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Evaluation of Tea Smallholders' Knowledge and Attitudes towards the Adoption of Recommended Agricultural Practices in Tea

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ABSTRACT

Tea smallholdings sector plays a major role in the tea industry of Sri Lanka. Knowledge and Attitudes of tea smallholders are identified as one of the critical factors affecting the adoption of recommended practices. This study was aimed at evaluation of existing knowledge and attitudes of tea smallholders on the adoption of recommended agricultural practices. A sample of 108 smallholders were selected and primary data were collected using a simple question paper and a questionnaire. Descriptive and non-parametric statistical methods were adopted to analyze data using SPSS software package. In general, the majority of tea smallholders had poor knowledge and least favorable attitudes on the adoption of recommended agricultural practices. Simultaneously, smallholder attitudes and level of knowledge were positively correlated. Exposure to tea related extension programs was identified to be the most important factor that effect both the knowledge level and attitudes of tea smallholders. At the same time, gender had a significant effect on level of knowledge whereas farmer experience is found to be a significant determinant of attitudes.

Keywords: *attitudes, knowledge, level of adoption, recommended agricultural practices, smallholders, tea*

INTRODUCTION

Tea, (*Camellia sinensis* (L) kuntze) has been playing a significant role in the economy of Sri Lanka since early 20th century to date. Sri Lanka exports 94 percent of its tea production to the world market and contributes 15 percent to the foreign exchange earnings of the country. It also contributes 0.7% of the Gross Domestic Production (GDP) of Sri Lanka (Anon., 2017). Tea industry mainly consists of two sectors, namely the Estate Sector and Smallholdings Sector, occupying nearly 204,024 hectares in the country (Anon., 2013).

Tea Smallholdings Sector in Sri Lanka

Tea smallholding is defined as the tea lands below 4 ha (10 Acres) in terms of extent. Today, the tea smallholdings sector is considered the most dynamic segment of the tea sector as it represents 59% of total tea extent of Sri Lanka (TSHDA, 2012) and contributes more than 75% to the national tea production (Anon., 2017). Currently, the productivity of the tea smallholdings sector remains poor ant this could mainly be attributed to many factors such as land degradation, aging of tea bushes, poor rate of replanting and pest and disease damages, which ultimately causing the economic life span of tea bush as shorten as 15 years (Rajasinghe, 1999). Mahaliyanarachchi *et al*. (1996) found out that only 32.5% of small holders of Low country had a satisfactory knowledge on fertilizer usage, while the rest being either moderate or poor. Regarding pest management, only 13.25% had a fair knowledge. Furthermore, surveying tea smallholders in Matara district, Samaraweera *et al*. (2013) found that only 20% had a good knowledge about overall tea cultivation.

Knowledge and attitudes of the farming community

Hogg and Vaughan (2005) defined attitude as, 'A relatively enduring organization of beliefs, feelings and behavioral tendencies towards socially significant objects, groups, events or symbols. Attitude is positive or negative evaluations or feelings that people have towards other people, objects, issues or events. Attitudes are formed by what an individual perceives to be true about the attitude-object and is manifested through practice by changing the behavior of a person or organization. Knowledge is defined as the fact or condition of being aware of something the range of one's information or understanding (The Marriam-Webster, 2017). The knowledge, like other forms of wealth, is often differentially distributed throughout a social system. It is suggested that as the infusion of mass media information into a social system increases, segments of the population with higher socioeconomic status tend to acquire this information at a faster rate than the lower status segments, thereby increasing the knowledge gap between these segments (Wikipedia, 2016). A number of researches have been conducted to assess farmer knowledge and attitudes with regards to several issues that prevail in the agricultural sector of Sri Lanka as well as other countries. Malkanthi *et al*. (2001) conducted a study to assess attitudes of Up-Country vegetable farmers and agricultural officers towards the privatization of agricultural extension service. In another study, Mahaliyanarachchi *et al*. (2006) have developed a scale to measure farmer attitudes towards the commercialization of agricultural extension. As far as farmer knowledge is concerned, Mahaliyanarachchi *et al*. (1996) pointed out that the knowledge is an important pre-requisite for adopting the good agricultural practices successfully at the field level.

Factors affecting knowledge and attitude levels of smallholding farmers towards the adoption of recommended agricultural practices

Despite the great potential of agricultural recommendations and innovations, the uptake of knowledge by smallholders seems to be slow. Several studies have been carried out all over the world regarding the factors affecting the knowledge and attitudes of smallholding farmers towards the adoption of agricultural recommendations. Meijer *et al*. (2015) reviewed that uptake of agricultural innovations by the smallholding farmers is largely depend on intrinsic factors such as the knowledge, perceptions and attitudes of the potential adopter. In another study, Shikuku *et al*. (2017) have assessed influence of small-scale farmer attitudes towards the adoption of recommended practices to avoid possible risks of climate change.

However, a less effort has been made to evaluate knowledge and attitudes of tea small holders in Sri Lanka towards the adoption of innovative agricultural practices introduced by the TRI. It is therefore timely important considering this issue in depth and conducting a study in this regard. Therefore, this study is aimed at evaluating existing levels of farmer knowledge and attitudes towards the adoption of recommended agricultural practices along with possible factors affecting them. In long run, it could be of much useful in selecting possible remedies to uplift the existing knowledge and attitude levels of smallholders, thereby ensuring a satisfactory level of adoption of recommended agricultural practices in the field.

This study is intended to assess the level of knowledge and attitudes of tea smallholders towards the implementation of recommended agricultural measures in the tea lands. The specific objectives of this study were**;** to evaluate the existing knowledge of tea smallholders regarding the recommended agricultural practices in tea and the existing attitudes of tea smallholders on the adoption of recommended agricultural practices in tea and to identify the possible causes affecting smallholder knowledge and attitudes on the adoption of recommended agricultural measures.

MATERIALS AND METHODS

Study area, sampling frame and sampling technique

Four Tea Inspector (TI) ranges of Gampola and Kotmale regions were selected as the study area (Table 1). All the registered members of these tea smallholdings societies were considered as the sampling frame. A sample of 120 small holders was selected from these four TI ranges by using Simple Random Sampling method (Table 1). 30 smallholders were selected from each of the four TI regions thereby the total sample being 120.

Table 1. Sample selection of the study

District	Sub Office Region	TI Region	Sample size
Kandy	Gampola	Dolosbage	30
		Panvilatenna	30
Nuwara Eliya	Kotmale	Tispane	30
		Harangala	30

Data collection instruments

Knowledge level of tea small holders was evaluated by giving a simple question paper in the form of MCQ and structured essay type questions. In case of attitude evaluation, a questionnaire consisting of twelve (12) statements was prepared based on the guidelines given by Likert (1932) and Saravanan and Gowda (1999). Each statement was evaluated on a 5-point Likert Scale with weightage of 5, 4, 3, 2 and 1 for positive statements and the reverse scoring system for the negative statements. Once prepared, these two data collection instruments (question paper and questionnaire) were subjected to a relevancy test with a panel of subject specialists and further improvements were made based on the comments given by the panel.

Data collection

A field survey was conducted in the selected TI ranges from June to October 2017 (5-month period) to collect data. In case of knowledge evaluation, each respondent was given a separate question paper and allowed to answer the questions within 20 minutes time period. Each respondent was then interviewed for 15 minutes time period and the response for each attitude statement was noted down in a separate attitude questionnaire.

Data processing and analysis

Questionnaires were re-evaluated excluding incomplete and unreliable ones thereby selecting 108 responses for analysis. All the data were entered to an Excel Worksheet (MS Excel, 2010) for analytical works. Knowledge of each respondent was measured in terms of marks given for the question paper that ranges from 0 to 100. Respondent's attitudes were measured by summing up the score of each statement in the questionnaire (Likert, 1932; Wilcox, 1992). In analysis of data, Descriptive analyses was performed and illustrated using tables and bar graphs. Non-parametric statistical methods such as Wilcoxon Rank Sum test was used to find out factors affecting the knowledge and attitudes whereas Spearman's Rank Correlation method was adopted to find out the correlation between the knowledge and attitude level of smallholders.

RESULTS AND DISCUSSION

Demographic and socio-economic characteristics of respondents

Selected demographic and socio-economic characteristics of respondents were measured as shown in Table 2.

Table 2 indicates that male farmers account for majority (54%) of the respondents while female farmers were found to be 46%. The age levels of smallholders were found between the ages of 30 to 70 years. Accordingly, 30% of smallholders were found below 40 years of age which could be considered as the younger generation involving in the sector. At the same time, 59% were in between 40 – 60 years and the rest (*i.e.* 11%) were above 60 years.

The respondents were fairly educated, of which the majority has passed the G.C.E. Ordinary Level examination. There is a marginally higher tendency in higher education among male farmers where 17% of men and 10% of female had above GCE O/Level qualifications.

A majority (44%) of smallholders have been involving in tea cultivation for more than 15 years. Furthermore, another 28% were in between 10 – 15 years of experience in tea cultivation (Table 2). Majority (50%) of the respondents had cultivated 0.6 – 1.0 ha while 46% of respondents were having tea lands below 0.5 ha. Only a few (4%) respondents owned tea lands that were above 1 ha in extent. The yield data (average kg of green leaf per month per ha) of 107 respondents were collected and found out that the average yield remains around 875 – 1000 kg/ha/month (*i.e.* 350 – 400 kg/acre/month), which is significantly

below the expected level. Nearly one fifth they can harvest more than 1000 kg of green leaves per ha while the majority (79%) had recorded below 1000 kg/month/ha (Table 2).

Nearly a half of the respondents (51%) were full time farmers whose main source of income was tea. The other 49% was found to be part time tea growers where the tea was a (21%) of respondents mentioned that supplementary source of income for them. When questioned about the exposure to extension programs, majority 52% have attended to 1 – 2 training programs per year, while a considerable (36%) number of respondents have attended 3 – 4 training programs. It was observed that 11% has not exposed to extension training activities.

Table 2. Demographic and socio-economic characteristics of respondents

Characteristic	Frequency (n=108)	Percentage
Age (years)		
< 40	32	30
40 – 50	29	27
51 – 60	35	32
> 60	12	11
Gender		
Male	58	54
Female	50	46
Education		
GCE (O/L) or below	93	86
GCE (A/L) or above	15	14
Type of Involvement in tea cultivation		
Full time	55	51
Part time	53	49
Farming Experience		
> 15 years	48	44
10 – 15 years	30	28
5 – 9 years	16	15
< 5 years	14	13
Land Extent		
> 1.5 ha	1	1
1.1 – 1.5 ha	2	3
0.6 – 1.0 ha	55	50
< 0.5 ha	50	46
Participation in Extension Programs/year		
None	12	11
1 – 2	56	52
3 – 4	39	36
> 4	01	01
Yield (kg/ha/month)		
< 500	25	23
500 – 1000	60	56
1000 – 1500	18	16
> 1500	5	05

Level of knowledge on recommended agricultural practices

Irrespective of other factors, it was noticed that 34% of tea smallholders having a satisfactory knowledge on recommended agricultural practices (*i.e.* above 65 marks). Another 30% was found in between 50 – 64 marks which could be considered moderate. It was further revealed that the knowledge level of 36% was not satisfactory (*i.e*. below 50 marks). Table 3 and Figure 1 illustrate different knowledge levels of smallholders.

Table 3. Knowledge level of smallholders

Marks	Knowledge Level	Percentage (%)
< 50	Poor	36
50 – 64	Moderate	30
64 – 100	Good	34

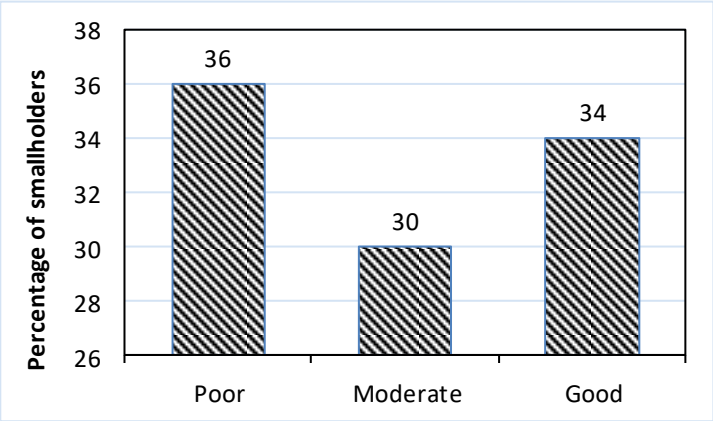

Figure. 1. Smallholders' level of knowledge on recommended agricultural practices

This information clearly indicates that a majority of smallholders (*i.e.* 36%) have relatively poor knowledge on recommended agricultural practices. Simultaneously, the knowledge of 34% of respondents was noticed to be satisfactory while 30% was being moderate.

Level of attitudes towards recommended agricultural practices

Attitude levels of respondents

The respondents were separated into three (03) attitude levels *viz*. most favorable, favorable and least favorable attitudes based on their total score by using the mean and confident interval as the measures of check (Saravanan and Gowda, 1999). Table 4 and Figure 2 explain the level of attitudes of respondents on recommended agricultural measures. Nearly 37% of the farmers have most favorable attitudes and another 19.5% were with favorable attitudes. The rest 43.5% showed least favorable attitudes in this regard.

Table 4. Attitude levels of respondents

Category	Attitude score	Respondents (N)	Percentage (%)
Most favorable	> 37.1	40	37.0
Favorable	35.34 – 37.1	21	19.5
Least favorable	< 35.34	47	43.5

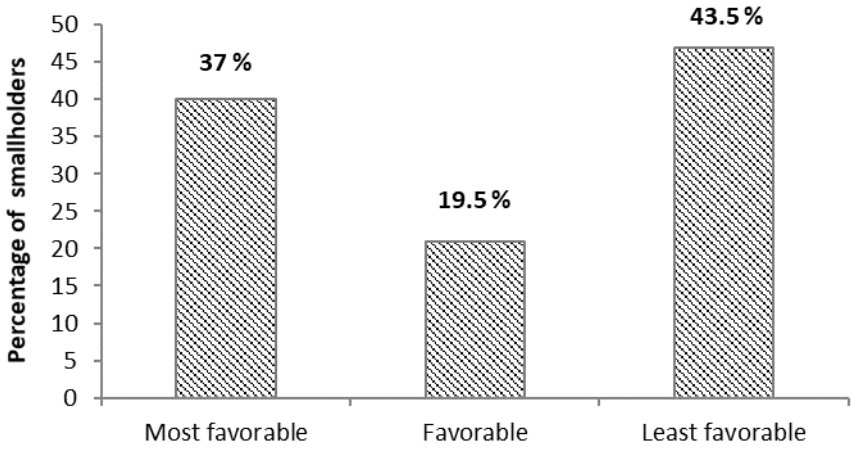

Figure. 2. Attitude Levels of smallholders

In general, responses for these statements clearly indicate that smallholders are seriously concerned about labor scarcity and the insufficient involvement of government authorities in solving tea related problems. Further, a majority of respondents have pointed out that they expect the recommended measures on tea be quick result oriented. Nearly 50% have perceived that mechanization is not suitable for tea smallholdings in long run. Moreover, nearly 40% were found having panic about the economic viability of tea in the future.

Simultaneously, statement-wise attitudes of tea smallholders regarding the adoption of recommended measures in tea is briefed in Table 5. In general, responses for these statements clearly indicate that smallholders are seriously concerned about labor scarcity and the insufficient involvement of government authorities in solving tea related problems. Further, a majority of respondents have pointed out that they expect the recommended measures on tea be quick result oriented. Nearly 50% have perceived that mechanization is not suitable for tea smallholdings in long run. Moreover, nearly 40% were found having panic about the economic viability of tea in the future. Simultaneously, a majority was in positive view regarding the implementation of recommended measures on productivity improvement of tea such as soil fertility enhance, weeding and correct plucking (Table 5).

Table 5. Statement-wise attitudes of respondents

Statement No	Statement	Response (N)					
		Agree		Neutral		Disagree	
		N	%	N	%	N	%
1	Cost of cultivation is bearable	51	47.2	1	0.9	56	51.9
2	Skilled pruners are rarely available	107	99.1	0	0	01	0.9
3	Mechanization is not suitable for smallholders	53	49.1	33	30.6	22	20.4
4	Economic value of tea is gradually diminishing	42	38.9	60	55.6	06	05.6
5	Recommendations should aim at quick results	55	50.9	08	7.4	45	41.7
6	COP can be compensated by monthly income	69	63.9	29	26.9	10	9.3
7	Only way to increase yield is fertilizer application	52	48.1	03	2.8	53	49.1
8	Weed management without weedicide is possible	70	64.8	17	15.7	21	19.4
9	Plucking round of 7 days need to be changed	40	37.0	01	0.9	67	62.0
10	Productivity goes down 15 - 20 Y.A.P.	51	47.2	52	48.1	05	04.6
11	Authorities are not concerned about tea related issues	98	90.7	05	4.6	05	04.6
12	Tea information given by private companies are reliable	61	56.5	07	6.5	40	37.0

Correlation between attitudes and knowledge level

Attitude score of farmers was tested with their knowledge levels using Spearman Rank Correlation method. According to the statistical results, it was revealed that respondents' attitudes is positively correlated with their knowledge level ($r = -0.3$, $P = 0.002$). Consequently, more positive attitudes (most favorable attitudes) is positively correlated with higher knowledge on recommended agricultural practices.

Factors affecting the knowledge and attitudes of tea smallholders

Five variables namely farmer age, farming experience, gender, level of involvement in farming (*i.e.* whether full time or part time) and number of extension programs per year were assumed to be affecting the knowledge and attitudes of the tea smallholders. Effect of these variables on knowledge and attitudes was separately evaluated by using two non-parametric statistical methods called Spearman Rank Correlation and Wilcoxon Rank Sum method (Table 6 and 7).

Out of the five variables, two were significantly associated with farmer knowledge on recommended agricultural practices (Table 6). Gender difference of farmers and number of extension programs per year were found significantly affecting on knowledge level. Farmer age, level of involvement and the farmer experience did not significantly effect on farmer knowledge.

According to the Table 7, two factors were found associated with farmer attitudes. Accordingly, farmer experience and number of extension programs per year were significantly affected on farmer attitudes. Gender difference of farmers was not statistically proven to be affecting on attitude (P = 0.179).

Table 6. Factors affecting farmer knowledge

Factor	**Statistical method**	**P - Value**
Farmer age	Spearman Rank Correlation	0.115
Gender	Wilcoxon Rank Sum	0.000*
Involvement	Wilcoxon Rank Sum	0.16
Experience	Spearman Rank Correlation	0.136
Extension programs/year	Spearman Rank Correlation	0.003*

*significant at 0.05 level

Table 7. Factors affecting farmer attitude

Factor	Statistical method	P - Value
Farmer age	Spearman Rank Correlation	0.667
Gender	Wilcoxon Rank Sum	0.179
Involvement	Wilcoxon Rank Sum	0.22
Experience	Spearman Rank Correlation	0.01*
Extension programs/year	Spearman Rank Correlation	0.001*

*significant at 0.05 level

CONCLUSIONS

It can be concluded that slightly a majority of tea smallholders are having a poor knowledge level on recommended agricultural measures of tea. Overall attitudes of tea smallholders on the adoption of recommended agricultural measures show a negative trend. In general, the majority of smallholders are having negative attitudes over the support rendered by the government institutes for the tea industry and showed a positive trend towards the extension services of private companies. Further, a half of the smallholders had no clear view on the actual economic life span of tea and the economic status for tea at the global level, while the rest were being basically negative in this regard. Simultaneously, smallholders were positive over the good agricultural practices on weed management, soil fertility improvement and plucking. Moreover, smallholders expect quick returns from the recommended practices in terms of increase in crop yield than what they gain at present.

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