Constraints and Determinants in the Adoption of Mechanisation in Rice Cultivation

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Abstract

In an effort to sustain rice cultivation in Kerala, there has been a major thrust on farm mechanisation by the State as well as the local self governments especially in Palakkad and Thrissur districts of Kerala. This study was taken up to identify the major constraints and determinants in the adoption of mechanisation in rice cultivation. Socio-economic constraints include small holding size, lack of unity among the farmers to adopt group mechanization followed by the technological constraint i.e, non-availability of skilled personnel for operation. Important determinants in the adoption of rice mechanization include availability of machines, availability of trained operators, initiative and responsibility in upkeep of machinery and the unity of farmers. There is a need for awareness programs apart from focus on a group mechanisation strategy where individual holdings are too small to own machines.

Introduction

Highly labour intensive practices in rice cultivation are not economically sustainable in a state like Kerala, where high wage rates are rampant. Despite the number of promotional government schemes for sustaining rice cultivation being operational, the area under rice in Kerala has dwindled from 8.81 lakh ha. in 1974-75 to a mere 2.34 lakh ha. in 2009-10 (Anon. 2010). In addition to the problem of high wage rates, farmers also face acute labour shortage during the periods of intense crop production activity. The widely accepted solution to these problems is the adoption of mechanised farming, but the pace with which mechanisation advanced in the wheat belt of India has not been noticed in Kerala (James, 1989). James and Regina (1993) described the general constraints in the adoption of mechanisation in Indian farms and reported that unlike other technologies, mechanisation has several constraints for adoption at the farmers' level. It was suggested that increased rice production can be achieved by mechanisation of rice group farms in Kerala (James and Regina, 1994). James and Ahmed (1994) proposed a strategy for technology transfer in this sector

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including industrial extension programmes to promote local manufacture of improved implements and machinery. James *et al.* (1995) reported that the fear of labour displacement due to agricultural mechanization was baseless and rice farm mechanization offers quality employment opportunities for the educated youth of this highly literate state.

James and Pillay (1998) have discussed the emerging technical strategy for rice farm mechanisation and highlighted the advantages in mechanising the highly labour intensive operations like transplanting and harvesting. James (2008) has proposed a package of machinery for major rice production systems in Kerala. However, the success of the past strategies was observed to be partial as experienced in various interaction programmes of the Krishi Vigyan Kendras of Thrissur and Palakkad districts of Kerala. Siraw (2010) emphasized that understanding of institutional, socio-economic and bio-physical attributes of technologies influence farmers decision in technology adoption. In an effort to sustain rice cultivation there has been a major thrust on farm mechanisation in Kerala by the State government as well as the local self governments, especially in Palakkad and Thrissur districts. However, no scientific investigations have been taken up in these areas so as to reveal the field level constraints in the adoption of mechanisation. Hence a study was undertaken in Thrissur and Palakkad districts of Kerala so as to identify the major determinants and constraints in the adoption of mechanisation in rice cultivation.

Methodology

Primary and secondary data for the analysis was gathered using quantitative as well as qualitative methods. Primary data was collected from farmers from 10 selected grama panchayats in 5 block panchayats of the two districts. The selected grama panchayats in Thrissur district were Nenmanikkara, Alagapppanagar, Muriyad and Puthukkad, where as Vilayur, Kizhakkencherry, Vadakkencherry, Kavassery, Kodumbu and Polppully were selected in Palakkad district. Three block panchayats in Palakkad district and two in Thrissur district were selected based on the rice area, accessibility as well as existing KVK linkages. Qualitative data were gathered through focused group discussions and informal interviews with lead rice farmers. The list of determinants and constraints were formulated through discussions, pilot study and experiences of the researchers. A structured interview schedule was used to conduct a survey among 150 purposively sampled farmers from the selected grama panchayats. Farmers with rice farming experience of more than 7 years with basic know how on popular rice machinery were selected for the survey. The study was based on '*padasekharams*', which are adjacent agglomerated paddy lands with similar geophysical conditions. An association of the land owning farmers called

'padasekhara samithi' is often formed for coordinating the activities with Government departments and other stake holders. The questionnaire contained a list of 15 constraints divided into 3 categories viz. socio-economical (SE1-SE6), technological (T1-T6) and bio-physical (BP1-BP3), assigned with codes as given in Table 1. The respondents were facilitated to assign scores ranging from 1-10 based on the importance of the constraint as perceived by them.

A list of determinants deciding the level of adoption of rice farm mechanisation was prepared through focus group interview. Based on mutual consensus, 5 determinants were selected in the list. The respondents were instructed to assign scores ranging from 1-10 based on the importance of the determinant as perceived by them.

Results and Discussion

The constraints experienced by rice farmers in adoption of mechanisation technology along with the respective scores are given in Table 1. Socio-economic constraints SE1 and SE2 were ranked 1 and 2, respectively followed by the technological constraint T3. The most important constraint viz. 'Small holding size' which prevents the farmers from owning the machines could have been overcome by adopting a group mechanisation strategy. In the situations prevalent in Kerala, where majority of holdings are having sizes less than 0.1 ha, this is very evident. This is a clear indication that apart from attempting mechanisation of individual holdings it will be appropriate to put more thrust on a group mechanisation strategy as suggested by James and Ahmed (1994). However, the lack of unity among farmers (SE2), is the next important constraint which tailbacks group action. Many machines purchased by *Krishi Bhavans* and given to *padasekhara samithis* are lying idle for want of a proper management strategy and upkeep.

Non-availability of skilled personnel for operations was the most important technological constraint which was also ranked third in the list. This shows that the training programmes in farm machinery operation taken up by Krishi Vigyan Kendras are relevant and need to be strengthened. It is a fact that even though many farmers are interested in participating in the training programmes and make use of machines on their farms, they are reluctant to operate the machines themselves. Financial backwardness of farmers and lack of awareness are the other major socio-economic constraints with ranks 4 and 5. The constraints which need attention of extension scientists are not only awareness programmes, but also concentrated efforts to bring unity among farmers so as to facilitate technology adoption jointly in a *padasekharam*. Promotion of entrepreneurship among young farmers and rural youth

in custom hiring of machines is yet another area, so as to overcome the socio-economic constraints of small holding sizes and financial backwardness of farmers.

Table 1. Constraints in Rice Farm Mechanisation

Sl. No.	Constraints	Constraint category Code	Total score	Mean score	Rank
1	Small holding size preventing individual possession of machines	SE 1	1206	8.04	1
2	Lack of unity among the farmers in a padasekharam to adopt group mechanisation	SE 2	1045	6.97	2
3	Lack of awareness	SE 3	696	4.64	5
4	Reluctance to adopt alterations in cultural practices for the sake of mechanisation	SE 4	310	2.07	12
5	Financial backwardness of individual farmers	SE 5	768	5.12	4
6	Insufficiency of support from government for the purchase of machines	SE6	501	3.34	8
7	Non-availability of skilled personnel for operation	T1	836	5.57	3
8	Non-availability of local maintenance facility	T2	521	3.47	7
9	Non-availability of spare parts	T3	347	2.31	10
10	Non availability of quality machines at affordable cost.	T4	573	3.82	6
11	Wrong selection of machines for specific agro climatic situation	T5	350	2.33	9
12	Insufficiency of technology integration	T6	194	1.29	14
13	Water logged condition preventing the use of transplanting and harvesting machines	BP1	333	2.22	11
14	Inaccessibility of field for machines	BP2	232	1.55	13
15	Climatic problems	BP3	184	1.23	15

The non-availability of quality machines at affordable prices was a constraint ranked 6. This information has a point of reference to the fact that the Government organizations solely constituted for this purpose in Kerala could not rise to the expectations. All the rice transplanters used in Kerala are imported, sometimes christened with Indian names. Local non-availability of maintenance facilities (rank 7) and insufficiency of support from government for the purchase of machines (rank 8) are also regarded as constraints by farmers. Farmers perceive that wrong selection of machines for specific agro climatic situation (rank 9) is also a constraint, indicating that the machines purchased by government agencies are sometimes not suitable for the specific situation. Proper technical advice based on on-farm trials for selection of machines is some times lacking. Local non-availability of spare parts was the constraint which was ranked 10. It is clear that this becomes a constraint where ever use of machinery has been popularized by overcoming other constraints. All these indicate that agricultural engineers in Krishi Vigyan Kendras can play a major role in

overcoming the technological constraints so as to enable proper dissemination of mechanisation technology. The multi disciplinary team of KVK scientists, comprising of agricultural engineers can be crucial in tackling both the socio-economic and technological constraints in an integrated manner.

The constraints ranked below 10 could be regarded as less significant. Water logged condition preventing the use of transplanting and harvesting machines (rank 11) was important among bio-physical constraints. It could be inferred that the less significant constraints viz. BP1, SE4, T6, BP2 and BP3 were not very widespread and do not require immediate interventions.

The determinants in rice farm mechanisation as perceived by the farmers are given in Table 2. The availability of machines in the *padasekharam* was the most important determinant in the adoption of rice mechanisation. The availability of trained operators and the unity of farmers were the determinant factors which ranked 2 and 3, respectively. The initiative and responsibility of *padasekhara samithi* leaders in proper upkeep of machinery was also important (rank 4).

Table 2. Determinants in Rice Farm Mechanisation

Sl. No.	Determinants	Total score	Mean score	Rank
1.	Availability of machines in the *padasekharam*	1235	8.23	1
2.	Availability of trained operators	977	6.51	2
3.	Initiative and responsibility of *padasekhara samithi* leaders in proper upkeep of machinery	876	5.84	3
4.	Unity of farmers in the *padasekharam*	772	5.15	4
5.	Convenient bio-physical conditions	559	3.73	5

It is clear that making the required machines available at *padasekharam* level is very important for which the three tier panchayati raj can play a major role. Many block panchayats like Pattambi and Alathur as well as Palakkad district panchayat have taken initiative in this direction. KVKs can play a phenomenal role in making available trained operators and bringing the farmers together to adopt a group mechanisation strategy. KVKs in Kerala should take up group mechanisation of *padasekharams* rather than organizing demonstrations of individual machines. Proper leadership training for *padasekhara samiti* leaders is also highly warranted.

Conclusions

The study could identify the major constraints as well as determinants in rice farm mechanisation. Even though, the small size of land holdings and financial backwardness are preventing individual possession of machines, group mechanisation approach has high relevance. The Krishi Vigyan Kendras, and especially their

agricultural engineers, can play a pivotal role in imparting quality training for machinery operators. Their advisory service in selection of machines could be made use of by governmental agencies. Programmes like Farmers Field School organised by KVKs can enlighten the farmers on the importance of a group approach in bringing the benefits of rice mechanisation technology to the *padasekharam* as a whole, rather than to individual farmers. Increased focus should be given on a group mechanisation strategy where individual holdings are too small to own machines.

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