Determinants of income diversification of flue cured tobacco barn owners in Sri Lanka

GGMDT Jayamanna, RAPIS Dharmadasa, NNR Abeysekara and EMJB Ekanayake

Abstract

Except tobacco farming, tobacco barn owners move to different income sources such as other crop cultivation and non-Agricultural activities due to clear differences in the living status. Therefore, this study aims to analyze the determinants of flue cured barn owner′s income diversification and share of income sources to total household income at Galewela, Polonnaruwa and Mahiyanganaya in Sri Lanka. The study drew a sample of 302 flue cured barn owners through random sampling technique from the three different regions and the data obtained were analyzed using descriptive statistics, Herfindhal diversification index and Censored Tobit regression. The results indicate that the level of income diversification among the flue cured tobacco barn owners in Sri Lanka depicted by the inverse of Herfindhal index is 3.02. According to Herfindhal index, the highest income diversification is observed in Mahiyangana area while the lowest income diversification is observed in Galewela area. The age of the barn owner, experience in tobacco cultivation, land ownership of the barn owner, total land availability (leased and tenure), capital goods ownership (tractors), tobacco specific resource endowment (number of barns), and distance to the nearest town were the major determinants of income shares from different sources of activities.

Key words: *Income diversification, Herfindhal Diversification index, Censored Tobit Regression, Tobaco fa*

Introduction

Tobacco (*Nicotiana tabacum*) is the most broadly produced non-food crop in the world and it is cultivated in more than 120 countries, as it can be grown under a wide range of climatic and soil conditions. Historical evidence shows that during the British rule 1823-1948, tobacco was an important commercial crop and was grown mainly in the northern part of Sri Lanka. Today, thousands of rural farmers grow tobacco in their lands by replacing their traditional food crops. Tobacco is cultivated in different areas of Sri Lanka. Tobacco cultivated areas can be categorized in to two areas as Yala area and Maha area. Galewela and Polonnaruwa come under Yala area and Ududhumbara, Haliela,

Mahiyanganaya, Theldeniya and Buththala come under Maha area. Tobacco is well known as a profitable cash crop in different areas of Sri Lanka. It can be categorized into different types based on its usage. They are chewing, cigar, pipe, beedi & cigarette tobacco. Cigarette tobacco can be further divided into flue cured Virginia (FCV) & air cured (AC) due to the differences observed in the curing or seasoning process. Curing is considered as one of the important steps in leaf primary processing. Curing of tobacco is done in barns. Heat generated in a furnace is transmitted to the barn through a flue (duct) system to facilitate curing process in FCV production while it is allowed to happen automatically under ambient temperature in AC tobacco production under the shade. FCV curing process has five distinguishable stages in temperature, namely, heating, yellowing, Color fixing, laminar drying, Stem drying. The tobacco production consists of three main activities: leaf growing and initial processing (cultivation); manufacturing; and distribution and retailing. In turn, these three activities consist of many support elements and together form a chain of linked activities. The nucleus of the industry is manufacturing. This transforms leaf and other inputs into manufactured tobacco products. The leaf suppliers to the manufacturers, the tobacco farmers, form the backward linkage of the tobacco supply chain. Other inputs include paper and packaging, chemicals and other additives. Services to get the final product to the consumer, such as distribution and retailing, form the forward linkages. Tobacco taxes are a source of revenue to almost every government in the world. In Sri Lanka, corporate taxes and exercise represent 10 percent of the government revenue (CTC Annual report, 2011). Except tobacco farming, tobacco barn owners move to different income sources such as other crop cultivation and non-Agricultural activities due to clear differences in the living status of the barn owners and tobacco farming deals with different uncertain factors such as weather and market conditions. These conditions will result varying returns (Tobacco income). Other than that barn owners have different living conditions. The most significant issue in tobacco production is the time period which takes to produce the return of investment to barn, owners. In flue cured tobacco production barn owners have to wait six to seven months for the return of investment due to different types of management practices. However, we are not sure about the income diversification of tobacco barn owners and factors influencing the decision of income diversification of the barn owners. Therefore, this study is to analyze the determinants of the income diversification of tobacco barn owners in Galewela, Polonnaruwa and Dehiaththakandiya areas.

Definition of terms

Tobacco income – Income generated from the tobacco cultivation.

Other agricultural income – Income generated from cultivations which are on the tobacco land or separate land. E.g. paddy, Vegetables, Cash crops (onion, chillies, etc), Major exports (Tea, Rubber, Coconut), Minor exports (pepper) and Orchards.

Non-Agricultural income – Income generated from the activities which are not related to agriculture. e.g. Local employment (Own), Foreign employment (Own), Local employment (Family Members), Foreign employment (Family members), Family business, Vehicle rent out, Land rent out, Building rent out, Deposit interests and Agriculture machinery hiring.

Continuous function tobacco barn owners – Barn owners who cultivate tobacco and produce cured tobacco leaves to company every year.

Random function tobacco barn owners - Barn owners who cultivate tobacco and produce cured tobacco leaves to company in a random manner. They are not involved in tobacco cultivation every year.

Exit tobacco barn owners - Barn owners who have left or exited from the tobacco cultivation due to different reasons.

Literature Review

The concept of income and income diversification is comprehensive. Malek *et al* (2009) define Household income as the sum of net incomes resulted from the engagements of household workers in local and non-local non-farm share and other incomes. Farm income is defined as all net incomes from primary production of household farm enterprises. Non-farm self-employment income is defined as all net incomes from the house hold nonfarm enterprises. “Don’t put all your eggs in one basket” is a common phrase for investing. Nevertheless it also applies to income. Diversifying the income streams is a great way to position against the unknowns: job loss, downturn in the market, business failure, etc. Many researchers realized that income diversification is a comprehensive theme. Therefore empirical literature did not explain it in any single definition. Different empirical studies generate different definitions for income diversification. Throughout the vast definitions, Ellis (2000) and Minot *et al* (2006) define income diversification as a process in which households increase not just the number of sources but also achieve a greater balance in terms of the relative share of the various income sources in their portfolio.

According to the large set of literature most of the determinants were broadly classified into two fundamental causes of household income diversification. One takes household income diversification to be a consequence of "push factors" while the other views the latter as driven by "pull factors". Among the push factors, household income diversification could be due to "risk reduction, response to diminishing factor returns in any given use, such as family labour supply in the presence of land constraints driven by population pressure and fragmented landholdings, reaction to crisis and liquidity constraints, high transactions costs that induce households to self-provision in several goods and services" (Barrett *et al*., 2001). Pull factors could include the "realization of strategic complementarities between activities such as crop livestock integration" or "local engines of growth such as commercial agriculture or proximity to an urban area create opportunities for income diversification in productivity and expenditure linkage activities" (Barrett *et al*., 2001).

Income Diversification motives

Risk refers as the most important diversification motive. Literature shows that there is a link between risk and income diversification. If household gain income from any single activity rather than different activities, household has to face a trade-off between a lower total income and a higher level of security since some activities may fail to benefit from increasing marginal returns to scale (Ellis, 2000, Barrett and Reardon, 2001). Therefore if a household confronts considerable risk or uncertainty in income, it may make a plan to reallocate productive resource across several uncorrelated risk activities (Dercon and Krishnan 1996, Start, 2001). In addition to risk, literature describes poverty of households as an important diversification motive. Poor households have identified a highly profitable primary activity. Nevertheless they may not be able to expand due to insufficient investment recourses. There are some constraints such as labour endowment, production wage, geographical and other market access constraints. Due to those constraints, households may allocate its underutilized resource to other income earning opportunities (Dunn, 1997, Lanjouw, and Feder, 2001). Finally, literature shows economic expansion of households may motivate the income diversification. In this motivation households may top up its existing income generating activity or new one by using wealth generated from its existing income source and there underutilized resources or excess resources. Expansion may reflect household's response to new economic opportunities (Davies and Bezemer, 2003) or simply a desire to increase income.

Determinants for diversification

According to large set of literature, they show a wide variety of determinants for diversification. A number of studies have found demographic factors such as age, number of household members, education, experience, net worth, and presence of small children as well as farm characteristics such as farm size, seasonality of farm labor requirements, and proximity to urban areas as relevant to both on farm crop or commodity mix and off-farm labor supply decisions (Goodwin and Mishra, 2004). There is empirical evidence in current literature that the area of land has a positive effect on diversification (Benin *et al*., 2004; Ureta *et al*., 2006). The larger the area of land, the more motivated a farmer will be to devote part of it to introduce diversification. The age of the farmer may affect diversification decisions. Empirical research found that the number of crops increase with the age of farmers, suggesting that they try new crops as they earn experience along their lives (Minot *et al*., 2006). Education level has a strong and positive influence on the number of grown crops, stressing the importance of education and ability to understand information coming from extension services or other sources (Minot *et al*., 2006). Ureta (2006) found a positive effect of the average level of education for household members on diversification. Labour factors can reflect the social structure and composition of farms and they could be determinants for taking decisions regarding diversification (Birthal *et al*., 2006; Manos *et al*., 2009).

Methodology

Data

Field survey method was used to collect the required information for the study. Primary data comprises of empirical information drawn through a detailed questionnaire. The questionnaire is administered to the FC barn owners in Galewela, Polonnaruwa and Mahiyangana areas. Secondary information for the research is gathered from the BATLeaf system (British American Tobacco). Before conducting the survey, a primary study was conducted to gather the ideas of relevant parties in FC tobacco industry covering tobacco farmers and company officers. It supports to look at the problem in the different perspectives and to have sound knowledge about the field situation. Semi structured questionnaire was used together to obtain the necessary information for the study. Questionnaire was constructed by referring to the relevant literatures. The semi structured questionnaire consist with basic information

- Background information
- General information of the barn owners
- General information of the business
- Information of the income diversification and income sources
- Evaluation of Perceived preference
- Additional information

Sample

Galewela, Polonnaruwa and Mahiyanganaya are the areas where the research was planned to be implemented. Sample for the research was selected from the above mentioned depots by using stratified random sampling method. Researcher had selected depot as strata. Because each strata is shows the unique features regarding social, economic and industrial perspectives. 302 FC

barn owners have been selected proportionately from the Galewela, Mahiyanganaya and Polonnaruwa depots. According to the primary analysis three type of flue cured barn owners were identified and three types were classified as continuous function (CF), Random function (RF) and exit (EX) FC barn owners. Whole three types of FC barn owners were included in to the 302 of sample.

Primary analysis of data

Descriptive statistics was used to identify the differences in socio economic characteristics between the flue cured tobacco cultivation areas.

According to Dimova and Sen (2010) Herfindhal diversification index was used to analyze the differences in income diversification across the socio economic factors. The HDI is based on the Herfindhal index, which originated in the industrial literature where it is used to measure the degree of industry concentration. It can be used to measure the degree of concentration of income from various sources of the individual household level. It is then calculated as the sum of squares of income shares from each income source (Ersado, 2006). The income diversification index used in the study was defined as the inverse of the Herfindahl index as follows;

$$HDI = \frac{1}{\sum_{j=1}^{n} S_j^2}$$

Where HDI is the Herfindhal diversity index and Sj is the share of the total income derived from source j. Thus, households with most diversified income sources have the largest HDI and vice versa (Barrett and Reardon, 2000)

Secondary analysis of data

To find the determinants of income diversification, the following model was used. It developed according to two empirical studies by Malek and Usami, (2009) and Beach *et al* (2008).

Y_{TON} = f (BOC, RE, TSRE, ECON)

Where,
Y_{TON} = Share of income (tobacco income, other agriculture income, nonagricultural income)
BOC = Barn owner characteristics
RE = Barn owner resource endowment
TSRE = Tobacco specific resource endowment
ECON = Economical factors for barn owners

All the relevant data were collected according to the above dimensions and below table describe the explanatory variables.

Table 1: Dependent variables description

Type	Category	Explanatory variable	Description	Data type
Dependent variables	**SHARE OF INCOME**	TOBAC_Y	Annual income share from tobacco for barn owner	Rupees (primary)
		OAGRI_Y	Annual income share from other agricultural activities to the barn owner	Rupees (primary)
		NAGRI_Y	Annual income share from non-agricultural activities to the barn owner	Rupees (primary)
		LIVES_Y	Annual income share from livestock activities to the barn owner	Rupees (primary)

Source: Field survey, 2012

Table 2: Independent variables description

Category	Explanatory variable	Description	Data type
BOC	BOAGE	Age of the barn owner	Year (primary)
	BOAGE_2	Age squared of the barn owner	Year (primary)
	EDUCA	Education level of the barn owner	Years of schooling (primary)

RE	EDUCA_2	Education level squared of the barn owner	No of schooling (primary)
	EXPER	Experience of the barn owner	No of years (primary)
	DEPEN	Number of dependents from barn owner	Number (primary)
	CHILD	Number of children	Number (primary)
	SCHIL	Number of schooling children	Number (primary)
	OWLAN	Land ownership to the barn owner	Hectares (primary)
	TOLAN	Total land ownership	Hectares (primary)
	TRACT	Tractors ownership	Dummy (primary)
TSRE	BARN	Number of barns owned	Number of barns (primary)
ECON	DISTEN	Distance to the nearest town	Kilometers (primary)
	AEXPEN	House hold annual expenditure	Rupee (primary)

Source: Field survey, 2012

The implicit relationship of the variables were represented and specified as follows. In this study three dependent variables (TOBAC_Y, OAGRI_Y, NAGRI_Y, LIVES_Y) were analyzed using same explanatory variables.

Share of income $_{TON}$ = f (BOAGE, BOAGE_2, EDUCA, EDUCA_2, EXPER, DEPEN, CHILD, SCHIL, OWLAN, TOLAN, TRACT, BARN, DISTEN, AEXPEN)

Share of income $_{T}$ = TOBAC_Y
Share of income $_{O}$ = OAGRI_Y
Share of income $_{N}$ = NAGRI_Y
Share of income $_{L}$ = LIVES_Y

An extension of the probit model is the tobit model originally developed by James Tobin (1958), the Nobel laureate economist. A sample in which information on the regression is available only for some observations is known as a censored sample. Therefore, the tobit model is also known as a censored regression model.

Statistically, we can express the tobit model as

$$Y_i = \beta_0 + \beta_1 X_i + u_i \qquad if\ RHS > 0,\ 0 = otherwise$$

Where, RHS = right-hand side. Note: Additional X variables can be easily added to the model.

In this study, FC barn owners have zero income shares from some components due to not participating, since these variables have some censored data. Therefore, censored Tobit regression was used as estimation method for this study.

Results and Discussion

Primary analysis

This sub-section in analyses preliminary results of survey of 302 flue cured tobacco barn owners. Figure 1 shows the functionality status of the FCTB owners in study area. According to the studied sample, 45 percent, 38 percent and 26 percent barn owners have been continuously function in Galewela, Polonnaruwa and Mahiyangana areas.

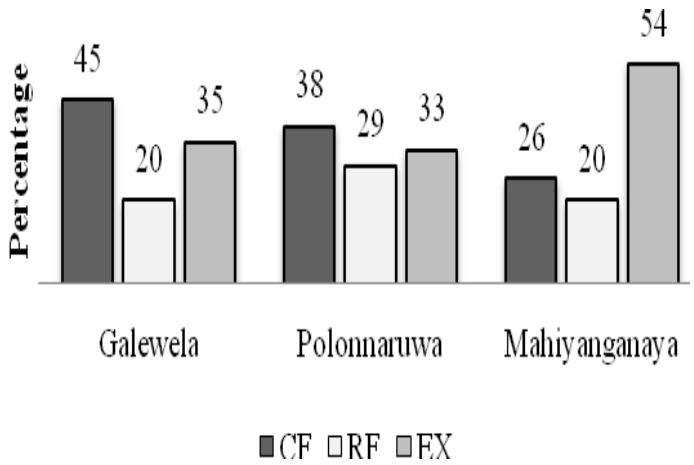

Figure 1 : Fun CF- Continuous function, RF – Random function, EX- Exit

Source: Field survey, 2012

The other barn owners are either random functioned or have exited from tobacco cultivation as presented in the above figure. Total surveyed sample represents, 34 percent of barn owners have continuously been functioning with tobacco cultivation and 22 percent of barn owners have randomly been functioning with tobacco cultivation. Out of the total sample, 44 percent of barn owners have exited.

Table 3: Participation percentage, mean income share by different income generating activities of flue cured tobacco barn owners in Galewela, Polonnaruwa and Mahiyanganaya

	Galewela		Polonnaruwa		Mahiyanganaya	
Activity	Participation (%)	Mean income share (%)	Participation (%)	Mean income share (%)	Participation (%)	Mean income share (%)
Tobacco	63	51	67	50	46	29
Other Agriculture	93	26	94	28	98	42
Non Agriculture	79	21	84	22	82	29
Livestock	6	2	0	0	0	0
TOTAL	-	100	-	100	-	100

Source: Field survey, 2012

According to the table 3, the highest participation, 98 percent to other agricultural activities is found from Mahiyangana area and the highest participation, 84 percent to non-agricultural activities is found from Polonnaruwa area. According to the table 3; 6 percent barn owners have adopted the livestock as one component for their total annual income. According to the above table 3, Mahiyangana and Polonnaruwa barn owners are highly depending on tobacco income share while dependent on other income shares. At the same time, Mahiyangana barn owners highly depend on other agricultural income.

Figure 2 shows the participation percentages of the survey of 302 flue cured tobacco barn owners with different activities respect to four main income generating sources. Figure 2 shows the different income components related to the four main income sources of tobacco barn owners in Sri Lanka. 93 percent of barn owners participate with the paddy cultivation. Due to the seasonality nature of tobacco crop most of the barn owners cultivated paddy in the next season. In any condition, barn owners cultivate paddy to provide the rice requirement for household consumption. According to the barn owner 's views, they cultivate paddy, whether it earns profit or loss. As depicted in Figure 2 major exports is the second most (39 percent) participation other agricultural activities by tobacco barn owners in Sri Lanka. 32 percent of barn owners have employment income as non-agricultural activity for their annual income. Second most income generation activity is family member employment to the

tobacco barn owners. Respectively, foreign employment (own), Land rent out, deposit interest and livestock have lower contribution to the barn owner's annual income.

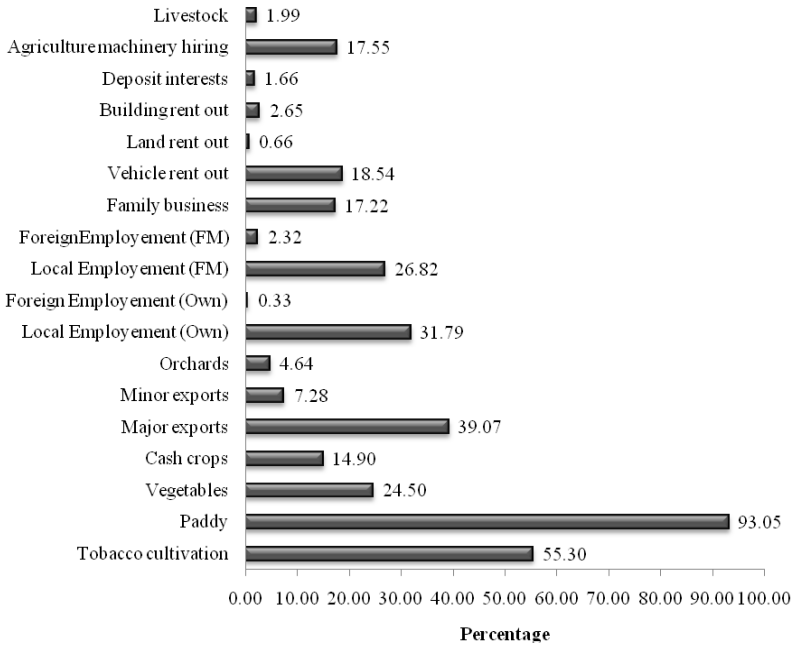

Figure 2: Income generating activities and participation percentage

Source: Field survey, 2012 (FM – family member, Own – barn owner)

In this section, influences of socio-economic factors to the income diversification of FCTB owners are described with the HDI. According to Barrett and Reardon (2000), households with the most diversified income sources have the largest HDI and vice versa.

Figure 3 shows the different Herfindhal indices across the functionality nature of tobacco barn owners. Barn owners in Galewela and Mahiyangana show the different Herfindhal indices across the functionality. However, barn owners in Polonnaruwa region do not show significant difference in HDI across the functionality status. Continuous function barn owners show low HDI across the Galewela and Polonnaruwa.

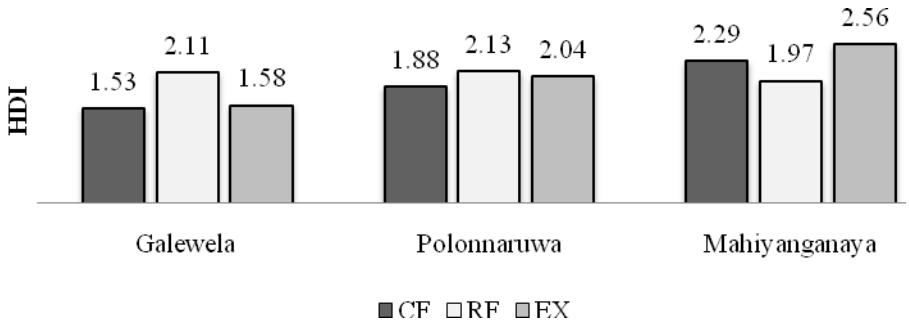

Figure 3: Income diversification by functionality nature

Source: Field survey, 2012

It is concluded that Continuous function barn owners are highly dependent on tobacco cultivation than diversifying in to alternative income sources. According to the above figure, Random function barn owners are highly engaged with income diversification than the continuous function barn owners. These findings show that functionality nature affects to the income diversification of tobacco barn owners.

Figure 4 highlights the differences in Herfindahl diversification indices across the 3 different regions surveyed. As depicted in Figure 4, the high income diversification is observed in Mahiyangana region and the lowest income diversification is observed in Galewela region. It can be concluded as; barn owners in Galewela practice tobacco cultivation as their livelihood and barn owners in Mahiyangana practice tobacco cultivation as an additional income source. Middle level income diversification is practiced by barn owners in Polonnaruwa region.

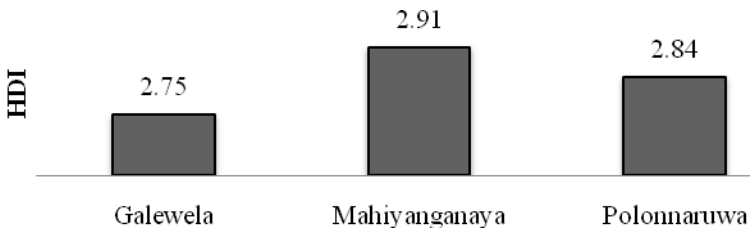

Figure 4: Income diversification by region

Source**:** Field survey, 2012

Secondary analysis method (Censored Tobit regression)

Multiple variant analysis has been done to evaluate the determinants of income diversification of FCTB owners. Fourteen factors have been taken to consideration in censored tobit regression. Independent variables have included demographic factors, industrial factors and the sociological factors and these variables were measured by using different scales. Different income shares (TOBAC_Y, OAGRI_Y, NAGRI_Y) were taken as dependent variables. Livestock income share have not been taken as the dependent variable due to lowest participation. Following Table 4 describes about the descriptive statistics of all the variables.

Table 4: Descriptive statistics for variables used in estimation

Variable	Obs	Mean	Std. Dev.	Min	Max
TOBAC_Y	302	39.26659	38.05154	0	100
OAGRI_Y	302	33.81629	29.96434	0	100
NAGRI_Y	302	25.43166	28.57369	0	100
BOAGE	302	51.49669	12.57951	24	94
BOAGE_2	302	2809.629	1365.413	576	8836
EDUCA	302	8.466887	3.317711	1	15
EDUCA_2	302	82.65894	51.73122	1	225
EXPER	302	14.49338	9.299999	1	49
DEPEN	302	3.801325	1.60365	0	9
CHILD	302	2.639073	1.509283	0	12
SCHIL	302	.8377483	.9799479	0	4
OWLAN	302	.8290397	.8920621	0	8
TOLAN	302	2.851391	3.276707	0	18
TRACT	302	.4834437	.5005552	0	1
BARN	302	1.092715	.7763189	0	5
DISTEN	302	5.957947	4.821767	.1	25
AEXPEN	302	198894	139550.2	12000	1200000

Source: Field survey, 2012

Table 4 summarizes the data used for this analysis. In this analysis 302 observations were used. Barn owner's age is averaged just over 50 years and experienced over 14 years. Most barn owner's mean years of formal education are 8.4 years. Mean number of dependents are four and their endowment of children is averaged over two. Barn owner's land ownership is averaged just 0.8 hectares and total land ownership is averaged just over 2.5 hectares. Their barn ownership is averaged equal to one. Most of the barn owners in the selected sample are resident in a distance over than five kilometers. According to the

findings, the mean annual expenditure level is resulted below 0.02 million As depicted in above table 4, 39.26 percent of mean income share was indicated by tobacco cultivation; 33.81 percent of mean income share was indicated by other agricultural activities and 25.43 percent of mean income share was indicated by non-agricultural activities. According to the selected sample HDI was 3.02 and it indicated that the selected barn owners are interested in income diversification

Table 5: Determinants of income diversification of FCTB owners in Sri Lanka

(Dependent variables: Income shares: Results from censored tobit regression) (N=302)

Explanatory variables	TOBAC_Y		OAGRI_Y		NAGRI_Y	
	Coef.	t	Coef.	t	Coef.	t
BOAGE	-3.38854**	-2.04	1.952141**	2.36	1.227492	1.30
BOAGE_2	.0153675	0.98	-.0145425*	-1.90	-.0091607	-1.05
EDUCA	-5.595024	-1.09	.4728641	0.18	1.268425	0.43
EDUCA_2	.2134765	0.65	.0159449	0.10	-.047394	-0.26
EXPER	2.787907***	6.58	-.7082672***	-3.29	-.9568204***	-3.85
DEPEN	2.781477	1.13	.3441513	0.29	-.7020631	-0.52
CHILD	-1.703887	-0.60	1.089501	0.81	.4460427	0.29
SCHIL	1.624851	0.45	.535746	0.28	-1.326218	-0.62
OWLAN	-11.20505***	-3.04	5.813331***	3.08	-.1452442	-0.07
TOLAN	.651496	0.52	-1.307663*	-1.93	-.5499046	-0.71
TRACT	18.29856***	2.80	-.116664	-0.03	-9.98493***	-2.60
BARN	26.1519***	4.53	-5.445497*	-1.86	-6.015626*	-1.83
DISTEN	1.748572***	2.66	-.9303119***	-2.66	-.2264143	-0.57
AEXPEN	-.0000207	-0.72	-.0000275*	-1.95	.0000374***	2. 44
CONS	96.22241	2.05	-10.25851	-0.43	1.038498	0.04
Log likelihood	-967.24943		-1380.4236		-1240.2309	
LR chi2(14)	145.17		72.31		50.05	
Prob > chi2	0.0000		0.0000		0.0000	

Left-censored observations	Y<=0	135	Y<=0	13	Y<=0	56
Uncensored observations		167		289		246

Source: Field survey, 2012 [Notes: ***P<0.01(99% confidence level) **P<0.05 (95% confidence level) *P<0.1(90% confidence level)]

The results in table 5 further revealed that barn owner's age, experience in tobacco cultivation, land ownership, tractors ownership, number of barns availability and distance to the nearest urban town were the significant factors affecting tobacco income share in total income of FCTB owners.

Age has the negative significant effect on the share of total income received from the tobacco cultivation. It suggests younger barn owners are more interested in tobacco cultivation and they earned more income share from tobacco to their total income. Experience in tobacco cultivation significantly increased the tobacco income share in the total income while land endowment (OWLAN) to barn owner significantly reduced the share of total income received from tobacco cultivation. Tractor ownership and barn ownership have positive significant effects on the share of total income received from the tobacco cultivation. It suggests general capital goods and tobacco specific goods ownership increased the total share of income received from tobacco. Distance to nearest town has positive significant effect on the share of total income received from the tobacco cultivation. It suggests the barn owners whoes are residence is far away from the town earned more income share from tobacco. High distance to the nearest town reduces the difficulties in finding lands. Experience in tobacco cultivation, land ownership to the barn owner and distance to the nearest town are the significant factors affecting other agricultural income share in total income of FCTB owners. These relationships are significant in 99 percent confidence level. Age is significant in 95 percent confident level. Total land availability, number of barns owned, and annual household expenditure are the significant factors affecting other agricultural income share in total income of FCTB owners. These relationships are significant in 90 percent confidence level.

Experience in tobacco cultivation has negative significant effects on the share of total income received from the other agricultural activities. It suggests the less experienced barn owners are interested in other cultivations and income diversification. Land ownership to the barn owners has positive significant effect on the share of total income received from the other agricultural activities. There is empirical evidence in current literature that the area of land

has a positive effect on diversification (Benin *et al*., 2004; Ureta *et al*., 2006). Accordingly, the land ownership prompts the income diversification decision. Distance to the nearest urban town has a negative significant effect on the share of total income received from the other agricultural activities. It suggests the barn owners whose residence is near to the town are interested in increasing their total income share by other agricultural activities. Age has a positive significant effect on the share of total income received from the other agricultural activities. Literature shows the age of the farmer may affect diversification decisions. Empirical research found that the number of crops increase with the age of farmers, suggesting that they try new crops as they earn experience along their lives (Minot *et al*., 2006). Barn endowment has negative significant effect on the share of total income received from the other agricultural activities. It suggests that the number of barns availability significantly affects the other agricultural activities by the reason of time management. Results in table 5 further revealed that experience in tobacco cultivation, tractor endowment and annual household expenditure were the significant factors affecting non-agricultural income share in the total income of FCTB owners. These relationships were significant in 99 percent confidence level. Number of barns availability was significant at 90 percent confident level.

Experience in tobacco cultivation has negative significant effect on the share of total income received from the non-agricultural activities. It suggests that low experienced barn owners increase their total income share by non-agricultural activities. It shows they are interested in income diversification strategy. Tractor availability has a negative significant effect on the share of total income received from the non-agricultural activities. Literature shows tractor availability increase diversification. It is true to agricultural activities therefore in that case tractor unavailability increased the barn owner's nonagricultural income share.

Annual expenditure has positive significant effect on the share of total income received from the non-agricultural activities. Number of barns availability has negative significant effect on the share of total income received from the non-agricultural activities. Generally, literature shows the availability of specific capital goods like tobacco curing barns, backpacks, grain machinery, and pasture machinery will prevent farmers from shifting to diversification. Opposite conclusion of this literature was shown by the negative relationship between number of barns availability and non-agricultural income share (Cornejo *et al*., 1992).

Conclusions

This study focused on analyzing the determinants of flue curd tobacco barn owner's income diversification and the share of income sources to total household income regards to Galewela, Polonnaruwa and Mahiyanganaya in Sri Lanka. The study showed that barn owners in Sri Lanka had its member involved generally in three income generating activities with two agricultural activities and one non-agricultural activity. Despite the involvement in tobacco cultivation by FCTB owners, almost 96 percent and 95 percent of them have involved in the other agricultural activities and non-agricultural activities respectively. However, tobacco cultivation contributes to the largest mean income share for FCTB owners. Most of the barn owners (93 percent) practice paddy in the manner of other agricultural activities and 32 percent of barn owners are self-employed as non-agricultural activities.

According to Herfindhal diversification indices, most of the operative income diversification was carried out by Random function barn owners and dormant income diversification was carried out by continuous function barn owners. Findings show that the highest income diversification was observed in Mahiyanganaya region and lowest income diversification was observed in Galewla region. Generally, the age of the barn owner, experience in tobacco cultivation, land ownership to the barn owner, total land availability (leased and tenure), capital goods ownership (tractors), tobacco specific resource endowment (number of barns), and distance to the nearest town were the major determinants of income shares from different sources of activities. Increased in size of land holding, number of tractors (capital goods) and average annual expenditure significantly increased the income diversification of the barn owners, while reduction in experience in tobacco cultivation, number of barn availability (tobacco specific resources) and distance to the nearest urban town significantly increase the income diversification.

According to the findings, barn owners' age is a significant factor which motivates the income diversification. When barn owners become mature, they move to different income generative sources with their experience. According to results barn owners' education level is not a significant factor for income diversification. Nevertheless, low educated barn owners earn more income from tobacco while high educated barn owners move to different income sources. It suggests more educated barn owners think differently and they invest their assets to new income generative activities. Generally, increasing of number of dependents, number of children and number of schooling children motivate the barn owners to move to different income generating activities. Nevertheless, those are not significant factors in this model. According to analysis, barn owners do tobacco cultivation on leased and tenured lands. They preferred to

cultivate other cultivations on their own lands. Resource endowment is a significant factor to income diversification. Tobacco specific resources increase the income share from tobacco cultivation. Capital goods ownership (tractors) increases the other income generative activities income share.

Recommendations

Younger barn owners earn more income from tobacco while older barn owners' moves to income diversification. Therefore, CTC should use strategic plans to recruit new younger barn owners. Lowest income diversification is shown by continuous function barn owners. Therefore, company should develop a strategic plan to keep continuous functionality of FCTB owners. Company should introduce additional income generative crop (intercropping) with tobacco cultivation as it reduces the risk and improve income. And also it can achieve the scope of economies and maximize the profit to barn owners.

References

Barrett, C. B. and Reardon, T., 2000. Asset, Activity, and Income Diversification among African Agriculturists: Some practical issues. Project report to the USAID BASIS CRSP.

Barrett, C.B. and Reardon, T., 2001. Asset, Activity, and Income Diversification Among African Agriculturalists: Some Practical Issues. Journal of Food Policy. 26(4): 315-331.

Barrett, C.B., Reardon, T. and Webb, P., 2001. Nonfarm income diversification and household livelihood strategies in rural Africa: concepts, dynamics and policy implications. Food Policy, 26: 315-331

Beach, R.H., Jones, A.S. and Tooze, J.A. 2008. Tobacco Farmer Interest and Success in Income Diversification. Journal of Agricultural and Applied Economics 40: 53–71

Benin, S., Smale, M., Pender, J., Gebremedhin, B., and Ehui, S., 2004. The economic determinants of cereal crop diversity on farms in the Ethiopian highlands. Journals of Agricultural Economics. 31: 197-208.

Birthal, P.S., Jha, A.K., Joshi, P.K., and Singh D.K., 2006. Agricultural diversification in North eastern region of India: Implications for growth and equity. Indian Journal of Agricultural Economics. 61 (3): 328-340.

Cornejo, J., Hendricks, C. and Mishra, A., 2005. Technology Adoption and Off-Farm Household Income: The Case of Herbicide Tolerant Soybeans. Journal of Agricultural and Applied Economics. 37: 549–63.

Davis, J.R. and Bezemer, D., 2003. Key Emerging and Conceptual Issues in the Development of the RNFE in Developing Countries and Transition Economies. NRI Report to Department for International Development and World Bank no. 2753.

Dearcon, S. and Krishnan, T., 1996. Income Portfolio in rural Ethiopia and Tanzania: choices and constraints. The journal of development studies. 32(6): 850-875.

Dimova, R. and Sen, K. 2010. Is household income diversification a means of survival or a means of accumulation? Panel data evidence from Tanzania. Brooks World Poverty Institute. University of Manchester.

Dunn, 1997. Diversification in the Household Economic Portfolio. Washington, D.C.: Office of Micro enterprise Development. USAID.

Ellis, F., 2000. Rural Livelihoods and Diversity in Developing Countries. New York: Oxford University Press.

Ersado, L., 2006. Income Diversification in Zimbabwe: Welfare Implications from Urban and Rural Areas. World Bank Policy Research Working Paper No.3964.

Goodwin, B.K., and Mishra, A.K., 2004. Farming Efficiency and the Determinants of Multiple Job Holding by Farm Operators. American Journal of Agricultural Economics. 86 :722-29.

Lanjouw, P. and Feder, G., 2001. Rural Non-farm Activities and Rural Development: From Experience Towards Strategy. The World Bank Rural Development Strategy Background Paper no. 4.

Malek, M.A. and Usami, K. 2009. Determinants of Non-farm Income Diversification in Developed Villages of Bangladesh. American Journal of Economics and Business Administration 1: 141-149

Manos, B., Bournaris, T., Papathanasiou, J. and Chatzinikolaou, P, 2009. Evaluation of tobacco cultivation alternatives under the EU common agricultural policy. Journal of Policy Modeling Articles. 31: 225-238.

Minot, N., Epprecht, M., Anh, T.T.T. and Trungl, Q.T., 2006. Income diversification and poverty in the Northern Uplands of Vietnam. Washington, D.C. International Food Policy Research Institute. Research Report. 145-149.

Start, D., 2001. Transformation, Well-being and the State: Rural Livelihood Diversification in South Asia. ODI Working.

Ureta, B.E., Solís, D., Cocchi, H. and Quiroga R.E., 2006. The impact of soil conservation and output diversification on farm income in Central American hillside farming. Journal of Agricultural Economics. 35: 267-276.