Determinants of training needs of small rubber farmers in Kalutara District, Sri Lanka

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Abstract

The rubber industry provides raw materials for the production of many industrial goods such as automobiles, aircrafts, railways, the textile industries, sports goods, engineering goods and even for building roads. It represents greater potential of high value adding capacity than any other industry like the textile and garment industry in Sri Lanka.

With respect to opportunities in the global markets being assured to technically sound and innovative local rubber as well as rubber based product manufacturers and suppliers, it is clear that the rubber industry will continue to be a solid and profitable facet of Sri Lanka's economy (EDB–2016). The improvement of the productivity in the rubber sector depends on skilled and knowledgeable labor force. Therefore, the training of small rubber farmers is an essential component for the future sustainability of the industry.

The main objective of this study is to identify the training needs of small rubber farmers in the Kalutara District of Sri Lanka. A multistage purposive sampling technique was used to collect data from 389 small farmers in three divisional Secretariats in Kalutara District to ensure representative sample size for the study. The data were collected through the administration of structured questionnaires.

Data were analyzed by employing a binary logistic regression model. To verify the impact of the dependent and independent variables, six hypotheses were tested. The study found that experience of farmers, age of farmers; the land size and number of hours spent on rubber farming are the primary factors that significantly influence training requirements of rubber farmers in Kalutara district. These findings are consistent with existing research findings of Alarima et al. (2011), Adesoji et al. (2006) and Pierre-André et al. (2010).

Further, results showed that the majority of respondents had expressed their needs for training about the identification of diseases and chemical application for their land. Second preference was given for the correct method of preparation of the land for the cultivation. The study emphasized that these factors should be highly considered when planning and organizing training for rubber farmers in Sri Lanka for the training to be efficient.

Key words: Small rubber farmers, training needs, Kalutara District in Sri Lanka

1. Introduction

The rubber plantation industry started in 1876, with the planting of 1,919 rubber trees at the Henerathgoda Botanical Gardens in Gampaha, Sri Lanka. In the 1950s manufacturing rubber products was pioneered by tyre re-trading and the market was enhanced rapidly after articulate free trade policies. Further it was expanded by introducing investment promotion zones in the late 1970s. Sri Lanka produces a variety of rubber products by using raw rubber. It includes rubber bands, beadings, medical, industrial and households gloves, hoses, auto parts, tyres, tubes, floor mats, carpets, sports goods, footwear, etc.

There are different types of rubber producers and exporters; namely, large-scale as well as small and medium scale. The rubber industry generates employment opportunities for a large number of people who lived in the rural areas. According to the available statistics, it shows that the industry creates direct and indirect employment opportunities for more than 300,000 people in the country (Export Development Board -EDB -2016). Rubber products are the second major industrial export in Sri Lanka, which accounted for around 7.2 percent of the total export earnings in 2015. Rubber export earnings declined from 8 per cent in 2014 to 7.2 percent in 2015. Further records indicate that earnings from rubber exports, which declined continuously from 2012, weakened further in 2015. Rubber production also has declined by 10.1 per cent to 88,570 MT in 2015 from 98,573 MT in 2014 (see Table 1). Specially, small rubber holders reduced their tapping operations in response to lower rubber prices (Central Bank Annual Report 2015).

The total land area under rubber farming is 134,409 hectares (ha) in 2015 (Rubber Development Department of Sri Lanka).

Though the production levels are declining, it represents greater potential of high value adding capacity than any other industry like that of textiles and garments. Further the link with the global rubber industry in Sri Lanka shows remarkable potential for exponential growth with the global industry which is growing annually at 4–6 percent. With respect to opportunities in the global markets being assured to technically sound and innovative local rubber as well as rubber-

Table 1 Production of Rubber from 2006–2015 (in kg Million)

Type of Product	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Sheet Rubber	52.5	48.9	55.0	54.6	59.2	60.7	59.2	62.8	48.5	44.4
Crêpe Rubber	25.8	27.5	27.7	40.6	61.1	64.6	39.7	20.2	15.3	11.1
Other	30.8	41.1	46.5	41.7	32.7	32.9	53.1	47.4	34.8	33.1
Total	109.2	117.6	129.2	136.9	153.0	158.2	152.0	130.4	98.6	88.6

Source: Central Bank Annual Report–2015

based product manufacturers and suppliers, it is clear that the rubber industry will continue to be a solid and profitable facet of Sri Lanka's economy (EDB–2016). Therefore, improvement of productivity in the rubber sector is also dependent on a skilled and knowledgeable labor force.

According to Ministry of Plantation Industries, progress report (2014) it was indicated that the small rubber farmers play a major role in the cultivation of the rubber sector. In terms of the cultivated area, at present small rubber famers have approximately 85,083 hectares comprising 63% of the total extent of the rubber lands. In 2015, the productivity level was recorded as 776 kg per hectare. According to 2010 records Sri Lankan smallholders have achieved comparatively higher levels of productivity compared to other regional smallholders. In the popular imagination, Malaysia is the home of rubber. The yield in Malaysia was just 1500 kg per ha in 2010. The figures for the other countries were: India 1750 kg/ha, Philippines, 1400 kg/ha, Vietnam, 1400 kg/ha and Indonesia, 950 kg/ha (Ministry of Plantation–2010).

Though Table 2 shows that the total land area under rubber cultivation exhibits an increasing trend, the average yield per hectare records decreasing during 2013–2015. An average yield of 1,290 kg per hectare was recorded in the year 2013 with the unfavorable weather conditions and also the relative low prices. That was due to the subsidy given by the government for new planting and replanting and the motivation of the farmers to obtain higher levels of output from the available rubber lands (Ministry of Plantation Industries, 2015). Some scholars have emphasized that the major factor which contributed to improving productivity level of the rubber farming industry was the training requirement of the farmers. The following researchers have carried out work on this theme and their findings are presented in summary form as below.

Pierre-André et al. (2010) examined the training requirements of rubber farmers in the South-West region of Cameroon. They used a structured questionnaire to collect data. The findings of the study showed that the majority of respondents indicated that they need training at different stages of rubber farming. This was especially so, with their interest on the production of planting materials, tapping techniques, the accurate preparation of stimulant and its application and improved agricultural techniques. The results revealed a negative significant

Table 2 Total Rubber cultivation area and Average Yield

	2008	2009	2010	2011	2012	2013	2014	2015
Total extent under rubber (Ha)	119,543	122,087	125,645	128,119	130,415	132,534	133,762	134,409
Ave. yield per Ha. (Kg.)	1,246	1,382	1,561	1,631	1,531	1,290	930	776

Source: Department of Rubber Development, Sri Lanka, 2015

relationship between the ages, levels of education and socio-economic conditions of farmers and training requirements. Farinde and Ajayi (2005) studied the training needs of women farmers in livestock production in Oyo State Nigeria. Data were collected through structured interviews from 171 women farmers from local government areas in Oyo. Women expressed their training needs in different aspects to improve livestock production.

Oyegbami et al. (2016) assessed the training requirements of rural women in livestock production in Oyo State, Nigeria. The study employed a multistage random sampling approach to collect data from 180 women. Results showed that 82 percent of women needed training in the general management of poultry and 42 percent showed that they needed training in sheep and goat production.

According to the findings Farinde and Ajayi, (2005), the main reason for the low level of productivity among small rubber farmers was the lack of skill and knowledge in improved agricultural practices. Since skill and knowledge could be achieved through proper training, they pointed out that to improve the productivity level, small rubber farmers also needed appropriate training. Nugawela, A, (2010) identified that major issues of the rubber growers are the increasing costs of production and the shortage of skilled workers for which solutions are needed. In order to achieve higher levels of productivity, skilled workers for raw rubber processing and the finished product manufacturing sectors are important. Therefore, this study is concerned with the reasons why farmers are traditionally bound in respect of skills and knowledge being used most of the time. Hence there is a gap between modern agricultural practices and traditional methods in the rubber farming industry. According to available literature no study has considered the relationship between the socio-economic aspects of the rubber growers and the rubber farmers training requirements in the Sri Lankan context. Dependent and independent variables were identified based on a review of the literature. In line with the above discussion, this study is giving focus on the determinants of the training need of rubber farmers in Kalutara District, Sri Lanka.

2. Materials and Methods

The study area was selected based on the extent of cultivated land area. The top three growers in the rubber industry are identified as Kegalle, Kalutara and Ratnapura Districts in Sri Lanka. Among them Kalutara was selected as the sample area for the study. Three divisional Secretariats in Kalutara District were purposively selected to ensure a representative sample size for the study. The three sample areas are Horana, Bulathsinhala and Dodangoda in Kalutara District. A total of three hundred and eighty nine (389) small rubber farmers were selected for the primary data collection. The data were collected through the administration of structured questionnaires to randomly select a sample from small rubber farmers in three divisions. Further focused group discussions and in-depth interviews were conducted with selected households by the researcher.

The data were analyzed using frequency distribution, percentage distribution and by employing the Binary Logistic Regression Model. To verify the impact of the dependent and independent variables, a hypothesis is formed based on previous research findings.

2.1 Hypothesis

H_0: Time spent on rubber production, experience of the farmer, size of rubber land, monthly income from rubber production, age of rubber farmer and education level of rubber farmer are significant impacts on the training requirement of the rubber farmer.

2.2 The Model

Simple linear regression techniques were used to test the hypothesis. The model which is employed in the analysis is as follows.

$$Z = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + U$$

Equation (1)

Here, 'α' is a constant, β_1, β_2, β_3, β_4, β_5 and β_6 are binary logistic regression model coefficients, Z is the training requirement (dependent variable - Yes and No) and X_1, X_2, X_3, X_4 X_5 and X_6, are independent variables. U is a random term that accounts for unobserved factors.

3. Discussion of the results

3.1 Socio-economic characteristics

Data in Table 3 indicate that the majority (80%) of respondents were male in the rubber industry while only 20% were female. The large proportion of males in rubber farming is justified by the local traditional culture and land ownership pattern in the economy. According to the traditional land ownership system of the country, women do not inherit land; they have access to land property and rubber farms through their deceased husbands.

Further, Table 3 reveals that 75.4% of respondents had up to the Ordinary level of education, 22% at least completed up to secondary school level and only 2% received a higher level of education. This concludes that most respondents were knowledgeable.

Out of 389 respondents, 19 were aged between 18 and 30; and only 84 respondents were at the age of 59 and above. The majority of the respondents belonged to the age category 45–58 years. The data showed that the bulk of rubber farmers (78.4%) fell within the productive age group (18–58 years).

Only 1% of respondents earned less than Rs. 10,000 per month from rubber production. About 80% of respondents belonged to income levels which were greater than 20,000 and less than 40,000. According to Central Bank statistics (2012/13), the median household income was Rs. 30,814 per month. Since the majority of households earned greater than 20,000 income from rubber production, this result is reliable with the annual report data of the Central Bank.

Data in Table 3 also indicates that 77.4% of the respondents have less than 5 acres of land for rubber planting. This shows clearly that in the study area all farmers are small -scale farmers. It also shows that only 5% of the respondents rent the land on payment of specified fee while 42% were using inherited

Table 3 Personal and Socio-economic characteristics of Respondents

Characteristics	Frequency	Percentage
Gender		
Male	315	80.98
Female	74	19.02
Total	389	100
Level of Education		
Grade 5	85	21.9
O/L	208	53.5
A/L	87	22.4
Degree	9	2.3
Total	389	100
Age structure of Rubber Farmer (Years)		
18–30	19	4.9
31–44	99	25.4
45–58	187	48.1
Above 59	84	21.6
Total	389	100.0
Monthly income of Rubber Production (in Rupees)		
Less than 10,000	4	1.0
10,001–20,000	80	20.6
20,001–30,000	152	39.1
30,001–40,000	153	39.4
Total	389	100.0
Size of rubber land		
Less than 5 acres	301	77.4
5–10 acres	68	17.5
10–15 acres	18	4.6
15–20 acres	01	0.3
Above 20 acres	01	0.3
Ownership of land		
Inherited by Family members	165	42.4
Purchased land	205	52.7
Rental land	19	4.9
Total	389	100.0

land for their farming. The majority of the respondents were using purchased land for their rubber production.

Data presented in Table 4 shows that the majority of respondents had expressed their needs for training about the identification of diseases and the chemical application for their control. Second preference was given for the correct method of preparation of the land for cultivation. Since respondents were unable to identify the most frequent rubber diseases and the control measures needed, they believe

Table 4 Area of training needs of rubber farmers

	Frequency	Percent
Fertilizer Usage	26	6.7
Tapping Techniques	17	4.4
Preparation of Land	70	18.0
Planting	4	1.0
Identification of Diseases and Control	272	69.9

Table 5 Statistics on overall significance

Model Summary			
Step	−2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	286.037[a]	0.181	0.298

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

that an advancement of knowledge regarding the above issues through training could lead to an increase in their rubber production and finally their income.

We generally relied on Binary Logistic Regression approach for data analysis because of the multivariate relationship of the model.

Table 5 provides information about the goodness of the fit of the model. Two measures are given for Cox & Snell R Square and Nagelkerke R Square. Both describe the proportion of variance in the outcome that the independent variables successfully explain. Similarly R^2 in the multiple regression model in which these values lie is between "0 and 1" with a value of "1" suggesting that the model accounts for 100% of variance in the outcome and "0" suggesting that it accounts for none of the variance. From Nagelkerke R^2, it is clear that 29.8% of the variation in training requirement is accounted for by the age of rubber farmer, the experience, the size of rubber farm land, the time spent on rubber farming, monthly income and constant.

3.2 Multicollinearity

This is also identical to multiple regression analysis. The assumption requires that predictor variables should not be highly correlated with each other. Of course predictors are often correlated with each other to a certain degree. As an example, below is a correlation matrix (Table 6) that shows the relationships between several independent variables. As we might expect, monthly income is significantly related to the size of rubber land but the relationship does not appear strong enough (Pearson's $r = 0.64$) to be considered a problem.

The main objective of this study is to identify the main determinants of the training requirement of the farmers. Selecting these combinations of variables does have some objectivity because in a setting like Sri Lanka it is urgent to highlight the contribution of the rubber industry which creates direct and

Table 6 Pearson Correlation Matrix

	Age of rubber farmer	Experience	Education level	Size of rubber farm Land	Training requirement	Time spent on rubber farming	Monthly income
Age of rubber farmer	1	.642**	−.273**	.192**	−.313**	.258**	.249**
Experience	.642**	1	−.252**	.161**	−.359**	.307**	.223**
Education level	−.273**	−.252**	1	.116*	.134**	−.452**	−.024
Size of rubber farm Land	.192**	.161**	.116*	1	.119*	−.041	.643**
Training requirement	−.313**	−.359**	.134**	−.119*	1	−.212**	−.065
Time spent on rubber farming	.258**	.307**	−.452**	−.041	−.212**	1	.008

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 7 Results of Regression Analysis

Variables in the Equation							
		B	S. E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Age of rubber farmer	−.448	.269	2.775	1	.096*	.639
	Experience	−1.039	.250	17.252	1	.000***	.354
	Education level	.038	.235	.026	1	.871	1.039
	Size of rubber farm Land	.562	.306	3.390	1	.066*	.570
	Time spent on rubber farming	−.505	.245	4.249	1	.039**	.603
	Monthly income	.570	.227	3.890	1	.048**	1.768
	Constant	8.210	1.517	29.293	1	.000***	3677.105

a. Variable(s) entered on step 1: Age of rubber farmer, Experience, Education level, Size of rubber farm Land, Time spent on rubber farming, Monthly income.

*** Significant at 1% level, ** significant at 5% level and * significant at 10% level.

indirect employment opportunities for more than 300,000 people in the country. At the same time, rubber products are the second major industrial export of Sri Lanka. The following Table 7 provides the regression coefficient (B), the Wald statistic (to test the statistical significance) and the all-important Odds Ratio (Exp (B)) for each independent variable.

As it was assumed that the relationship between the dependent variable and the experience of the farmer is negatively related, this relation was accepted by the negative coefficient value 1.039 and the highly significant t-value (Wald Statistic) 17.252 as the human capital theory pointed out that

individuals acquire training through work experience. In other words, higher level of experience lowers the level of formal training. Since the t-value is less than 1%, the null hypothesis of there being a significant impact of experience level of the farmer on training needs cannot be rejected. On the other hand, experience the older farmers have gained in rubber farming may also be viewed as an obstacle when they are interested in other training in rubber farming. This result supports the findings of Alarima et al. (2011).

The Exp (B) column (the Odds Ratio) indicates that rubber farmers who have higher experience are one (−1.039) times less likely than those who have less experience for motivation to get training in different areas of rubber farming.

The results shown in Table 7 indicate that training needs of rubber farmers were significantly negatively related with age level. It is proved by the coefficient value −0.448 (negative) and significant at the 10% level. This implies that the older the rubber farmers, the less their training requirements become. This result is consistent with the findings of Adesoji et al. (2006) and Pierre-André et al. (2010).

The size of rubber land had a positive and significant impact on training needs. (β =0.562, p=0.066). Hence, it was expected that the farm size would probably have a positive impact on training needs because big farms require more labor than small ones and farmers with large farms would desire to acquire knowledge in order to enhance their production and yield. So there will be more requirements for the farmer to search for ways of improving their knowledge through training. Also, as the farm size increases, the farmer will be more inclined to maximize the profit from investment and thereby to have training on new ways of doing things. This is consistent with existing evidence presented by Alarima et al. (2011), in which the larger the land size becomes the more the training is required.

Table 7 also shows that the number of hours spent on rubber production (β = −0.505, p=0.039) had a negative significant impact on farmers' training needs. Farmers who spent fewer number of hours on farming needed more training in related areas of rubber farming.

A majority of farmers required training on the identification of diseases in rubber production and the controlling methods (see Table 4). The monthly income of rubber farmers had a positive but insignificant impact on training needs. (β =0.57, p=0.048).

4. Conclusion

This study was conducted to explore the major factors that influence the training need of rubber farmers in Kalutara District. The findings of the study clearly show that there is a need for training in different areas in the rubber farming sector. Especially, farmers have pointed out that they need special training in the field of identification of diseases and controlling techniques.

Six hypotheses were used in the study to examine the effects on the training needs of rubber farmers. Two hypotheses were accepted at 10% level of significant while

three hypotheses were accepted at 5% level of significant. The study found that the experience of farmers, the age of farmers; the land size and the number of hours spent on rubber farming are the primary factors that significantly influence the training requirements of rubber farmers in Kalutara District. These findings are consistent with the existing research findings of Alarima et al. (2011), Adesoji et al. (2006) and Pierre-André et al. (2010). The study emphasized that the above factors should be highly considered when planning and organizing training for rubber farmers in Sri Lanka for the training to be efficient.

5. Direction for Future research

Due to the time and resources limitations, the study was unable to cover all the factors which will influence to the effective training of small rubber farmers. This research finding explains only about 30 percent of the variation from this model and unexplained part is substantial. Therefore it is suggested that future research may replicate the same approach (Binary Logistic Regression Model) using a different data set and large sample size on other areas in Sri Lanka. Also, it could be identified that what are the reasons for younger generation to move traditional industry to modern industries like apparel and so on.

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References

Adesoji S. A., Farinde A. J. and Ajayi O. A., 2006. Assessment of the training needs of Fadama farmers for future agricultural extension work development in Osun State, Nigeria. Journal of Applied Science, 6(15): 3089–3095

Alarima C. I., Kolawole A., Fabusoro E., Ajulo A. A., Masunaga T. and Wakatsuki T., 2011. Knowledge and training needs of farmers adopting Sawah rice production technology in Nigeria, *Journal of Food, Agriculture & Environment*, Vol. 9 (3&4) pp. 183–188

Central Bank Annual Report, Sri Lanka, 2015

Farinde A. J., Ajayi O. A., 2005. Training needs of women farmers in livestock production: Implications for rural development in Oyo State of Nigeria, Journal of Social Science. 10(3): 159–164

Nugawela A., 2010. Rubber research in Sri Lanka-the past 100 years and the future, Bulletin of the Rubber Research Institute of Sri Lanka, (51), 28–35

Oyegbami A., Fato B. F., Adeniran A. A., Akintoye N. A. andOgarr E. E., 2016. Training Needs Assessment of Women in Small Scale Livestock Production and Its Implication forSocio-economic Empowerments in Oyo State, Nigeria, *Asian Journal of Agricultural Extension, Economics & Sociology*, 8(1): 1–8

Pierre-André O. N., Aurelie N. N., Ejolle E. E., Bénédicte C. P. and Jean-Claude B., 2010. Assessment of training needs of rubber farmers in the South-west region of Cameroon, African Journal of Agricultural Research 5(17), 2326–2331

Progress Report, 2010 and 2014, Ministry of Plantation Industries, Sri Lanka

Statistics, 2015, Rubber Development Department, Sri Lanka

Sri Lanka Export Development Board, 2016