Original Research Paper

Agriculture

DETERMINANTS OF PADDY MECHANIZATION THROUGH AGRO MACHINERY SERVICE CENTRES

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ABSTRACT Paddy cultivation needs appropriate mechanization to cope up with the increased cost of cultivation due to high wages and scarcity of labourers. The farm workers are largely migrating to works offered under the MGNREG Act, 2005 thereby causing a shortage of labour for labour-intensive crops such as paddy. AMSCs are the promoters of farm mechanisation among the farming community. They act as technology and information disseminating centres and provide modern machinery services to farmers. The present study tried to identify the determinants of paddy mechanisation through AMSCs by taking into account the relationship between overall mechanisation index of farmers and variables such as level of education, farm experience, cost of cultivation, production and income from paddy. It has been proved from the study that reduced cost of cultivation, availability of skilled labour force, and saving in time are the factors that encourage the adoption of mechanisation by farmers through AMSCs.

INTRODUCTION:

The use of machines and technology in the field of agriculture is referred to as farm mechanization. Mechanisation brings more efficiency in Agricultural operations. The mechanisation needs of farmers are now met through Agro Machinery Service Centres (AMSCs) located at Panjayath level. It is a registered society under "Charitable societies Act, 1955". There are three models of AMSCs, viz, co-operative model, individual model and SHG model. The initial members of the AMSCs established in Thrissur District were trained by the Agricultural Research Station (ARS), Mannuthy of Kerala Agricultural University, under the Food Security Army Training Programme. Green Army, Sivasakthi and Parijatham are the three successful AMSCs functioning in Thrissur District and they are providing the mechanized services of land preparation, Transplanting, and harvesting to paddy farmers.

STATEMENT OF THE PROBLEM:

Paddy is an important crop of Kerala. Nowadays farmers are deviating from paddy cultivation due to lack of labour availability and high cost of cultivation. Mechanisation is the only solution to this problem and mechanisation needs of farmers can be met through these AMSCs. Many authors have made an attempt to study the various determinants of farm mechanisation among the farmers. According to Rasouli *et al.* (2009) and Amadi *et al.* (2010) the concept of farm mechanisation is determined by a set of inter - related factors including size of farm, irrigation, access to institutional credit, and experience of farmers. The present study is an attempt to identify the determinants of paddy mechanization through Agro Machinery Service Centres.

METHODOLOGY:

The study is based on primary data collected from farmers of Thrissur district who are using and not using the services of AMSCs. Farmers who have undertaken paddy cultivation under Padasekharam were also taken in to account. The analysis was done by taking into account the relationship between overall mechanisation index of farmers and variables such as level of education, farm experience, cost of cultivation, production and income from paddy. The same variables are considered for group farmers except education and farming experience. To identify the determinants, Chi-square test was used and the values are presented in a 2x2 contingency table. If any of the values in a 2x2 contingency table is less than five, Yates's correction factor for continuity is performed to find out the determinant. If any variable is found to be a determinant of mechanisation, it is considered as a determinant of adoption of mechanisation by users through AMSCs. The formulas used in the calculation are as follows:

$$\chi^2 = \frac{N\,(ad-bc)^2}{(a+b)\,(a+c)\,(b+d)\,(c+d)}$$

$$\chi^2_{Yates} = \frac{N\,(|ad-bc| - N/2)^2}{(a+b)\,(a+c)\,(b+d)\,(c+d)}$$

Where a,b,c, d are cell frequencies and N is the total of cell frequencies. The overall mechanisation index studies the relationship of mechanisation costs to sum of labour cost, animal usage cost and machine usage cost.

$$MI = CM / (CH + CA + CM)$$

Where
MI = Mechanisation index
CM = Cost of use of machinery
CH = Cost of use of human labour
CA = Cost of using animal power

RESULTS AND DISCUSSIONS:

The variables considered for determinants along with their Table values and level of significance is presented in Table 1.

TABLE- 1: DETERMINANTS OF MECHANISATION BY USERS OF AMSCS

Sl. No.	Variables	Mechanisation index	X^2 value	p- value	
		40 to 60	60 to80		
1.	**Education**				
	Up to SSLC	8	20	0.004	0.952
	Above SSLC	5	12		
2.	**Experience in farming**				
	0 to 30	5	7	1.301	0.254
	30 to 60	8	25		
3.	**Cost of cultivation**				
	34000 to 43000	37	9	43.108	0.000
	43000 to 52000	5	39		
4.	**Production**				
	3000 to 6000	17	27	2.230	0.135
	6000 to 8000	25	21		
5.	**Income from paddy**				
	50000 to 100000	17	28	2.857	0.091
	100000 to 150000	25	20		

Source: Compiled from primary data

From Table 1 it is inferred that the Chi-square value is significant at one per cent level, only in the case of cost of cultivation, which means that cost of cultivation is a determinant of adoption of mechanisation by the users of AMSCs. Through mechanisation farmers can save labourers, thus resulting in reduction of labour cost. This ultimately leads to lower cultivation cost.

The Chi-square value fails to show any relationship between mechanisation index and education, experience, production and income from paddy of user farmers. Hence it is inferred that these variables has no role in the adoption of mechanisation by the farmers through AMSCs.

The determinants of adoption of mechanisation by non-users of AMSCs are also found out with the help of Chi-square test by using the same variables as in the case of users of AMSCs. Here, for variables like education, experience in farming, production and income from paddy, Chi-square is calculated using Yates's correction factor since one of the values in a 2x2 contingency table is less than 5. The values are depicted in Table.2.

TABLE -2 DETERMINANTS OF MECHANISATION BY NON-USERS OF AMSCS

Sl. No.	Variables	Mechanisation index		X^2 value	p- value
		0 to 20	25 to 50		
1.	**Education**				
	Up to SSLC	7	23	0.015	1.000
	Above SSLC	4	11		
2.	**Experience in farming**				
	0 to 26	3	18	1.290	0.256
	26 to 52	8	16		
3.	**Cost of cultivation**				
	35000 to 55000	6	13	0.906	0.341
	55000 to 75000	5	21		
4.	**Production**				
	2500 to 5000	8	19	0.406	0.524
	5000 to 7500	3	15		
5.	**Income from paddy**				
	35000 to 71000	4	9	0.061	0.805
	71000 to 107000	7	25		

Source: Compiled from primary data

In the case of non- users of AMSCs, Chi-square fails to show any relationship between adoption of mechanisation and education, experience in farming, cost of cultivation, production and income from paddy. The water logged nature of land hinders them from adopting mechanisation especially for transplanting. So they depend on manual labourers for transplantation. The farmers cannot adopt mechanisation for transplanting even though they are aware that mechanisation will lead to reduced cost of cultivation. This leads to high cost of cultivation and less income from paddy. If they were in a position to adopt mechanised transplanting, they would also have become users of AMSCs by adopting mechanised transplanting and enjoying economies of scale in their cultivation.

EVALUATION OF SERVICE QUALITY OF AMSCS:

The quality of services provided by AMSCs may be considered as one of the factors determining the selection of AMSCs and hence inquired into as a determinant of mechanisation through AMSCs. The variables identified with respect to quality of services are accessibility, approachability, punctuality, skillfulness of workers, specialised services, usefulness in farm operations, time saving and cost saving. The qualities are analysed using a service quality index. For calculating the index, farmers are asked to rate the qualities through a five - point scale ranging from 1 to 5. The response of farmers was rated as 'Very good', Good, Moderate, Poor and Very Poor. 'Very good' is assigned a score of '5' and rest of them in descending order with 'Very Poor' rated as '1'. The specialised services as one of the indicators of service quality include any other mechanisation service over and above transplantation service.

TABLE-3: INDEX OF SERVICE QUALITY OF AMSCS

Indicators of service Quality	Green Army		Siva sakthi		Parijatham		AMSC index
	Individual	Group	Individual	Group	Individual	Group	
Accessibility	86	92	88	84	84	80	86.
Approachability	89	93	90	89	85	90.6	89
Punctuality	81	94	84	89	80	93	87
Skillfulness of workers	100	100	100	100	100	100	100
Specialised services	20	20	20	20	20	20	20
Timeliness	90	92	88	88	94	85	89
Time saving	100	100	100	100	100	100	100
Cost saving	100	100	100	100	100	100	100
Overall service quality	85	83.83	83.33				

Source: Compiled from primary data

It could be observed from Table 3 that skilled labour force provided by AMSCs and saving in time and costs of farm operations are the major indicators of service quality of AMSCs. Farmers are experiencing acute labour shortage at peak seasons due to the availability of employment to those people below poverty line under the Mahatma Gandhi National Rural Employment Guarantee (MGNREG) Act, 2005 and huge demand from the construction sector in cities. The availability of labour at exhorbitant rates leading to higher cultivation cost per Ha dissuades the farmer to depend on manual labour and encourages to go for mechanisation. AMSCs are tailor - made solution to this problem wherein labourers are organised to carry out bulk operations using specialised mechanical implements especially paddy transplanting with minimum time requirement. This will directly reduce the cost of cultivation. The charges for the services provided by AMSCs other than transplanting which is categorised as 'specialised services', are very high which is not affordable to the farmers. Hence farmers rate such services as 'very poor', providing the least score i.e. one. Due to the seasonality in agricultural operations, the farmers might be demanding the services of AMSCs at the same time. As the demand is getting increased day by day, the Centres may not be able to allocate skilled labourers and machines and attend mechanisation work at a time in all the fields. Hence there might be some delay in certain cases. As a result the farmers have given lower scores for punctuality and timeliness.

CONCLUSION:
The overall evaluation of AMSCs shows that Green Army takes the lead position (85%) followed by Sivasakthi (83%) and Parijatham (83%). Due to the better service quality of Green Army its operations are spread to more districts of Kerala compared to the other two AMSCs. The farmers as a whole are satisfied with the performance of their respective AMSC as evident from the index of 100 for the indicators of skilled labour force provided by AMSCs and saving in time and costs of farm operations. It has already been proved statistically that cost of cultivation is a determinant of mechanization (Table 1), which is reinforced here. In addition to cost of cultivation, saving in time and availability of skilled force are factors that encourage the farmers to opt for mechanisation, in the opinion of farmers. It can be concluded that reduced cost of cultivation, availability of skilled labour force, and saving in time are the factors that encourage the adoption of mechanisation by farmers through AMSCs.

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