in the custom hiring services in Punjab and will bring down the price differentials between AMSCs and private owners with regard to the machinery use for various farm operations. Keeping in view a large expanse of benefits emanating from the success of these AMSCs, there is a need to strengthen the subsidy component for these machinery centres by the government.

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Appendix 1**Details of farm machinery owned by AMSCs of Noorpur Bet and Sudhar in Luhdiana**

Farm machinery/implement	Noorpur Bet (No.)	Sudhar (No.)
Tractor	4	2
Trolley	3	2
Disc	3	4
Seed drill	2	4
Planker	5	4
Cultivator	2	2
Laser leveller	2	1
Ridger	1	-
Reaper/Reaper binder	6	-
Happy seeder	1	-
Spray pump	1	-
Thresher	2	2
Rotatvator	2	1
Other implements	6	5