Factors influencing the adoption of productivity enhancement practices in pepper cultivation in Sri Lanka

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1. Introduction

Sri Lanka is popularly known as the "Spice Island" and acquainted with the "Spice Route" from East to West for many centuries. Pepper is known as "King of the Spices" since it is widely used and extensively demanded spice around the globe. Pepper is generally attributed to as "Black gold" due to its luxurious nature and used as commodity money (Ministry of Minor Export Crop Promotion, 2014).

Sri Lanka ranks fifth concerning the pepper cultivated extent and seventh in production, with a world market share of around 5% (SLEDB, 2019). The Sri Lankan Export Development Board (SLEDB) statistics show that the country exported nearly Rs.11.5 billion worth of pepper in 2018, estimated as Rs.12.7 billion in 2017. Pepper fetches a sizable foreign exchange to Sri Lanka annually. Nevertheless, it has been reported that pepper productivity in Sri Lanka is comparatively low. Compared to the average export by Sri Lanka during the last decade, pepper export declined by 31% in 2019 (IPC, 2020). Nevertheless, Sri Lanka plays a crucial role in the world market under the 'Ceylon Spice' trade name due to its inherent superior quality. Taking this advantage to negotiate the intense competition in the world market, improving the productivity of the pepper will undoubtedly open up the way for Sri Lanka to explore high-end markets in USA and EU while enhancing the per capita income of the pepper farmers.

However, it seems that the application in the field is not following the recommendations. In order to explore the problems in the field, the effort needed to accelerate the adoption of the productivity enhancement practices, it is necessary to carry out a study by observing farmers' cultivation directly in the field and interviewing them. This study aims to explore the factors influencing the adoption of productivity enhancement practices by pepper farmers in Sri Lanka.

2. Materials and Methods

In Sri Lanka pepper cultivations are prominently found in Matale, Kandy, Kagalle, Kurunegaleand Nuwara Eliya districts (IPS, 2017). Kurunegala is one of the potential districts for pepper cultivation that contributed around 9% of the pepper production in the whole Island was selected for this study. In consultation with the department of export agriculture (DEA)-Kurunagala office, three major pepper cultivating DS divisions namely Rideegama, Alawwa, and Narammala were selected for the data collection. Multi stage purposive random sampling technique was employed and a total of 224 farmers were identified and interviewed with a pretested structured questionnaire. Multi stage sampling implies the divisional secretariat (DS) division, agriculture instructor (AI) division and grama niladhari (GN) divisions respectively. The collected primary data were entered in a spread sheet and the outliers were dropped from the sample during the data gleaning process. The effective sample size was 194. The data were analysed within the frame work of Ordered Probit Regression Model (Gujarati, 2003). Ordered Probit models explain variation in an ordered categorical dependent variable as a function of typically more than two independent variables.

The respondents were grouped into three categories, namely low, medium and high adoption levels based on the mean adoption score and standard deviation of the 'Productivity Improvement Practices Adoption Index' (PEPAI). Here the dependent variable in the Ordered Probit Model was coded as 1, 2 and 3 for low-level adopters, medium-level adopters and high-level adopters, respectively. The response variable here is trichotomous. Based on the literature, gender, age, and years of education of household head, household size, nature of farming, the extent of pepper cultivation, number of vines, age of the vine, market distance, access to the extension service, access to credit and crop yield index were included as the explanatory variables in the model.

3. Results and Discussion

Descriptive statistics disclosed that the mean age of the pepper farmers are 53 years and the majority of them, 82% are males. Only 18% of the farmers surveyed for the study depended on pepper as their main source of income. Many farmers interviewed in Kurunegale district have grown pepper for years, ranging from 8 to 50 years. Much of the knowledge and skills related to pepper farming have been transferred through generations. Mean years of experience in pepper cultivation was 30, and this indicates the most of the farmers possess an appreciable amount of experience in growing pepper. Most of them grow pepper in their small plots of land. According to the survey, the extent of land ranged from 0.25 to 4 acres, with a mean of 0.94 acres. The estimated production enhancement practices adoption index (PEPAI) ranged from 42.86% to 57.14%, with a mean of 55.52%. This indicates that more than 50% of the productivity improvement practices are already being adopted by the pepper farmers. Nevertheless, the maximum percentage of the adoption index was merely 57%. Primarily it was seen that selecting the planting material is one of the important follows under productivity enhancement practices.

Most farmers in the Kurunegala district are missing the commercial dimension of pepper farming by simply skipping the critical practices like going for improved clones and application of inorganic fertilizers and could be the prime reasons for low productivity.

Prob > chi2 is the probability of getting a small p-value from the Wald test, < 0.00001, which would lead the researchers to conclude that at least one of the regression coefficients in the model is not equal to zero. This implies that there is a significant relationship exist between the explanatory variables and the PEPAI. The Pseudo R2 = 0.2103 means model outperform the baseline model by 21%. In qualitative response regression model analysis, marginal effects use model prediction for interpretation because it can better interpret the model on the scale that makes more sense.

The results (Table 1) revealed that the age, years of education of the farmer and number of vines in the farm were positively correlated with the PIPAI and found to be significant at 1% ($P>|z|=0.001$) and 1% ($P>|z|=0.004$) and 5% ($P>|z|=0.038$) α level respectively. On the other hand, the extent of pepper cultivation, age of the vine and crop yield index was negatively correlated with PIPAI and found to be significant at 5% ($P>|z|=0.033$) and 5% ($P>|z|=0.038$) and 1% ($P>|z|=0.000$) α level respectively.

Table 01. Ordered Probit Regression STATA 13.1 Out-put

Variable	(dy/dx)	Std.Err	Z	P>|z|
Gender	0.0031	0.0681	0.05	0.963
Age	0.0166	0.0050	3.35	0.001**
Household size	-0.0086	0.0213	-0.41	0.685
Years of education	0.0361	0.0126	2.87	0.004**
Nature of farming	-0.0785	0.0916	-0.86	0.392
Extent of pepper	-0.3287	0.1540	-2.13	0.033*
Number of vines	0.0005	0.0002	2.08	0.038*
Age of vines	-0.0108	0.0052	-2.08	0.038*
Distant to market	0.0071	0.0173	0.41	0.680
Access to credit	0.0620	0.1492	0.42	0.678
Crop yield index	-0.6702	0.1536	-4.36	0.000**
Number of observations	194			
Wald chi^2 (11)	39.76			
Prob > chi^2	0.0000			
Pseudo R^2	0.2103			
Log pseudolikelihood	-92.0612			

dy/dx Average Marginal Effect ***significant at 1% level & **significant at 5%level

Figure 1 depicts the gender effect on the income generated from pepper farming with respect to farmers' educational levels. With the higher levels of formal education, farmers have more opportunities to secure a white-collar job or position in the private sector. Though this opportunity can be viewed as a risk reduction and income diversification strategy, it is found that it does not favour a good harvest in pepper, especially for female farmers. Generally, it was found that females with higher educational levels are taking up another job and not performing well in their farming activities. This is mainly due to their double fold responsibility both in the workplace and at home. The socio-economic and cultural setting of Sri Lanka shifts most of the household responsibility to females.

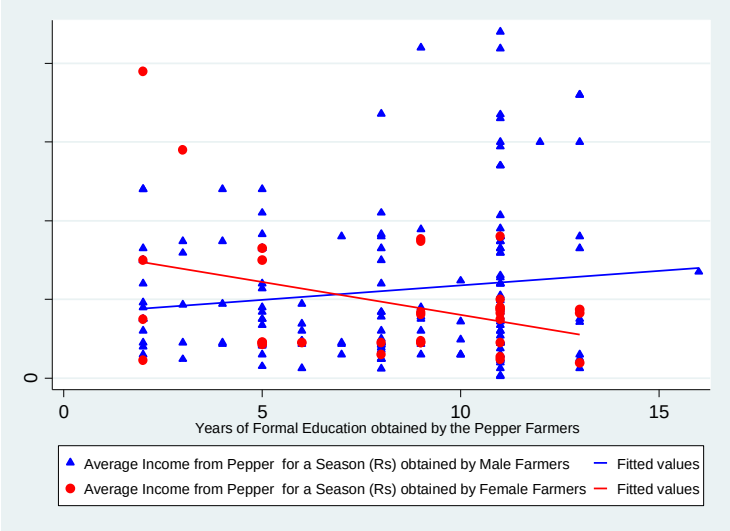

Figure 1. Income from pepper farming & Years of education and Gender Relationship.

Since they have a reasonable commitment towards their family and job, they may not keep up the farming phase. However, the male farmers, along with their job, seem to manage their farm well and could generate an appreciable income from it.

4. Conclusions

Age and education of the farmer are positively associated with adopting productivity enhancement practices. Farmers who are interested in practising crop intensification are also motivated to adopt more productivity enhancement practices. Contrarily farmers who own a larger extent of land and have older pepper vines and those who have attained a higher crop yield index have shown less incentive in adopting the productivity enhancement practices. Though education is generally favouring the adoption of productivity improvement practices for pepper farmers, it seems to be causing inefficiencies and affecting the returns from pepper farming for female farmers. Thus, special attention has to be paid to prioritizing the needs and constraints of the female farmers in formulating any policy to upgrade pepper production. In order to shift the pepper farmers in Kurunegale district more towards commercially oriented, the insufficiency in the adoption of productivity enhancement practices in pepper cultivation must be addressed immediately. Farmers have to be clearly explained the benefits of adopting the productivity enhancement practices and the spill over effect, probably through the extension efforts.

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