Factors affecting the utilization of machinery for paddy cultivation: Special reference to Ibbagamuwa Divisional Secretariat Division

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Abstract

Paddy cultivation occupies a unique place in agriculture in Sri Lanka. This is further confirmed by the dual consideration of national production as well as domestic rice demand. Although it has played a positive role in the rural agriculture sector as subsistence agriculture as traditional paddy cultivation, modernized paddy cultivation can be seen in Sri Lanka with the help of modern agricultural machinery. At the same time, there are significant benefits to be gained from leaning towards this mechanized agriculture to make the agrarian community an economically strong community for promoting local agriculture. Accordingly, the study's main objective is to identify the factors that influence the use of machinery for paddy cultivation in agriculture in Sri Lanka. Preliminary data were collected from hundreds of paddy farming households in the Batalagoda area of the Ibbagamuwa Divisional Secretariat in the Kurunegala District of Sri Lanka. Descriptive statistical methods identify the socioeconomic background of the paddy farmers in the sample. The factor analysis was carried out to identify the most effective factors influencing the use of machinery for paddy cultivation. Accordingly, labor, convenience, time, and cost were identified as the most effective factors. According to the research findings, manure spraying and weed removal are still traditional practices in paddy cultivation and there is an urgent need for research and innovation in some modern machinery. Therefore, Strategies will enable even the farmers engaged in traditional paddy cultivation methods to use the machinery required for efficient and effective paddy cultivation instead of arrears.

Keywords: agricultural mechanization, paddy farming and Sri Lanka

Introduction

The productivity of agricultural products depends on the collective processes of using advanced planting techniques, organic fertilizer, water management, and new technological knowledge. Agriculture is one of the best avenues for development. Karale et al., (2008) studied about the relationship between the use of machinery and agricultural products. It showed machines add value to the agricultural products and provides power for farm operations such as irrigation. In agriculture, the processes from plowing to sowing seeds and harvesting are progressively more sophisticated.

Nevertheless, before 1950, agriculture used manpower and animals. Since then, with the advent of the agricultural revolution and the agricultural sector's advancement, modern machinery has been able to reap the maximum benefits of agriculture. Decreasing manual labor requirements is an important aspect of farm mechanization. Therefore, saving in machine buying costs and labor costs and timelines in farm management practices (Chandran, 2018 & Singh, 2006). The fast-paced technological advances in agriculture have led Japan and Taiwan, China, and Korea, to become more dependent on agriculture. Singh (2006) found that mechanization of agricultural operations has been undertaken in many parts of the world to increase farmers' income and promote the economic interests of agriculture. It is in this backdrop that local agriculture also tends to mechanize. Paddy cultivation occupies a unique place in agriculture in Sri Lanka, which is even more evident when considering both the national production and the local rice requirement. Rural agriculture plays a significant role in subsistence agriculture as traditional subsistence agriculture. Mechanical agriculture is known as mechanized farming, from land preparation to harvesting, and there are great benefits to this farming community in promoting indigenous agriculture as an economically viable practice. Less number of laborers is needed to complete the cultivation process by mechanized farm compared to traditional farms (Rahman et al., 2011). Labor shortages during growing sessions and the low speed of manual cultivation compared with mechanized farming are also significant problems (Pateriya & Datta, 2012). Therefore, it has become a timely need to study the factors that lead to mechanized agriculture and obtain policy solutions to develop paddy cultivation and related issues. The use of machinery for paddy cultivation is present more prevalent in the world. It is problematic to have to use different machinery based on different characteristics from area to area. Research in various countries has shown that the use of machinery for paddy cultivation is an effective policy.

In addition to the various factors identified by national and international research, other factors may influence machinery use for local paddy cultivation. The study of the literature indicates that few research papers in Sri Lanka have come forward to make policy decisions on the development of paddy cultivation using machinery. This study was intended to fill that research gap. The study's main objective is to identify the factors that influence the use of machinery for paddy cultivation in agriculture in Sri Lanka. The study also intends to identify changes in the use of agricultural machinery due to socio-economics factors.

Methodology

The study was based on primary empirical data.100 of paddy farming households in the Ibbagamuwa Divisional Secretariats' Division were selected by simple random sampling method. The data was gathered by a structured questionnaire. In addition to this survey, the problem of using machinery was identified through targeted and group discussions. The data analysis was explained, including both descriptive and statistical analyses. The factor analysis was conducted to determine the factors that affect agricultural machinery use in paddy cultivation. Factors analyzed on the Principal Component Method.

The descriptive analysis was carried out to identify the variation in socio-economics factors in terms of the use of machinery for paddy cultivation. The socio-economics background of paddy farmers in the sample was identified through descriptive methods, including tables and graphs. Further, the factor analysis of the most effective factors that influence the use of machinery for paddy farming was presented using a diagram. Accordingly, several factors that affect the use of agricultural machinery in paddy cultivation were recognized.

Conceptual Framework

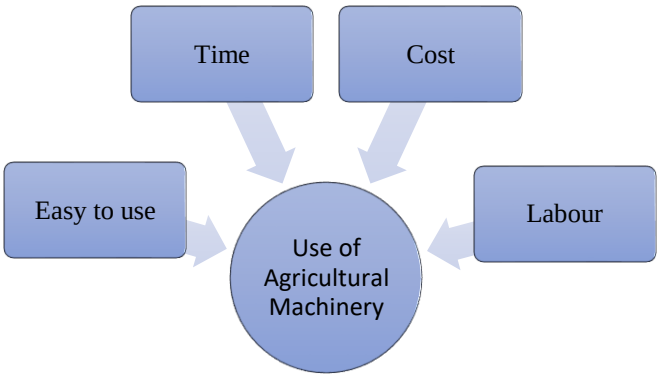

Fig 1. Conceptual Framework

Results and Discussions

Descriptive Analysis results emphasize that the percentage of machinery utilization for paddy cultivation varies by age group and educational level. The chart (a) below shows the relationship between the use of machinery by farmers engaged in agriculture and their age groups. Particularly, the younger generation under the age of 30 is 11% less likely to be involved in farming,

but the percentage of machinery used for paddy cultivation is more than 50%. The chart (b) below shows the relationship between machinery use by farmers engaged in agriculture and their educational level. Compared to the educational level, those who have studied up to A / L are the lowest in the sample, and they all use more than 50% of the machinery.

(a) (b)

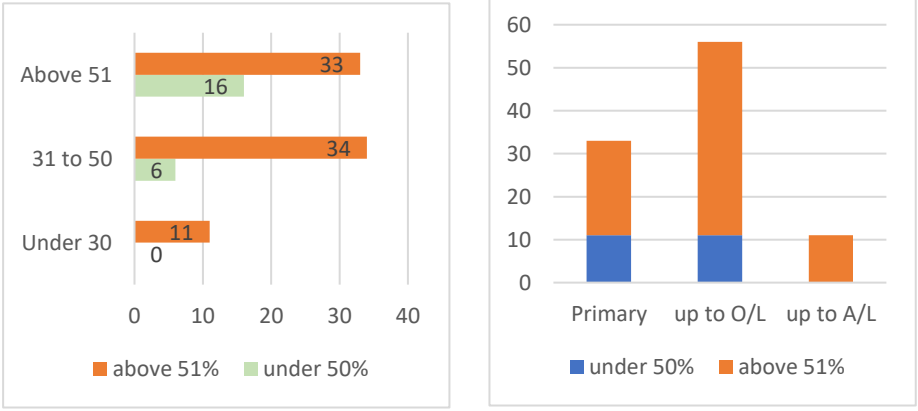

Fig 2: (a) Relationship between Percentages of using agriculture machineries and Age Level;

(b) Relationship between Percentage of using agriculture machineries and Education Level

In the statistical analysis of the factors affecting agricultural machinery use for paddy cultivation, Cronbach's Alpha test was first performed to test the reliability of the data for the analysis, with a value of 0.703. Two tests were performed to tcest for consistency, with a KMO score of 0.676, and Bartlett's test was run separately (Chi-Squre = 1186.944 / P = 0.000). An Eigen analysis of correlation was performed to identify the common factors of the variables used.

Table 1. Results of Eigen analyses of the correlation matrix

Component	Initial Eigenvalue	% of Variance	Cumulative %
Easy to use	4.196	34.970	34.970
Time	2.940	24.503	59.473
Cost	1.998	16.653	76.126
Labor	1.467	12.224	88.350

Four common factors greater than 1 were identified for the 12 variables used. Accordingly, the factors that affect the use of agricultural machinery in paddy

cultivation could be identified as (1) easy to use, (2) time, (3) cost, and (4) labor. These four factors are the most significant factors for the research purpose.

Conclusions

According to the descriptive analysis results, most of the workers in the age group between the ages of 31- 50 are engaged in paddy cultivation using machinery. Therefore, an agricultural subsidy scheme and agricultural insurance scheme should be expanded throughout the country through state and rural banks to encourage youth and subsidize machinery and fuel maintenance. Although the farming community can be empowered by initiating a formal concessionary loan scheme to locate the financial position, they need to purchase machinery to further develop agriculture. These strategies will enable even the farmers engaged in traditional paddy cultivation methods to use the machinery required for efficient and effective paddy cultivation instead of arrears. As the farming community with a higher level of education such as the GCE Ordinary Level and Advanced Level is mostly engaged in this division's agricultural sector. Agriculture should be centralized as the vocational sector that strengthens the rural sector in the country. They are engaged in paddy cultivation using machinery, which has enabled them to increase the agricultural sector's efficiency using capital applications. Duet to this, low cost paddy cultivation methods and high-efficiency machinery should be introduced to transform them into a new professional, knowledgeable farming community capable of generating innovations. The recommendation is to introduce agricultural machinery in developed countries to Sri Lanka to train them to give them professional recognition to the educated youth and thereby create a rural agricultural employment economy capable of resolving the national employment crisis.

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