

Determinants of Profitability in Organic Paddy Farming in Gampaha District

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Introduction

Agricultural sector plays an important role in economic development in developing countries. It helps to achieve economic development in order to fulfil nations' demand for food, supplying raw materials for industries, generating employment opportunities, and earning foreign exchange. Agricultural sector can be divided into two as organic agriculture and inorganic agriculture. Inorganic agriculture farmers use artificial pesticides and fertilizer as the techniques for their production process. Organic agriculture is a production system that sustains the health of the people, soils and ecosystems. There are about 15000 farmers in Mirigama area and out of these farmers nearly 70% of them used to organic paddy farming techniques because of its healthy, friendly and positive benefits to the people as well as for the safety of the environment. Unfortunately, most of the farmers engaged in inorganic farming methods to cultivate paddy and other vegetable crops in Sri Lanka. But this farming method causes adverse effects in many ways in the farming and as well as in the society. On the other hand, organic farming methods have many advantages but it is not adopted by the farmers in Sri Lanka. Because the farmers try to get the maximum yield by the application of inorganic farming techniques and they try to get those techniques easy way.

Research problem

Organic farming is in advance popularity all over the world, as it can spread agricultural production systems towards attaining improved productivity, farm income and food, as well as environmental safety in a country. Despite the global awareness of environmental degradation and climatic change that could result from the continuous practice of inorganic farming, many paddy cultivators in Sri Lanka are still producing paddy inorganically. In this background, the farmers are not interested much to apply organic fertilizers in their agricultural activities. They expect to get more profit for a short period and they can get those chemicals and fertilizers easily than organic. Thus, they should be encouraged by conducting awareness programs which may increase their attitudes towards the application of organic paddy farming in their cultivation.

Research questions

This study has the following research questions.

- What determine the profits for organic paddy farmers in the study area?
- Do the farming characters significantly affect profits of organic farming in the paddy sector?

Objectives of the study

The objectives of the study are,

- ❖ To identify the major determinants of the profitability of organic paddy farming in the Gampaha district.
- ❖ To examine how those factors do affect the profitability of organic paddy farming in the above district.

Literature review

Sanjib Bhuyan & Michael Postel (2009) have done a study related to the determinants of organic dairy farm profitability: Some evidence from the Northeast United States and their results found that organic dairy farms typically did not earn positive returns to unpaid management and labour and diversification was important for the organic dairy farms in the country.

Another study has done by Bongiwe G. Xaba (2013) to investigate the factors affecting the productivity and profitability of vegetable production in Swaziland using multiple regression analysis and found that, level of education, land under vegetable production and type of marketing agency were the determinants of profitability of vegetable production in Swaziland.

One of other study done by S.K. Ndungu, I. Macharia & R. Kahuthia-Gathu (2013) with the topic on analysis of profitability of organic vegetable production system in Kiambu and Kajiado counties of Kenya and found that, age, farming experience, and number of training attended, availability of irrigation, target market selected, production per acre, cost of production and price per unit were found to have a bearing on the profitability of a given vegetable in the country.

Modelling Irwa Issa and Ulrich Hamm (2017) have examined the adoption of organic farming as an opportunity for Syrian farmers of fresh fruit and vegetables: An application of the theory of planned behaviour and structural equation modelling. Their findings showed that most farmers used at least one of the

practices that are also part of the certified organic production, and hold strong positive attitudes and intentions to adopt organic production within the next five years.

Methodology

The sampling frame was the entire community of paddy farmers in the Mirigama D.S Division. Of which 100 paddy farmers were selected as the research sample by using simple random sampling technique in the study. By issuing a structured questionnaire, the primary data were collected from 100 farmers who are cultivating paddy as the main crop with the application of organic fertilizer in their farming in Mirigama D.S Division.

Determinants of profitability of organic paddy farming were investigated using different methods of statistical analysis such as ordinal probit model and marginal effect in the study.

Ordinal probit model

An ordinal probit model is more appropriate where the dependent variable is an ordinary data and thus to identify the factors which are influencing the profitability of organic paddy farming systems, the above model was applied in this study.

The model used in the study can be written as,

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e_i$$

Where,

Y_i = profitability of organic paddy farming which was categorized in the following order.

- 1 for below Rs10,000/=
- 2 for between Rs 10,001/= and 30,000/=
- 3 for between Rs 30,001/= and 60,000/=
- 4 for between Rs 60,001/= and 90,000/=
- 5 for more than Rs 90,000/

β_0 = Constant term

$\beta_1, \beta_2, \beta_3, \beta_4$, are the coefficients of each independent variable respectively.

X_1 = Distance to the market

X_2 = Storage facilities

X_3 = Credit availability

X_4 = Types of labour

Marginal Effects

Marginal effects measure the expected instantaneous change in the dependent variable as a function of a change in a certain explanatory variable while keeping all the other covariates constant. Using marginal effects, the effect of each independent variable on the dependent variable can be explained in terms of probability.

Results and Discussions

Factors determining the profitability of organic paddy farmers in the study area ordered probit model was applied and the results were displaced in the following table.

Table1. Estimated results of the ordered probit model

Variables	Estimated coefficients	Std. error	t-ratio	p-value
Constant	0.401	0.716	-	-
Storage facilities	-1.118	0.244	-4.58	0.000
Credit availability	-0.480	0.232	-2.05	0.040
Type of labour	0.730	0.240	-3.04	0.002
Distance to the market	0.015	0.014	1.00	0.317
Cut.1	-3.416	0.781	-	-
Cut.2	-1.879	0.734	-	-
Cut.3	-0.446	0.709	-	-

Number of observations = 100

Pseudo R² = 0.1483

LR chi² (4) = 40.58

Log likelihood = -116.57316

Probability > chi² = 0.0000

Source: Estimated by authors

According to the above table, estimated ordered probit model was statistically significant with a log-likelihood test which is 116.57 and goodness of fit model

judged by pseudo R^2 and it is statistically significant indicates that the model is good fitted one.

Further out of four explanatory variables, all farming characteristics are statistically significant at 5% level except distance to the market and based on the significant values of the variables, storage facilities are the important determinants on profits but their effect is negative indicates that the farmers who don't have storage facilities, they have less likely to earn more profits. Similarly, the negative sign of the credit availability which is 0.480 shows that the farmers who don't have credit availability they have less possibility to earn a higher profit and it is statistically significant at 5% level.

On the other hand, the farmers who are hiring the workers from their family will have more probability to earn more profit. But in case of distance from farming place to market has a positive coefficient which is 0.015 and it is the insignificant effect on the profits of the paddy farmers.

After estimated the ordered probit model, the impact of farming characters on different profit levels were analyzed using marginal effects as below:

Table2. Marginal effects of the ordered probit model

Variables	Profit range				
	Pro(1)	Pro(2)	Pro(3)	Pro(4)	Pro(5)
Storage facilities	0.0422	0.3225	-0.0405	-0.2093	-0.1148
Credit availability	0.0181	0.1386	-0.0174	-0.0900	-0.0494
Type of labour	-0.0276	-0.2107	0.0264	0.1368	0.0750
Distance	-0.0005	-0.0043	0.0005	0.0028	0.0015

Source: Estimated by authors

Note: Pro(1), Pro(2), Pro(3), Pro(4) and Pro(5) represents probability of profit levels less than Rs10 000/=, between Rs10 001/= and Rs 30 000/=, between Rs 30 001 and Rs 60 000/=, between Rs 60 001 and Rs 90 000/=, and more than Rs 90 000/= respectively.

Results of the marginal effects in the table show that the marginal effect of storage facilities has positive signs for first and second ranges of profits while more than Rs 90 000/= range of profit has a negative sign. This represents that the farmers who have storage facilities, there is a 4.2% more probability to earn profits less than Rs 10 000/= while those farmers who have those facilities, there is a 32.2% of more probability to earn the profit between Rs10 001/= and Rs 30 000/=. Even they have enough storage facilities in their paddy, they have 11.4% of less probability to earn the profit of than Rs 90 000/=. Because when they have more storage facilities, it will cause to raise their storage cost because they should

maintain their yield with proper facilities such as monitoring, lightning with enough space and chemicals. Hence, it may reduce their profit.

Credit availability has a positive sign for the first range of profit but the negative sign for the last range represents that the farmers who have credit facilities, there is a 1.8% more probability to earn profit below Rs 10 000/=, but 4.9 % of less probability to earn the profit more than Rs 90 000/=. However, as they have credit availability, it will lead to a 13.8% more probability to earn the profit between Rs 10 001/= and Rs 30 000/=. Even they have chances to get more credit facilities with low-interest rates, those loans are not properly used in the farming activities and sometimes they will use the loans for other activities such as build up their houses, daily expenses, caring of children etc. Because of these reasons, they are unable to earn more profits. Unfortunately, in the study area monitoring facilities are not given to the farmers after getting the loans and thus, farmers are not keen to utilize their credits in a proper way in the farming activities.

Compared to hired labour, the farmers who are using family labour, have 13.6% of more probability to earn the profit between Rs 60 001/= and Rs 90 000/=:, while only 7.5% more likely to earn the profits above Rs 90 000/=. This revealed that when family members are doing their farming activities with enthusiasm it will increase the productivity of paddy yield, able to reduce the wastage than using the hired labour.

Conclusion

Results of the ordinal probit model concluded that out of four variables all have significantly influenced the profits of organic paddy farming except distance to the market from the farming place. A storage facility and credit availability have negatively impact while types of labour positive impact on profits of the paddy farming. Marginal effects for storage facility and availability of credit revealed that the farmers who have those facilities, there is a more probability to earn their profits between Rs10 001/= and Rs30 000/= and the farmers who have hired their family labour, the probability of earning profits between Rs 60 001/=and Rs 90 000/=is also more. Based on the discussion with the farmers it showed that major problems faced by the farmers were inadequate time to produce compost and other fertilizers. To prepare organic fertilizers, farmers need to find out inputs like animal manure and some farmers have difficulties to find out those inputs to prepare to compose their area. Currently, farmers are aware of the profitability and importance of the organic paddy farming systems and thus, the most of the inorganic farmers prefer to move from inorganic farming to organic because of its importance and advantages. Unfortunately, they don't have enough facilities and time to produce pure organic products in their paddy farming.

Recommendations

According to the findings, most of the farmers don't have storage facilities and those farmers face many problems due to the failure to response market changes and the natural reasons. Farmers are facing difficulties to protect their harvest from the insects and natural changes in the environment. Thus, it is recommended that increasing the awareness further the farmers would actively engage in organic agriculture and it may also be useful to create awareness among the consuming public regarding the benefits of consuming organic paddy production. Provision of physical facilities for warehouses to protect the harvest of paddy and market infrastructure would help in to promote the culture of organic farming among small farmers in the area.

References

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