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Capital Use among Farmer Households: A Study of Cotton Belt of Rural Punjab

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Abstract

The present paper analysed the ownership and utilisation of farm machinery in agriculture. The tractor contributed the highest value of ₹146665, followed by the electric tubewell (₹72865), trolley (₹26933), and combine (₹21058). The ownership of capital assets and the size of farm holdings had a positive association. Around 70 per cent of the farmer households had owned tractors. Only 18.11 per cent of the tractor owners used tractors for commercial purposes. In contrast, the proportion was 23.26 per cent for the rotavator, 95.83 per cent for the reaper and 100.00 per cent for the combine harvester. The tractor was utilised for 352 hours only over the year by all the sampled farmer households, which was much below the minimum 1000 hours of productive use in agriculture. Rotavator was utilised for personal farming by the medium and large farmer households, and the small and semi-medium farmer households made commercial use of it. However, reaper and combine were owned for commercial purposes by the farmer households.

Keywords

Fixed capital, Tractor, Commercial, Agriculture, Farmer households.

JEL Codes: E22, Q1, D24, R2

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1. Introduction

The term capital refers to all non-land and non-human inputs of production used in agriculture. Capital is used in two forms: fixed capital inputs and working capital inputs (Sen, 1970). Fixed capital inputs include submersible pumps, diesel engines, tractors, combines, reapers, straw combines, power threshers, power tillers, sprayers and dusters (manual and powered), tractor-drawn equipment (ploughs, harrows, cultivators, seed drills, etc.), hand tools and garden tools, sprinklers and drip irrigation equipment, and other agricultural equipment (stubble shavers, water tankers, land levellers, forage harvesting equipment, manure spreaders, etc.). Working capital inputs include seeds, chemical fertilisers, insecticides, pesticides, herbicides, manure, diesel, electricity, etc. (Sen, 1970; Singh, 2015).

According to experts, the status of mechanisation has been a barometer for the rural economy of Punjab, which is measured by the growth of mechanically power-operated farm equipment over traditional human and animal power-operated equipment (Gulati & Juneja, 2020). Farm mechanisation helps in increasing production, productivity, and profitability by reducing the time taken in various farm operations, bringing precision, reducing input loss, and increasing efficiency in input use (Gulati et al., 2017).

According to Ministry of Agriculture & Farmers Welfare (2023), the adoption of mechanisation by the farmers depends on various factors such as socioeconomic conditions, geographical conditions, crops grown, irrigation facilities, etc. The farm mechanisation levels assessed by Indian Council of Agricultural Research for major cereals, pulses, oilseeds, millets and cash crops indicates that the seedbed preparation operation is highly mechanised in rice and wheat crops as compared to other crops. However, mechanisation level for sowing operation is the highest for wheat crop (65 per cent). The mechanisation levels in planting operation for sugarcane and rice crops are 20 and 30 per cent, respectively. In case of harvesting

and threshing, the mechanisation levels in rice and wheat crops are more than 60 per cent and very less in cotton crop.

Punjab is a highly mechanised state in agriculture. During 2018-19, Punjab had an average farm power availability of 5.68 kW/ha, which was 2.8 times higher than the national average (Government of Punjab, 2023). It is estimated that one tractor in the state of Punjab is available for every 8.7 hectares of cultivable land; it is much higher as compared to the national average of one tractor per 62 hectares. The average use of tractors is less than 40 per cent of the 1000 hours required for economic viability (Government of Punjab, 2018). The Punjab state transport department shows that ten lakh farmers (33 per cent among them were small farmer) in Punjab bought 20000 new tractors every year, on average since 2016. The cost of a tractor starts from ₹6 lakh and going up to ₹12 lakh. The numbers of tractors bought were 19210 in 2016; 20327 in 2017; 19700 in 2018 and 13645 till September, 2020 (Hindustan Times, 2020). Punjab Agricultural University principal economist Sukhpal Singh said that of the one lakh small farmers who owned tractors, the maximum were under debt or were the ones who had committed suicide. Smaller farmers faced unfavourable market terms and lower profit. He also added that to prevent their suicides, co-operative societies must provide tractors to at least half of the state's villages. (Hindustan Times, 2020)

The adoption of new agriculture technology resulted in large increases in the use of current and capital inputs (Singh & Toor, 2005). However, farm mechanisation in Punjab has reached saturation point, and overcapitalisation in farm mechanisation and its underutilisation leads to higher production costs and lower net income for farmers, thereby making it economically unviable (Pathak, 2015; Gulati et al., 2017). Currently, Punjab faces various challenges related to farm mechanisation, including high per hectare investment costs, under-capacity utilisation of farm equipments, limited availability of suitable farm machinery for small farms, higher fixed farm costs, and limited mechanisation of horticultural crops (Government of Punjab, 2023). These problems must be addressed to ensure the competitiveness and profitability of agriculture in Punjab. The cotton belt of rural Punjab is an area confronted with the similar problems along with lower productivity and crop failures.

2. Data Sources and Methodology

Both primary and secondary data has been used in the present study. Secondary data has been collected from various journals, books, magazines, reports, dissertations, theses, web-sites, etc. Primary data has been collected through a well-structured schedule from selected farmer households using a multi-stage stratified random sampling technique for the period 2016-17. Firstly, four districts, Mansa, Bathinda, Sri Mukatsar Sahib, and Fazilka, have been selected purposely out of 9 districts of the cotton belt of rural Punjab. Secondly, all 23 developmental blocks of the selected districts have been chosen for the sample. Thirdly, one village from each block has been picked up for the study. Fourthly, out of the total number of the farmer households of different categories found in each selected village, 10 percent of the farmer households from each category and of each village were randomly selected. In this way, 520 sampled farmer households of different farm-size categories consisting of 118 marginal, 126 small, 134 semi-medium, 115 medium, and 27 large have been selected for the survey purpose. Finally, descriptive statistical tools such as averages, percentages, etc., have been used to analyse the results of the present study.

3. Results and Discussion

In this paper, an attempt has been made to study the ownership pattern of major capital assets, commercial-use of the farm machinery, and utilisation of tractor by the sampled farmer households in the cotton belt of rural Punjab.

3.1 Ownership Pattern of Major Capital Assets among Sampled Farmer Households

Land, livestock, and farm machinery and equipment are the main productive assets for the farmers. Land is an important livelihood asset for households. Land ownership acts as collateral for accessing credit. It can be reused multiple times, offering enhanced economic returns to the households. Animal husbandry, dairying, and fisheries activities play an important role in the national economy and the country's socio-economic development. The extent of ownership of farm machinery and equipment like tractor, trolley, harrow, cultivator, sealer, wheat drill, cotton drill, crah, leveller, farm generator, rotavator, reaper, combine, farm building, etc., has a major impact on productivity and profitability of agricultural

activities (NABARD, 2018). Table-1 shows the value of the major capital assets among the sampled farmer households in the cotton belt of rural Punjab. The data revealed that among the major capital assets, the tractor contributed the highest value of ₹146665, followed by the electric tubewell (₹72865), trolley (₹26933), and combine (₹21058). The proportionate value of the capital assets was 50.01, 24.84, 9.18, and 7.18 per cent, respectively. The other farm machinery and equipment contributed marginal shares in the value of total capital assets, ranging from 0.30 to 1.70 per cent. Across the different farm-size categories, the absolute value of all the capital assets increased as the farm-size increased, except for the farm generator and cotton drill, wherein the small and semi-medium farmer households interchanged their position.

Table-1 : Per Household Average Value of Major Capital Assets
among Farmer Households (Mean Value in ₹)

Capital Assets	Marginal	Small	Semi-medium	Medium	Large	All Sampled Farmer Households
Tractor	19831 (33.78)	51873 (44.63)	150299 (55.10)	278261 (49.42)	564815 (51.45)	146665 (50.01)
Trolley	3686 (6.28)	13373 (11.50)	25485 (9.34)	52217 (9.27)	91296 (8.32)	26933 (9.18)
Harrow	453 (0.77)	1270 (1.09)	2511 (0.92)	6478 (1.15)	9815 (0.89)	3000 (1.02)
Cultivator	907 (1.54)	1929 (1.66)	4466 (1.64)	8926 (1.59)	14296 (1.30)	4540 (1.55)
Sealar	148 (0.25)	397 (0.34)	433 (0.16)	1704 (0.30)	4898 (0.45)	873 (0.30)
Wheat Drill	479 (0.82)	754 (0.65)	2739 (1.00)	8000 (1.42)	13407 (1.22)	3463 (1.18)
Cotton Drill	85 (0.14)	385 (0.33)	149 (0.05)	2687 (0.48)	5185 (0.47)	1014 (0.35)
Leveller/ Computer Crah	110 (0.19)	404 (0.35)	1153 (0.42)	12479 (2.22)	10630 (0.97)	3732 (1.27)
Electric Tubewell	32966 (56.15)	43373 (37.31)	50000 (18.33)	130957 (23.26)	250926 (22.86)	72865 (24.84)
Rotavator	—	238 (0.20)	1657 (0.61)	8452 (1.50)	22037 (2.01)	3498 (1.19)

Reaper	—	1746 (1.50)	2463 (0.90)	11478 (2.04)	26852 (2.45)	4990 (1.70)
Combine	—	—	31343 (11.49)	39565 (7.03)	81481 (7.42)	21058 (7.18)
Farm Generator	42 (0.07)	500 (0.43)	60 (0.02)	1800 (0.32)	2111 (0.19)	654 (0.22)
Total Capital Assets	58707 (100.00)	116242 (100.00)	272758 (100.00)	563004 (100.00)	1097749 (100.00)	293285 (100.00)

Source : Field Survey, 2016-17.

Note : Figures given in parentheses represent percentages.

Among the marginal farmer households, electric tubewell contributed the highest share of 56.15 per cent, followed by tractor (33.78 per cent), trolley (6.28 per cent), and cultivator (1.54 per cent), and so on. However, among all other farm-size categories, tractor contributed the highest share of 44.63, 55.10, 49.42, and 51.45 per cent among the small, semi-medium, medium, and large farmer households, respectively. Prahladachar (1987); Singh et al. (2016) and Kaur (2017) also found with the increase in the size of landholdings, the value of productive assets owned by the farmer households increased. The field survey recognised that the large farmer households had owned all types of farm machinery and equipment required in the cultivation.

3.2 Number of Sampled Farmer Households Owning Major Capital Assets

The number and proportion of the sampled farmer households owning major capital assets are explained in Table 2. Out of the total 520 farmer households, 488 (93.85 per cent) had been equipped with electric tubewell on their farms. As many as 359 (69.04 per cent) sampled farmer households owned a tractor. The proportion of farmer households who owned cultivator, trolley, harrow, wheat drill, sealer, cotton drill, rotavator, leveler/computer crach, reaper, farm generator, and combine were 57.69, 50.00, 40.00, 29.62, 16.73, 12.12, 8.27, 6.92, 4.62, 4.23, and 2.12 per cent, respectively. All the medium and large farm-size categories had owned tractors, whereas this proportion was 82.84, 61.11, and 24.58 per cent among the semi-medium, small, and marginal farmer households, respectively. The data revealed that the ownership of capital assets and the size of farm holdings had a positive association.

It was noticed that still there were farmer households in the study area who depended upon either diesel engines or other farmers' electric tubewells on a payment basis for irrigating their lands. The proportion of farmer households, who installed electric tubewell, was 78.81 and 94.44 per cent among the marginal and small farmer households, respectively. The field survey pointed out that only the large, medium, and some semi-medium farmer households had installed submersible pumps in their farms, while others had old tubewells. The results of the study were in line with the study of Singh and Toor (2005), which stated that the Punjab peasantry, especially the marginal and small farmers, could not afford to invest in farm machinery from their savings for transforming traditional farming into capital-intensive scientific farming. Due to low access to capital and investment, the marginal and small farmers could not get their fair share of the cake (Sekhon et al., 2009). NCEUS (2008) also supported that the number of productive assets, particularly mechanical equipment, implements, and tractors, was deficient among the smaller holdings. The small and marginal farmers, thus, had to rent such equipment, which added to their cost of cultivation.

Table-2 : Number of Farmer Households having Major Capital Assets

Capital Assets	Marginal	Small	Semi-medium	Medium	Large	All Sampled Farmer Households
Tractor	29 (24.58)	77 (61.11)	111 (82.84)	115 (100.00)	27 (100.00)	359 (69.04)
Trolley	12 (10.17)	41 (32.54)	74 (55.22)	106 (92.17)	27 (100.00)	260 (50.00)
Harrow	8 (6.78)	29 (23.02)	49 (36.57)	95 (82.61)	27 (100.00)	208 (40.00)
Cultivator	21 (17.80)	51 (40.48)	89 (66.42)	112 (97.39)	27 (100.00)	300 (57.69)
Sealar	4 (3.39)	11 (8.73)	13 (9.70)	42 (36.52)	17 (62.96)	87 (16.73)
Wheat Drill	6 (5.08)	14 (11.11)	39 (29.10)	74 (64.35)	21 (77.78)	154 (29.62)
Cotton Drill	2 (1.69)	6 (4.76)	3 (2.24)	40 (34.78)	12 (44.44)	63 (12.12)

Leveller/ Computer Crah	2 (1.69)	5 (3.97)	8 (5.97)	9 (7.83)	12 (44.44)	36 (6.92)
Electric Tubewell	93 (78.81)	119 (94.44)	134 (100.00)	115 (100.00)	27 (100.00)	488 (93.85)
Farm Generator	1 (0.85)	4 (3.17)	1 (0.75)	13 (11.30)	3 (11.11)	22 (4.23)
Rotavator	—	1 (0.79)	9 (6.72)	21 (18.26)	12 (44.44)	43 (8.27)
Reaper	—	3 (2.38)	4 (2.99)	12 (10.43)	5 (18.52)	24 (4.62)
Combine	—	—	4 (2.99)	5 (4.35)	2 (7.41)	11 (2.12)
Total Households	118 (100.00)	126 (100.00)	134 (100.00)	115 (100.00)	27 (100.00)	520 (100.00)

Source : Field Survey, 2016-17.

Note : Figures given in parentheses represent percentages.

Overcapitalisation and underutilisation of capital assets in the state's agriculture sector, excessive use of pesticides and fertilisers, and decreasing farm-size hit the profits negatively, especially that of small and marginal farmers (Gandhi, 1997). According to Dandekar and Bhattacharya (2017), farming practices, including cash renting of land, labour costs, tractors, deep tubewells, fuel, seeds, harvesters, combines, chemical fertilisers, insecticides, and weedicides, have increased the cost of production. Punjab farming was highly capital intensive with the highest tractor density, having 68 tractors per 1000 net sown area (Pathak, 2015).

3-3 Utilisation of Major Capital Assets for Commercial-Use among Sampled Farmer households

The number and proportion of the farmer households using their owned farm machinery for commercial purposes are given in Table-3 on next page. The data indicated that only 18.11 per cent of the tractor owners used tractors for commercial purpose. In contrast, this proportion was 23.26 per cent for the rotavator, 95.83 per cent for reaper and 100.00 per cent for the combine harvester. The commercial use of tractors was done by 31.03 per cent of the tractor-owning marginal farmer households, followed by 22.52, 18.52, 18.18, and 10.43 per cent of the semi-medium, large, small, and medium farmer households, respectively.

Table-3 : Commercial-Use of Major Capital Assets among Farmer Households

Capital Assets		Marginal	Small	Semi-medium	Medium	Large	All Sampled Farmer Household
Tractor	Commer- cial Use	9 (31.03)	14 (18.18)	25 (22.52)	12 (10.43)	5 (18.52)	65 (18.11)
	Total Use	29 (100.00)	77 (100.00)	111 (100.00)	115 (100.00)	27 (100.00)	359 (100.00)
Rotavator	Commer- cial Use	—	1 (100.00)	8 (88.89)	1 (4.76)	0 (0.00)	10 (23.26)
	Total Use	—	1 (100.00)	9 (100.00)	21 (100.00)	12 (100.00)	43 (100.00)
Reaper	Commer- cial Use	—	3 (100.00)	4 (100.00)	11 (91.67)	5 (100.00)	23 (95.83)
	Total Use	—	3 (100.00)	4 (100.00)	12 (100.00)	5 (100.00)	24 (100.00)
Combine	Commer- cial Use	—	—	4 (100.00)	5 (100.00)	2 (100.00)	11 (100.00)
	Total Use	—	—	4 (100.00)	5 (100.00)	2 (100.00)	11 (100.00)

Source : Field Survey, 2016-17.

Note : Figures given in parentheses represent percentages.

As far as the rotavator was concerned, none of the large farmer households utilised it for commercial purposes. Rotavator was basically utilised for personal farming by the medium and large farmer households, whereas the small and semi-medium farmer households made commercial use of it. However, reaper and combine were owned for commercial purposes by the farmer households.

3-4 Utilisation of Tractor among Sampled Farmer households

Tractors are generally considered economically viable if they run for about 1000 hours per year; however, the studies on farm mechanisation revealed that the utilisation is only about 50-60 per cent of this norm, indicating an overcapitalisation of farms (Gulati, 2019). Pathak (2015) stated that the average use of tractors per annum in the State was hardly 450 hours, much below the minimum 1000 hours of productive use in agriculture. Table 4 explains the type of tractor owned and its utilisation by tractor-owner farmer households. The data highlighted that only 36 per cent of the

tractor-owning farmer households purchased new tractors, while 64 per cent had purchased second-hand tractors in the cotton belt of rural Punjab.

Table-4 : Ownership and Utilisation of Tractor among Tractor-Owning Sampled Farmer Households

Capital Assets		Marginal	Small	Semi-medium	Medium	Large	All Sampled Farmer Household
Tractor	New	—	2 (2.60)	25 (22.52)	77 (66.96)	25 (92.59)	129 (35.93)
	Old/Second-hand	29 (100.00)	75 (97.40)	86 (77.48)	38 (33.04)	2 (7.41)	230 (64.07)
	Total	29 (100.00)	77 (100.00)	111 (100.00)	115 (100.00)	27 (100.00)	359 (100.00)
Average Utilisation of Tractor (in Hours Per Annum)		72.68	212.05	351.75	645.84	976.93	352.07

Source : Field Survey, 2016-17.

Note : Figures given in parentheses represent percentages.

As far as the ownership of new tractors was concerned, the proportion of farmer households increased as the size of the farm increased, which was 2.60, 22.52, 66.96, and 92.59 per cent among small, semi-medium, medium, and large farmer households, respectively. The proportion of farmer households purchasing old/second-hand tractors decreased with an increase in the size of farm holdings. The results highlighted that none of the households from the marginal farmer category had purchased new tractors because of their low income levels. Whereas, 97.40 and 77.48 per cent of farmer households purchased old/second-hand tractors in the case of small and semi-medium farmer households, respectively. The data also pointed out that, on average, the tractor was utilised for 352.07 hours only over the year by all the sampled farmer households, which was much below the minimum 1000 hours of productive use in agriculture. The results were as per the findings of Pathak (2015) that every third farming household in the State's cotton belt owned a tractor, but its underutilisation had resulted in increased cost of production and lower profitability. In the case of marginal farmer households, the utilisation of tractor was only for 72.68 hours in a year. The use of tractors was the highest (976.93 hours) by the large

farmers, followed by medium (645.84 hours), semi-medium (351.75 hours), and small farmer (212.05 hours) households. It was recognised in the field survey that utilisation of farm machinery and equipment increased as the size of the farm increased, except for the cotton drill and sealer, wherein the utilisation was higher among the small farmer households than the semi-medium farmer households. It was because of the higher area under cotton among small farm-size categories compared to the semi-medium farmer households. Thus, the data indicated that it was only the tractor, rotavator, reaper, and combine harvester that had been used commercially by the sampled farmer households, whereas rest of the farm machinery and equipment was used for personal farming only and a large proportion of the farmer households owned second-hand tractors.

4. Conclusion

In a nutshell, the tractor was utilised for 352 hours only over the year by all the sampled farming households, which was much below the minimum 1000 hours of productive use in agriculture. The ownership of capital assets and the size of farm holdings had a positive association. As the size of the farm increased, both the number and the proportion of the sampled farmer households owning farm machinery and equipment increased. Around 70 per cent of the farmer households had owned tractors. The data indicated that only 18.11 per cent of the tractor owners used tractors for commercial purposes. In contrast, the proportion was 23.26 per cent for the rotavator, 95.83 per cent for the reaper and 100.00 per cent for the combine harvester. Rotavator was utilised for personal farming by the medium and large farmer households, and the small and semi-medium farmer households made commercial use of it. However, reaper and combine were owned for commercial purposes by the farmer households. As far as the ownership of new tractors was concerned, the proportion of farmer households increased as the farm size increased. On the other hand, the proportion of farmer households owning second-hand tractors decreased with the increased farm size. Thus, the study revealed the problems of overcapitalisation and underutilisation of capital assets in the agriculture sector of the region. Therefore, there is a pressing need to improve the level of farm mechanisation in the state, especially in the cotton belt area of rural Punjab, in a manner that enhances the economies of scale and benefits farmers across all categories.

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