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IMPACT OF MECHANISATION Of AGRICULTURE ON OUTPUT SUPPLY AND INPUT DEMAND IN KRISHNAGIRI DISTRICT, TAMIL NADU STATE

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Introduction

Agriculture is the corner stone of development in developing countries. It is a dominant sector in Indian economy both in terms of its contribution to the total value added as well as support base for labour. It is observed that the farmers of mechanised farm execute the agricultural operations more capably than the farmers of non-mechanised farm. This paper analyses and compares the input-output structure of both the farmers of mechanised and nonmechanised farm so as to enable to find the impact of mechanisation on farm operations.

The investigation of this part is aimed at analysing the impact of motorization for both mechanised and non-mechanised ranchers in the area of study. Examination of work assimilation limit which ranchers of mechanised and non-mechanised homestead accept subject to re-examinations of scale in paddy development. Proposed by Youtopoulos and Lau, the lag profit function technique as well as the input demand equation were used to estimate the profit function.

Impact of Mechanization on Productivity:

Agricultural mechanization, one of the great achievements of the 20th century (NAE, 2000), was enabled by technologies that created value in agricultural production practices through the more efficient input management with a focus on sustainable, high-productivity systems. Historically, affordable machinery, which increased the capability and standardization and measurably improved productivity, was the key enabler of agricultural mechanisation1. In the 19th century, as our society matured, so many great innovations transformed the face of American agriculture. Taking advantage of a large labor base and draft animals, farmers had been able to manage reasonable areas of land. This form of agriculture was still practiced in some places until the middle of the 20th century.

Early innovations were implemented and tools that increased the productivity of draft animals and assisted farmers in preparing land for cultivation, planting and seeding, and managing and harvesting crops. The origin of the John Deere Company, for example, was based on the steel surfaced plow developed by its founder. This important innovation increased the productivity of farmers working in the sticky soils of the Midwest. A major turning point occurred when tractors

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began to replace draft animals in the early decades of the 20th century. Tractors leveraged a growing oil
economy to significant acceleration in agricultural productivity and output. Early harvesting methods had required separate process operations for different implements. With tractors, the number of necessary passes in a filed for specific implements was reduced, and eventually, those implements were combined through innovation into the „combination„ or combine
harvester. For most of the 20th century, four key factors influenced the increase in the rate of crop production are more efficient use of labour; the timeliness of operations; more efficient use of inputs; and more sustainable productions systems. These four drivers played out at different rates in different crop production systems, but always led to more efficient systems with lower input costs. Technological innovations generally increased mechanisation by integrating functional processes in a machine or crop production system and by making it possible for a farmer to manage increasingly the large areas of land. By late 20th century, the electronically controlled hydraulics and power systems were the enabling technologies for improving machine performance and productivity. With an electronically addressable machine architecture, coupled with public access to Global Navigation Satellite System (GNSS) technology in the mid-1990, mechanisation in the last 20 years has been focused on leveraging information, automation and communication to advance in ongoing trends in the precision control of agricultural production systems.

Review of Literature

In agricultural operations, the farm cost of production refers to the expenses incurred on the various inputs (both operational and fixed) to obtain the final produce. The cost of production consists of two parts, namely fixed cost and variable or operational cost. In farm management studies, Shukla has categorised cost into Cost A1, Cost A2, Cost B and Cost C. Cost A1 includes the cost of seeds, manures and fertilizers, plant protection, livestock expenses, hired human labour, irrigation charges, land revenue, interest on working capital , depreciation of fixed assets and miscellaneous expenses. Cost A2 covers Cost A1 plus rent paid for leased in land. Cost B includes Cost A2 plus rental value of owned land plus interest on fixed capital minus land revenue owned land. Cost C includes Cost B plus imputes value of family labour. A study of owned and hired machine labour was conducted by J.S.Amarnath in 2019 in Sivagangai area of Tamil Nadu State in India. Hold farms off farm income, input cost, yield and crop revenue increased by 321.37 percent, 15.66 percent, 19.37 percent and 17.83 percent, over hired farms. Per year, the maximum manage point for thresher was 2496.57 hours. According to partial budgeting, all machines have a net gain. The factors of automation were human labour cost and input cost for own farms as well as productivity for rented farms. With a net revenue of Rs.138320/ha, crops of groundnut, paddy and sugarcane were available. The ideal plan generated 45.99 percent more revenue in comparison to the baseline plan.

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Objectives Of The Study

- To find out the impact of mechanisation of cost and returns structure of paddy cultivation in the study area. motorisation impact on output supply and input demand in the study area.
- To analyse Demand and supply elasticities.
- To analyse Demand for variable inputs.

Analysis of Farm Mechanisation by Farmers

The equations one and two estimated result for the paddy cultivating farmers of Punjab who had taken up mechanisation was presented in the Table.1. The table takes into account of both small and large scale farmers. The small and large scale farmers profit and Input demand was estimated.

Table 1 INPUT DEMAND AND PROFIT FUNCTIONS OF SMALL AND LARGE FARMERS WITH MECHANISED PADDY FARMERS

VARIABLES	PARAMETERS	ESTIMATES (RESTRICTED)	
		SMALL FARMERS	LARGE FARMERS
Intercept	α0	3.2133	2.1921
Log W	β *1	-0.3945* (-3.7813)	-0.3716* (-3.6416)
Log B	β *2	-0.0683* (-4.1314)	-0.0881* (-3.6416)
Log F	β *3	-0.3213* (-3.6815)	-0.2776* (-5.6511)
Log P	β *4	-0.1115* (-2.9216)	-0.1131* (-2.9616)
Log A	α1	0.8573* (2.8562)	0.8161* (4.7615)
Log C	α2	0.1623* (3.2843)	0.2274* (3.4611)
Demand for Labour	β *1	-0.3945* (-3.7813)	-0.3716* (-3.6416)
Demand for Bullock Labour	β *2	-0.0683* (-4.1314)	-0.0881* (-3.6416)
Demand for Fertilizer	β *3	-0.3213* (-3.6845)	-0.2776* (-5.6511)
Demand for Pesticides	β *4	-0.1115* (-2.9216)	-0.1131* (-2.9616)

Note : Figures in parentheris indicate t-value
*Indicates significance at 5 per cent level.

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Demand and Supply Elasticity

Table 2 presents the elasticities for cross price and own prise for the labour force admiration for the cultivation of paddy and the supply of labour was also studied. The mechanisation for the own and cross elasticities of prices for the labour was taken for large scale and small scale farmers.

Table 2

OWN AND CROSS PRICE ELASTICITIES OF DEMAND FOR SMALL AND LARGE FARMERS OF MECHANISED FARM PRODUCTION OF PADDY

Sl No	Variables	Elasticities of Labour Demand	
		Small Farmers	Large Farmers
1.	Price of Paddy	1.8956	1.8504
2.	Wage Rate	-1.3945	-1.3716
3.	Price of Bullock	-0.0683	-0.0881
4.	Price of Fertilizer	-0.3213	-0.2776
5.	Price of Pesticide	-0.1115	-0.1131
6.	Land	0.8573	0.8161
7.	Capital	0.1623	0.2274

Source: Computed data.

It was evident from the Table 2 that is the mechanised farms of the study area. The labour elasticities demand in case of both big and small farmers for own prices was 1.8504 and 1.8956 respectively.

The small and big farmers observed changes in the prices of paddy due to mechanisation of the farms and increase of labour demand there was significant impact in the entire study area. There was nearly 10 percent price rise of paddy for big and small farmers. The impact of labour demand was more than 10 percent due to mechanisation of paddy farms.

It was estimated to that the real pay elasticity was increased by 10 per cent for small farmers, which led them to reduce the employment of labour to 13.95 percent in their farms and in the case of big farmers it was recorded to be 13.71 percent. The impact real pay increase had resulted in the pay rate change, which had effected the paddy producing employment structure.

The variable land was calculated with the elasticities of labour demand and it was estimated that for small farmers was 0.8573 and 0.8161 for large farmers. In case of capital the elasticities of labour demand was estimated to be 0.1623 for small farmers and 0.2274 for large farmers. The researcher had observed that small farmers labour utilization was more compared to that of large farmers who adopted mechanised way of paddy farming.

The mechanised farms among the big and small paddy producing farms had the ability to price the variable input and demanded according to their needs. This is studied in the Table 3.

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Table 3: SMALL AND LARGE FARMER DEMAND FOR INPUTS WITH THEIR OWN PRICES IN THE MECHANISED FARM

Sl No.	Particulars	Input Demand Elasticities	
		Small Farmers	Large Farmers
1.	Real wage of labour demand	-1.3945	-1.3716
2.	Real Price of Bullock to that of Bullock Demand	-1.0683	1.0881
3.	Real Price of fertilizers to that of Fertilizer Demand	-1.3213	-1.2776
4.	Real Price of Pesticides to that of Demand Pesticides	-1.1115	-1.1131

Source: Computed Value.

Table 3 studies about both the small and large farmers demand for inputs with their own prices in the mechanised farm in the study area. It was observed that the variable inputs costs was to increase by 10 percent in case of labour, bullock labour, fertilizer and pesticides. Then the drop in their respective needs was 13.94 percent for labour, 10.68 percent for bullock, 13.21 percent for fertilizer and 11.11 percent. In case of big farmers drop was observed to be 13.17 percent for labour, 10.88 percent for bullock, 12.77 percent for fertilizer and 11.11 percent for pesticides. The big and small farmers involved in mechanised farms for producing paddy observed elastic relation for variable inputs to their own pricing. It means that whenever there is increase in the cost of variable input, then there would be 10 percent drop in the demand.

The own and cross price elasticities of demand for variable inputs with regards to small and big farmers in mechanised paddy production is studied in the Table 4

Table 4: OWN AND CROSS PRICE ELASTICITIES OF DEMAND FOR VARIABLE INPUTS FOR SMALL AND LARGE FARMERS OF MECHANISED FARM

Sl No.	Particulars	Price of Labour	Price of Bullock Labour	Price of Fertilizer	Price of Pesticide
		Small Farmers			
1.	Demand for labour	-1.3945	-0.0683	-0.3213	-0.1015
2.	Demand for bullock pairs	-0.3945	-1.0683	-0.3213	-0.1015
3.	Demand for fertilizer	-0.3945	-0.0683	-0.3213	-0.1015
4.	Demand for pesticides	-0.3945	-0.0683	-0.3213	-0.1015
		Large Farmers			
1.	Demand for labour	-1.3716	-0.0881	-0.2776	-1.1131
2.	Demand for bullock pairs	-1.3716	-0.0881	-0.2776	-1.1131
3.	Demand for fertilizer	-1.3716	-0.0881	-0.2776	-1.1131
4.	Demand for pesticides	-1.3716	-0.0881	-0.2776	-1.1131

Source: Computed data

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As shown in Table 4, the own and cross price elasticities of demand for variable inputs negative, indicating that they are complements rather than replacements for small and big farmers of Mechanised Farms producing paddy.

Conclusion:

To conclude, variable sources of information are low so far as the cross value versatilities of interest are concerned, indicating a weak link, rather than substitutes, these components are considered as complements for both large and small mechanised farmers providing paddy.

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