Factors prompting in technology adoption of cashew farmers: Case of Eastern dry zone of Sri Lanka

K. Parththini, K. Umashankar*

Department of Agricultural Economics, Faculty of Agriculture, University of Jaffna, Ariviyal Nagar, Killinochchi, Sri Lanka
* *pkushankar@univ.jfn.ac.lk*

1. Introduction

The economy of Sri Lanka continues to be dominated by small holder-agriculture and is highly dependent on the import-export economy. Presently, Cashew has gained the status of a commercial crop through technological advancements concerning propagation, production management and mechanized processing. Cashew produced in Sri Lanka is not sufficient to meet local consumption as well as export. The annual production of Cashew is estimated to be around 10000MT – 12000 MT (Sri Lanka Cashew Corporation, 2016). Cashew is imported in large quantities from India and is re-exported with value addition to address the inadequacy. It is expedient; therefore, existing plantations have to be managed efficiently for increased productivity, and fresh plantations have to be established to increase production substantially. Thus, new technology and management practices must be adopted to enhance the productivity of plantations. Cashew Corporation introduces new technology and management practices extensively.

In Sri Lanka, cashew is observed to thrive and flourish in significant ground stretches in the Dry and Intermediate Zones. Cashew cultivation is prominent in Puttalam, Kurunegala, Anuradhapura, Hambantota, and Batticaloa. As far as Sri Lanka is concerned, removing the obstacles in increasing the productivity, enhancing the knowledge and skill of the farmers, and eliminating the hindrances in adopting technology in the industry, the quantity of cashew produced could be increased substantially.

Hence, this study considered determining the extent of technology adopted relevant to cashew cultivation and identifying the socio-economic and demographic factors influencing the adoption of the technology in the Eastern dry zone of Sri Lanka.

2. Materials and Methods

Researchers obtained details of cashew cultivators in the Batticaloa district, which is one of the potential districts in Sri Lanka. Those who were in the commercial dimension were chosen purposively, and relevant information was elicited. Commercial dimension is defined as the possession of a minimum of two acres of cultivation. Data were collected by administering a pretested structured questionnaire from the 236 selected respondents. Collected data were entered into a spreadsheet, and the outliers were dropped. The resulting 220 samples were analysed using descriptive statistics and Linear Probability model. Technology adoption features of the cashew farmers were calibrated considering the practices adapted relevant to the aspects ranging from Establishment of the plantation, Fertigation, Irrigation, Land utilization, Training and Pruning, Plant protection, Harvesting to Value addition. Based on the technology adoption index of the farmers, they were categorized either into the technology adopters or non-adopters' category. The adoption index for individual farmers is calculated as the technology score for individuals divided by the total technology score. The average adoption index is calculated as the sum of all individual adoption indexes divided by the number of samples (Obisesan, 2014). The dichotomous nature of the dependent variable suggests the suitability of the Logistic regression model for the data analysis (Gujarati, 2003; Wooldridge,

2010). Scientific literature, especially within econometrics (Gujarati, 2003, Wooldridge, 2010), commonly illustrates the Logit model in the following form Li = ln (Pi/1-Pi) = $\beta 1 + \beta 2Xi + \varepsilon i$. Here, Li is the log of odds ratio, and Pi is the probability that the ith farmer's decision to adopt the innovative cultivation practices was equal to 1 and 0 otherwise. Linear Probability Model assumes that Pi is linearly related to Xi. The Logit model assumes that the odds ratio is linearly related to Xi. $\beta 2$, the slope, measures the change in L for a change in Xi. $\beta 1$ is the Y – Intercept, and εi is the stochastic error term. The data were analysed using the econometric software STATA 13.1. Interpretation of the data was made based on the marginal values of significant variables resulted from Logistic regression analysis.

3. Results and Discussion

The overall significance (Prob > chi2 = 0.0162) of the Logit model (Table 1) implies that the relationship between the adoption of technology and the socio-economic characteristics of cashew growers in the Batticaloa district were significantly correlated. The results showed that the years of education, household size, the extent of the cashew plantation and the degree of exposure to the mass media are significant and positively associated with technology adoption of the cashew farmers at 5%, 5%, 5% and 10% α levels respectively.

Table 01. Logistic regression output

Variables	Coefficient	Std.Err	Z	P > |z|	dy/dx
Gender	0.14788	0.4529	0.33	0.743	0.29577
Age	0.00838	0.0318	0.26	0.792	0.00168
Years of education	0.16738**	0.6644	2.80	0.005	0.03348**
Farming experience	0.01015	0.2072	0.49	0.623	0.00203
Household size (medium)	1.56960*	1.1089	1.78	0.075	0.27035*
Household size (small)	2.19763**	1.1346	2.55	0.011	0.39726**
Extent of plantation	0.43880*	0.2411	1.91	0.056	0.08776*
Output	-0.00212	0.0013	-1.65	0.100	-0.00043
Price of output	-0.00009	0.0036	-0.03	0.980	-0.00002
Extension services	0.50698	0.4725	1.09	0.274	0.10139
Mass media exposure	0.98174**	0.4214	2.53	0.012	0.19635**
Irrigation	0.21500	0.7571	0.28	0.776	0.04300
Fertilizer application	-0.11571	0.6258	-0.18	0.853	-0.02314
Number of observations	220				
Wald chi2 (14)	20.46				
Prob > chi2	0.0162				
Pseudo R^2	0.1558				
Log pseudolikelihood	-70.2170				

dy/dx for factor level is the discrete change from the base level- Marginal effect.
**significant at 5% level, *significant at 10% level.

It could be seen that more the educational level of the farmer better the adoption of technology in cashew farming. Education improves one's capability and understanding of the benefit of technology and may help them make correct decisions. It enhances one's ability to perceive and understand innovations and information and apply the same in their cultivation practices. This result is consistent with Nhantumbo et al., 2017 and Uhunamure et al., 2019. In the total sample, 60% of respondents had above average years of education within that 48.83% of males and 19.17% were female cashew growers.

It was found that medium and smaller household sizes favouring the adoption of technology in cashew farming. This may be due to the fact of labour substitution. In Sri Lanka, the fraction of agricultural workers in the labour force is decreasing yearly, and thus it is becoming more expensive (CBSL,2018, 2019 & 2020). For this reason, smaller farm families are keener to go for new technologies and innovations that would help them substitute the labour. Particularly the labour-saving technologies, for instance, farm mechanization, would be more attractive to them. In contrast, larger families often have more family labour to support the farming, and due to this reason, they may not be much attracted to the modernization of their plantations.

The extent of cashew plantation is also played a crucial role in fostering the adoption of technology. More extensive plantations seem to be doing quite well and capable of supplying a sizable portion to the market. Since larger plantations are fetching more returns, farmers are mainly involved and occupied with their plantations and paying more attention to the management and maintenance aspect of their plantations. Higher returns always motivate the farmers to know about the innovations and technology introduced in cashew farming. Larger farmers are mostly more market-oriented and thus giving them comparatively higher access to the information. They are more up to date and enthusiastic. This nature could be favouring the adoption of technology. Beshir (2014) and Mwangi and Kariuki (2015) also got the same results and arrived the similar conclusions.

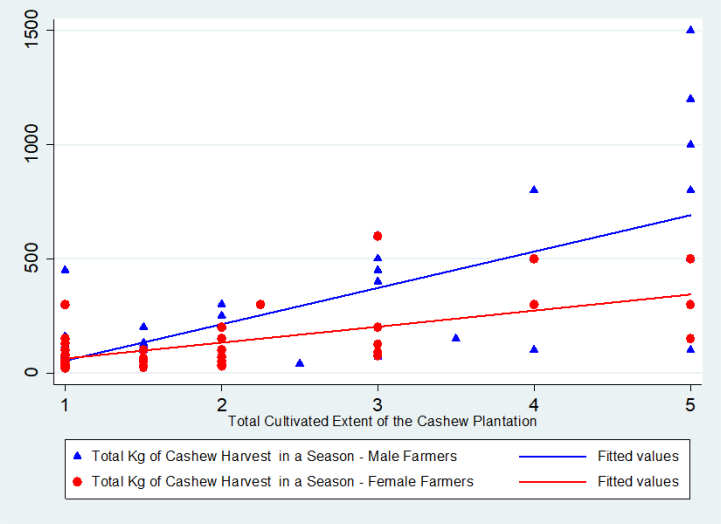

Figure 1. Extent of Cashew plantation (ac), Output (kg) and Gender relationship

Moreover, gender seemed to play a crucial role in the performance of the cashew plantations in the Batticaloa district. It was observed (Figure 1) that with the increased extent of the plantation, male farmers seem to perform well and can reap a higher production than female farmers. This may be because female farmers have more household responsibilities than men. This may hold them back to manage their plantations to a certain extent. It is seen in the above figure that the yield difference is get widened when the extent of the plantation gets larger.

Logistic regression revealed the significant contribution of mass media exposure in the adoption of technology in cashew cultivation. The more exposure, the greater the technology adoption was observed. Many other researchers, Singh et al. (2011); Anusuya et al. and Vishakha Yadav et al. (2020), reached the same conclusion. When farmers have a chance to watch the television programs relevant to new technology or read the printed materials

distributed by the department of agricultural extension or Cashew Corporation played a crucial role in convincing the farmers to opt for new technologies.

4. Conclusions

The results showed that the years of education, household size, the extent of the cashew plantation and the degree of exposure to the mass media are significant and positively associated with the technology adoption of cashew farmers. Therefore, the policy options that promote rural extension education services, access to mass media and factors of production, precisely land, are pertinent to enhance the adoption of improved agricultural technologies by the Cashew farmers in the Batticaloa district. Special attention and extension support can be extended to the female farmers to increase their productivity, especially those managing to greater extents.

5. References

Anusuya, A., Balasubramaniam, P., R., T., & Krishnaveni, S. (2020). Socio-economic Characteristics of the Cashew Growers of Tamil Nadu – An Analysis. *International Journal of Current Microbiology and Applied Sciences*, *9*(7), 1790–1801. https://doi.org/10.20546/ijcmas.2020.907.205

Mwangi, M., & Kariuki, S. (2015). Factors Determining Adoption of New Agricultural Technology by Smallholder Farmers in Developing Countries. *ISSN*, *6*(5), 2222–1700. Retrieved from https://www.researchgate.net/publication/303073456_Factors_determining_adoption_of_new_agricultural_technology_by_smallholder_farmers_in_developing_countries

Nhantumbo, A., Takeshita, H., Uaciquete, A., & Miura, S. (2017). Determinants of Adoption of Technologies for Cashew Production in Nampula, Mozambique. *Journal of Experimental Agriculture International*, *17*(5), 1–11. https://doi.org/10.9734/jeai/2017/36035

Obisesan, A. (2014) 'Gender Differences In Technology Adoption And Welfare Impact Among Nigerian Farming Households', *IDEAS Working Paper Series* from RePEc; St. Louis, (58920), pp. 1–22. Retrieved from https://search-proquest com.kuleuven.ezproxy.kuleuven.be/docview/1700391295?rfr_id=info%3Axri%2Fsid%3Aprimo

Yadav, V., Yadav, S. R., Mishra, A., & Sachan, P. (2020). Impact of Mass Media on Agriculture Practices in District Lucknow (U.P). *International Journal of Current Microbiology and Applied Sciences*, *9*(4), 1313–1319. https://doi.org/10.20546/ijcmas.2020.904.155