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Drivers to Utilize Farm Credits: Lessons From Tea Farmers of the Nyaruguru District in Southern Province, Rwanda

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Abstract

This paper examines the factors of credit utilization for tea enterprise production and the conditions to inform stakeholders and policymakers in the Rwandan tea sector. Through purposive and random techniques, the study used data collected from 358 tea-farming households. A fractional regression model was utilized in the analysis. Factors like access to credit in group ($p<0.01$), training on tea agricultural practices and credit management ($p<0.01$), level of production costs ($p<0.01$) and type of lending sources ($p<0.01$) were shown to influence the rate of credit allocated for tea production projects while engagement of tea-farming households in off-farm businesses ($p<0.01$) and larger size of credit($p<0.01$) both increased incidences of credit diversion to other than tea farming uses. Policymakers can intervene for mechanisms that improve management and accountability of tea farmers' organizations as emerging players in the tea sector. Also, public policies should integrate other economic and social attributes that may have real-valued utilities for rural tea-farming households to sustain living needs if they have the right to choose, and engage in, certain range of income activities.

Keywords: tea credit, credit diversion, credit utilization, fractional regression model, tea-farming household interest

1.0 Introduction

Tea production is a traditional and important cash crop in Rwanda. Since its introduction by missionaries in 1952 years, tea has become an economic activity for purposively export. Tea farming progressed on a small-scale and is currently expanding in Northern, Western and Southern provinces. Rwanda is naturally advantaged for tea growing factors through ideal climate, tropical, volcanic soils and well-distributed rainfall fluctuating between 1,200mm to 1,400mm per annum. Mostly tea is cultivated on hillside areas and drained marshes with altitude ranges from 1,550 m to 2,500 m (International Fund for Agricultural Development, 2005). Currently, the tea subsector is the largest employer in Rwanda of both casual and self-employed people and remains a major source of income for thousands of household tea farmers in rural areas. Today, the Rwandan tea sector consists of 16 operational tea factories that are managed by private companies and 16 collaborative tea cooperatives that groups a larger percentage of smallholder tea farmers who own more than 70% of total tea zones in the country. Made tea represents a significant share in agricultural exports and foreign earnings for the country over many years (Ministry of Agriculture and Animal Resources, 2018). In particular, tea is leading major economic activities in the Nyaruguru district under consideration for this study (National Agricultural Export Development Board [NAEB], 2016).

The economic role of the tea sector is further considered in the country's long-term targets for agricultural exports and earnings in the 2018-2024 Strategic Plan for Agriculture Transformation (SPAT) and the National Strategy for Transformation (NST1), 2017-2024. The 2018–2024 strategic plan for agriculture transformation targets to increase tea production from 7 MT/ha to 9 MT/ha and exports by 73% (Ministry of Agriculture and Animal Resources [MINAGRI], 2018). The plan will be achieved through the introduction of high-yielding clones, increased fertilizer application and expanding land area for tea production (Ministry of Agriculture and Animal Resources, 2018). Tea farmers are key stakeholders who will contribute to governmental targets realisation. They are required to adopt modern techniques that integrate the intensive use of fertilizers and improved seedlings in tea farming in order to increase production of green tea leaves. The necessity of accessing and utilizing credit to purchase agricultural inputs is crucial for tea farmers to increase green tea leaf production and to meet factories' demand for raw materials (NAEB, 2018).

Tea credits lending sources in Rwanda consist of formal sources that include microfinance, commercial and development banks, and informal credit sources that are comprised of (a) private money lenders, (b) rotating savings and credit associations (ROSCA), (c) tontines and input traders, and (d) friends and relatives. Tea-farming households have the right to borrow from any of these sources for a desired credit amount and or input credits for tea production purpose. However, if incidences of credit diversion to uses other than tea farming increase, it may affect the level of tea green leaf production which also determines factories' outputs of 'made tea' and the volume of exports for the sector. Available studies were limited in evaluating responsible factors and the conditions that influence access to credit (Byaruhanga, 2013; Muhongayire et al., 2013; Papias & Ganesan, 2010; Sebakambwe, 2012). Furthermore, there is a need to understand the other side of utilization for the accessed farm credits. This paper contributes on this by investigating the factors of utilizing farm credit for tea production by tea-farming households of Nyaruguru District in Southern Province, Rwanda.

2.0 Literature Review

Despite the challenges in accessing agricultural credits for small-scale farmers in the rural areas(Oboh & Epkbu, 2011), increased incidences of farm credits diversion remain amongst the challenges to achieve the targeted production in the agriculture sector(Enya et al., 2008; Oboh, 2008; Riaz et al., 2012).The importance also varies from one context to another, for instance, Khatun et al. (2014) highlighted that agricultural credit diverted was estimated at 44.26% to cover consumption needs in Bangladesh and around 35% was used for consumption as well in Karnataka in India (Devi, 2018). Similarly, 20% was diverted and used for consumption needs in Punjab in Pakistan (Waheed, 2009). In Ghana, 27.57% of credit diverted to a non-farm sector (Kuwornu et al., 2012) and 43.9% was used on other purposes in Nigeria (Oboh & Ekpebu, 2011). In Kenya, around 38% was diverted from coffee to other uses including schooling fees (Kamakia, 2016). In Rwanda, out of 465 million Rwandan francs dedicated to tea production uses through farmers cooperatives from the Development Bank of Rwanda, only around 64 million—representing 13.6 %—was used for intended projects of purchasing fertilizer inputs and land preparation (NAEB, 2013), the remaining was used for off-farm tea uses.

Despite engaging in juggling of credits, a number of studies supported that agricultural loans have a significant impact on improved agricultural production, farm income, and overall living standards of user participants (Diagne & Zeller, 2001; Khodke et al., 2010; Kuwornu et al., 2012; Muhongayire et al., 2013). Some others revealed determinants associated with credit utilization for intended projects and impact of expected outcomes among farming households (Gana et al., 2010; Olofinsao et al., 2018; Wivine, 2012). For instance, factors like timely availability of credit, size of households, diversification of businesses, and poor management and skill of farmers—all of which translated into low yield, affected utilization, and increased incidences of credit diversion (Nimoh et al., 2011; Oboh & Ekpebu, 2011; Hamidi & Sabbaghi, 2016). Whereas, (a) age, (b) level of education and income of household head, (c) time of receiving credit, (d) loan size, (e) farm size, (f) type of lending source utilised, and (g) benefiting extension services are likely to increase the rate of credit utilised to planned uses (Gana et al., 2010; Olofinsao et al., 2018; Wivine, 2012). The choice of participants for the end credit uses would be explained by the natural and social attributes that determine the households' satisfaction and level of sustaining life needs within the agricultural household model (de Janvry et al., 2006).

3.0 Theoretical Framework

The study background takes into consideration 'sustainable rural livelihoods' within agricultural households and 'utility theory'. Credits utilisation by tea-farming households could be explained within the framework of sustainable rural livelihoods that illustrates their ability to achieve different livelihood outcomes by combining livelihood resources—tangible and intangible capital—that individuals possess and by using different strategies. Household livelihoods and the strategies that people use to create them are the core of the development. Livelihoods concept has richer connotations and a broader scope to stipulate the means that a household uses to achieve and to sustain a certain well-being level. It has been debated as the fundamental intervention approach for poverty eradication and rural development by broadly defining livelihoods as the means and way of sustaining life. It agreed with the classic definitions as the (a) capabilities, (b) assets—both material and social resources, (c) access to these mediated by institutions, and (d) social relations

and activities that together determine the living gained by a the individual or household (Ellis, 2000; Li et al., 2021; Scoones, 1998). Beside the need of increasing financial capacity for small holder farmers to meet the capital stress and chocks for engaged in production activities like purchasing the farm inputs, they also have natural and social attributes that determine the drive utilization of available resources for the household living needs as food and enjoy good health. Therefore, in utilizing accessed resources they have the right to choose and engage in a certain range of activities.

The current study also refers to the household decision theory and utility function within a 'household' and 'agricultural household' or 'farm household' theories to distinguish an agricultural household from any other by classifying household both in its dual role as consumer and producer which is very important to a range of public policies. In contrast to an outsider's view, many of the people who live on farms may not regard the farm as their main activity (United Nations Economic Commission for Europe, 2007) which proves the existence of a real-valued utility function the so-called expected overall utility to be maximized by a rural household from adopted principles of rational choice from alternatives under constrained resources (Li et al., 2021; Mazziotta & Pareto, 2014). In this way, utilization decision of the accessed credit for tea production or diverting to off-farm uses is driven by the latent expected utility as a proxy of the degree of household's satisfaction. Therefore, a maximum or full utilization of accessed credits for green tea leaf production remains the household's expectation to maximize the utility attributed to farm income rather than any other factor.

4.0 Methodology

4.1 Data

The study was conducted in the Nyaruguru District in the Southern Province of Rwanda. The district is located between latitude 2° 41' 54" south and longitude 29° 31' 25" east. It is 1,010 square kilometres with an annual average temperature of around 20^{o} C and annual rainfall varies between 1,000 and 1,250 mm depending on the altitude. The soils of the district are generally clay and sandy with a pH that ranges between 5 and 5.5. Such soil is adapted to tea and coffee plants. The choice of the district for the current study is crucial as it represents not only the areas in the country for tea production but also a targeted area for tea expansion programs from 2013. The program engaged intensive use of input fertilisers and adoption of high yielding clones and new construction of tea factories which also increased demand for credits by tea-farming households in the area (NAEB, 2016). in addition, tea is currently produced in 10 out of 14 sectors of Nyaruguru district. In 2017, the National statistics of Rwanda has ranked the tea production as a major economic activity in the district (NISR, 2017).

4.2 Sampling Procedure and Sample Size

A multi-stage sampling that involved a purposive and random sampling procedure from the cooperatives of tea farmers that operating in the district. The population is 3,445 as members of these two cooperatives (Cooperative des Théiculteurs Nshili-Kivu [OTHENK] and Cooperative des Theiculteurs de Muganza-Kivu [COTHEMUKI] each has 2,560 and 885 tea-farming households respectively.

Using the Yamane (1967) formula for finite population, the sample was calculated as follows:

$$n = \frac{N}{1 + N(e)^2}$$

where, $\boldsymbol{n}$ is the sample size and $\boldsymbol{N}$ is the population while $\boldsymbol{e}$ represents the level of precision. Therefore, the total sample is calculated as:

$$n = \frac{3445}{1 + 3445(0.05^2)} = 358$$

Thereafter, respondents were proportionally drawn from each cooperative respectively using the proportion formula as follows:

$$n_i = \mathrm{n}\frac{N_i}{N}$$

where, $\boldsymbol{n_i}$ is the number in the respondents from each cooperative, $\boldsymbol{n}$ represents total respondents in both tea cooperatives, $\boldsymbol{N_i}$ is relative population in each cooperative and, $\boldsymbol{N}$ stands for the total of targeted population in tea cooperatives. The sampled tea-farming households are shown in the following Table 1.

Table 1. *Sample Size*

Cooperatives	**Sub-Population**	**Sample size**
COTHENK	2,560	266
COOTHEMUKI	885	92
Total	**3,445**	**358**

4.3 Analytical Method

The magnitude of responsible factors that influenced credit utilization on tea production was empirically estimated as the marginal effect on the dependent variable. The dependent variable represents a percentage of the amount of received credit that was used on tea enterprise. For a continuous dependent variable (y) that ranges within one-unit interval as [0,1] or (0,1) such as fractions, proportions, rates and percentages, indices, and probabilities the classical models like linear regression, Tobit and non-linear squares were proved to have some limitations in the analysis of the data. For instance, linear regression failed to capture non-linear relationships especially when the outcome variable is near to zero or one. The predictions could fall outside those intervals. Other models are unlikely to be efficient for natural observations because common distributions of fractional response imply heteroscedasticity distortions which may cause inconsistency and invalidate usual test statistics (Arabmazar & Schmidt, 1981; Gallani & Krishnan, 2017; Wooldridge, 2002).

To avoid criticism of the classical models, a fractional regression model proposed by Papke and Wooldridge (1996, 2008) was used in the analysis. The fractional regression has the advantage of integrating non-linear models like probit, and logit models while restricting the mean of the dependent variable (*y*) conditional on

explanatory variables (*x*). Parameters of the model are estimated using the quasi-maximum likelihood method (QML) estimator under general linear model conditions (Gallani & Krishnan, 2017). The fractional regression model has the advantage of computing robust standard errors by default, therefore; there is no need to know the true distribution to obtain consistent parameter estimates.

4.4 Specification of the Fractional Regression Model

Since dependent variable *y* outcomes fall within [0,1], the regression of its mean *E(y|x)* conditional on *x* is also expected to fall in the same unit interval [0,1] and it can be expressed as follows:

$$E(Y|X) = G(X\beta) = \frac{exp(x\beta)}{1+exp(X\beta)} = \frac{1}{[1+exp(-X\beta)]}$$

Where $G(.)$ is a known function satisfying $0 < G(z) < 1 \quad \forall z \in \mathbb{R}$, with conditions that y is continuous within a unit interval and $f(y|x)$ is the conditional distribution of y and x is a vector of observed variables and β is a vector of parameters to be estimated.

The fractional regression model has the following identical likelihood function

$$F(Y) = G(X\beta)^Y \times (1 - G(X\beta))^{1-Y}$$

$$for\ 0 \leq Y \leq 1,$$

According to Papke and Wooldridge (1996), parameters can be estimated in the same manner as in the binary logistic regressions with quasi-maximum likelihood (QML) estimator based on the Bernoulli log-likelihood function:

$$LL_i\ (\beta) = y_i * \log\big(G(x_i\beta)\big) + (1 - y_i) * \log(1 - G(x_i\beta))$$

Given that, the Bernoulli distribution is a part of linear exponential families, the QML estimator of β is defined by

$$\beta \equiv arg\ \max_{\beta} \sum_{i=1}^{N} LL_i(\beta)$$

Interpretations of average marginal effects calculated after fractional regression model portray a consistent story as for linear regression coefficients. The empirical model used to estimate the marginal effect of factors influencing credit utilization on tea production using fractional regression model is presented as follows:

$$Y_{iCUI} = \beta_0 + x_1\beta_1 + x_2\beta_2 + \ldots\ldots\ldots\ldots\ldots\ldots + x_{17}\beta_{17} + \varepsilon_i$$

Where, Y_{iCUI}= is the amount of received credit utilized on tea production (indexed in one unit). x_1 to x_{17} represents explanatory variables in the respective order.

The index was calculated based on observations on credit utilization. A positive coefficient indicates the marginal effect of one independent variable due to one unit increases in the dependent variable other factors held constant. The independent variables included in the model include the age of household head, education level of the household head, household size, type of credit, experience in tea farming, credit being non-constrained, payback period, trained on credit management, trained on good agricultural practices, timely availability of credit, tea farm size, tea production costs, annual household income, conduct off-tea farm businesses, received credit size, and type of lending sources.

5.0 Results and Discussion

5.1 Tea Household Characteristics

Table 2 presents descriptive statistics of the variables used in the fractional regression model for the analysis. The results show that there is significant difference between the two groups of tea-farming households—users and non-users—towards credit utilization. On average, 69% of the received amount was utilized for tea production projects. Out of 58.4% utilised accessed credit for intended tea production projects (see Table3), they have allocated the maximum of the credit accessed (92%) while their counterparts have utilised only 38% of the total credit and the balance was used to other than tea farming.

The results show that there is a statistical significance difference in the age between those who utilized credit for tea production—on average 53 years old—and those who diverted tea credits—on average 51years old. The implication of this result is that probably aged people have fewer ambitions in conducting off-farm rural businesses in the study area. It corresponded very much with the work of Oboh and Ekpebu (2011) that aged people may show uprightness in using received credit for intended projects.

The credit disbursement period was captured during survey interviews as the number of days to mean the timely availability of credit for a borrower to receive the approved amount. This period is very important for utilization and for what accessed credit is supposed to be utilized for by household tea farmers in the study area. For this variable, there was a significant difference between household tea farmers who utilized credit for tea production and those who diverted credits. The assumption was that the shorter the period for approving credit, the better for farmers as they can procure inputs on time. In other words, there is a risk of diverting credit from planned projects to other uses when credit is delayed. The same finding by Sogo-Temi and Olubiyo (2004) who found that credit made in a timely manner to agricultural farmers significantly enhances crop production activities because they can acquire inputs on time to meet the crop seasons. Similarly, a payback period defined as a period between the time the credit is approved and the time it has to be fully repaid affects the amount invested in tea projects among farmers as it is significant at 5% level. The shorter the repayment period, the better for farmers particularly when credit has to be paid upon supplying green tea leaf to the factories. The study found that there is significant difference for this range of period captured in months between household tea farmers who utilized credit for tea production and those who diverted credits.

The results in Table 3 below show a statistical significance when a household farmer has accessed credit in the group between farmers who utilized credit for tea production (60.3%) and those who diverted credits (44.4%). This implies that there is a relationship between utilizing credit that is accessed in group and its further utilization for intended tea projects. Furthermore, the average credit received by household tea farmers showed a statistical significance. This is because joint credit is commonly accessed in the form of inputs—mainly fertilizers—through their respective cooperatives where they do procure agricultural inputs in bulk to members. The advantage is that farmers were helped to acquire agricultural inputs on time while being monitored through cooperatives to reduce incidences of credit diversion. This did not necessarily happen to their counterparts who had received individual credit from formal

lending sources because the monitoring for disbursed credit is highly limited to the repayment performance in accounts.

Table 2: *Relationship Between Characteristics of Tea Credit User Farmers and Credit Utilization*

Variables	**Overall Mean (n=358)**	**Credit utilization for tea projects (n=209)**	**Credit diversion to off-farm businesses (n=149)**	**t-test**
Credit utilization index (CUI);	0.69	0.92	0.38	-29.67***
0≤CUI≤1	(0.32)	(0.11)	(0.23)	
Age of household head (years)	52	53	51	-2.14**
	(12)	(12)	(11)	
Education level of the	5	5	5	0.18
household head	(4)	(4)	(4)	
Household size	6	6	6	0.96
	(1)	(2)	(2)	
Number of years in tea	7.3	7.3	7.4	0.36
farming	(2.2)	(2.1)	(2.3)	
Credit disbursement (days)	12.1	10.8	13.9	2.31**
	(13.0)	(12.2)	(13.9)	
Payback period (in months)	11.9	10.8	13.5	2.42**
	(10.5)	(10.5)	(10.3)	
Tea plantation size (hectares)	0.94	1.00	0.86	-1.67*
	(0.82)	(0.90)	(0.67)	
Total production cost	262,998	307,940	199,960	-2.84***
(Rwandan currency)	(357,934)	(398,776)	(280,525)	
Total household earnings in	1,223,848	1,221,402	1,227,279	0.06
Rwandan currency	(944,310)	(980,414)	(894,463)	
Size of credit (Rwandan	474,074	370,411	619,478	3.43***
currency)	(687,375)	(542,808)	(830,156)	

Standard deviations in parentheses; Significant level: *=10%, **=5%, ***=1%.

Source: Authors' calculations.

The study revealed also that credit constraint plays an important role in utilizing credit among household farmers. A farmer is not constrained if he or she has received the desired credit amount. Any approval of a less desired credit amount for a household farmer, means that he or she is credit constrained. The results show a

significant difference towards credit non-constraint between the two groups of household farmers; those who utilized credit for tea production (24.8%) and those who diverted credits (11.1%). Furthermore, there was a significant difference in participating in the arranged training on good agricultural practices (GAP) between farmers who utilized credit for tea production (93.3%) and those who diverted credits (79.2%). This implies that types of training involve farmer field and learning schools' approach (FFLS) are much helpful to improve utilization of credits and farm inputs among smallholder farmers. Under assumptions, farmers who received on-farm pieces of training likely they would improve the utilisation of tea credit for the intended purposes compared to those who did not participate. In other word, fail to attend training on tea production techniques further would affect the way of utilizing received inputs on tea farms for some farmers.

This study's findings concur with the expectation that tea off-farm businesses are amongst competing uses for the received tea credits in the study area. Statistically, significant variations were observed in the conducting off-tea businesses between household tea farmers who utilized credit for tea production (28.7%) and those who diverted credits (71.5%) at one percent significance level.

The type of lending sources also influences the level of utilizing the accessed credit on tea projects. Informal sources of credit are significant at the 1% level ($P<0.01$) and increasing borrowing from one more informal lender is expected to influence the utilization of credit for tea production purposes by 76.3 % other factors held constant. Similarly, the regression estimates show that the choice made to borrow from one more formal source of credit would increase the investment in tea production by 30.2 % with other factors held constant. This is because informal sources of credit are more flexible in terms of lending conditions and have closed monitoring systems through farmers' cooperatives than formal sources of credit. In addition, informal lending sources such as input sellers, tea factories, and private lenders could provide desired inputs—chemical fertilizers—in bulk to farmers upon presenting the collective responsibilities of members where one member is collectively cautioned by other members as a guarantee. In the case of credit defaulting, other members have a duty to share his or her part to repay the credit. In contrast, formal lenders could only arrange follow up visits upon notice of their client's delay in repayment.

Table 3: *Factors Affecting Credit Utilization for Tea Production*

Characteristics	**Overall Mean (n=358)**	**Credit utilization for tea projects (n=209)**	**Credit diversion to off-farm businesses (n=149)**	**Chi-Square (χ^2)**
Variables	**Percentages**			
Tea credit allocation (1 if it was allocated for tea utilization)	100	58.4	41.6	-
Household head (male)	82.7	83.7	81.3	0.39

Table 3 continued

Type of credit (1 if had received a joint credit)	53.6	60.3	44.4	8.95***
Desired credit (1 if a famer was not constrained)	19.3	24.8	11.1	10.15***
Participation in training on credit Management	24.0	26.8	20.8	2.11
Participation in training on GAP	87.7	93.3	79.2	14.57***
Having off-tea farm business(es)	45.8	28.7	71.5	59.16***
Borrowing from a formal source	31.3	36.8	22.9	7.21***
Borrowing from informal source	81.0	85.6	74.3	7.03***

Significant level: *=10%; **=5%; ***=1%. Source: Authors' calculations

5.2 Factors for Credit Utilization for Tea Projects

The results in Table 4 are the estimates of the fractional regression model where the credit utilization index is the dependent variable that varies between zero and one unit. The parameter's estimates are obtained by employing 'fracreg logit' command available in the software of stata16 version. Preliminary diagnostic tests for the existence of multicollinearity and heteroscedasticity were done using 'vif' and the White Test respectively using 'hettest' both commands available and run after regression in the same software. The mean variance inflation factor value is 1.38 less than 10 and ranges between 1.07 to 2.69 which confirms the absence of multicollinearity. The White test for heteroscedasticity shows no issue about it as the P-value was not significant (p-value>0.05) to means no issue of independent variable with the residuals.

The results show that out of eighteen factors used in the model, nine of them are statistically significant and seven of these are significant at 1% level. Moreover, seven factors: (a) credits in groups, (b) credit non-constraint, (c) training on good agricultural practices (GAP), (d) training on credit management, (e) tea production costs, and types of credit sources—(f)formal and (g) informal—are positively significant in influencing the effective utilization of accessed credits for tea production among household farmers. Whereas factors like off-tea fam businesses and size of accessed credit are found as the amongst competing uses for tea production projects. Hence, they augment diverting credit from intended projects in the area.

The age of the household head is insignificant in the influencing utilization of accessed credit for tea production. Education of the household head is also not significant for influencing the farmers on the credit utilization decision. Generally, the average of household heads' education level in the study area is five years which falls in the primary education level. Therefore, this variable is not statistically significant when other factors are held constant. Similarly, both household size and

experience in tea farming variables are found not significant to influence the decision of farmers on utilization of accessed credit for tea production in the area. The results on the birth rate implies that it is almost the same for the sample while experience in tea production is constantly independent to related tea production investment as tea growers have the closer digits of experience since tea is once planted and remain for long term and continuous production. This means that tea productivity remains dependent on farm inputs application.

Table 4: *Fractional Regression Results of Factors Influencing Credit Utilization in Tea Projects*

Variables **Dependent variable: Credit utilization index (CUI)**	**Coefficient**	**Std. Err.**
Gender of household head (1=Male, 0=Female)	0.208	0.201
Age of household head	0.005	0.007
Education level of the household head	-0.001	0.016
Household size	-0.002	0.042
Type of accessed credit (1=if was a joint credit, 0= individual credit)	0.439***	0.134
Experience in tea farming	-0.012	0.032
Credit constraint (1=if was not constrained, 0=Otherwise)	0.559**	0.238
Loan payback period (months)	-0.012	0.008
Participation in Training on credit management (1=yes, 0=No)	0.672***	0.178
Participation in training on GAP (1=yes, 0=No)	0.434***	0.091
Credit disbursement (days)	-0.007	0.006
Tea farm size (Ha)	0.105	0.121
Tea production cost (Rwandan currency)	0.972***	0.198
Household income (Rwandan currency)	0.057	0.070
Having off-farm business(es) (1=yes, 0=No)	-0.508***	0.081
Credit Size (Rwandan currency)	-0.613***	0.153
Lending source formal	0.302*	0.162
Lending source informal	0.763***	0.224

Note: Significant level: *=10%; **=5%; ***=1%. Source: Authors' calculations

The coefficient of accessing credit in group is positive and significant in influencing credit utilization for tea production at 1% level (P-value<0.01) other factors held constant. The coefficient of accessing credit in groups of farmers is 0.439 approximately which means that the increase of amount to be utilized for tea production would increase by 43.9% if a tea farmer receives the credit in the group. The implication of the results is that types of group credits are provided as input fertilizers that are procured in bulk by tea cooperatives and further distributed to members which was found as the most used mechanism and effective to minimize mismanagement of credits in the study area.

A non-constrained farmer was defined as the state in which a household farmer fully received the expected loan amount. Throughout the discussion, it is named credit non-constrained. It was also found to have a positive effect and significance at 5% level (P<0.05) on the amount of credit utilized for tea production. This would increase the utilization of accessed credit on intended tea production by 55.9% other factors held constant. The assumption is that usually households have other unrevealed expenses during borrowing which may lead to credit diversions after borrowing such as the need of school fees for educating children, food consumption, health insurance, and so forth. Farmers can also partially divert the amount of received credit to run some rural businesses.

Our findings also show that training on credit management to improve farmers' knowledge about financial services is positively significant at 1% level (P<0.01). Therefore, training programmes for tea farmers are important to improve the utilization of accessed farm credits for tea production. One more training session would influence such decisions by 67.2% other factors held constant. Sharing knowledge and techniques about tea production through Farmer Field Schools (FFS) have helped cooperatives to mitigate the number of mismanagement cases among farmers.

The costs for tea production in the study area include (a) capital for mainly chemical fertilizers, (b) paying hired labour for plucking, and (c) rehabilitation of old plantations. The effect of the cost of these inputs was found positive and significant at 1% level (P<0.01). The results show that one unit increased in tea production input would increase the investment for tea production by 97.2 % when other factors are held constant.

The type of lending source also influences the level of utilizing the accessed credit on tea projects. Informal sources of credit are significant at 1% level (P<0.01) and increasing borrowing from one more informal lender is expected to influence the utilization of the credit for tea production purpose by 76.3 %, other factors held constant. Similarly, the regression estimates show that the choice made to borrow from one more formal source of credit would increase the investment in tea production by 30.2 % as other factors held constant. This is because informal sources of credit are more flexible in terms of lending conditions and credit repayment conditions than formal sources of credit. Besides, informal lending sources such as input sellers, tea factories, and private lenders could provide desired inputs—chemical fertilizers—in bulk to farmers upon presenting the collective responsibilities of members where one member is collectively cautioned by other members as a guarantee. In the case of credit defaulting, other members have a duty to share his or her part to repay the credit. In contrast, fewer formal lenders could only follow up the credit users upon notice of their client's delay in repayment.

Results further revealed that the size of credit and conducting off-farm businesses was negative and significant at 1% level (P-value<0.01) to affect the amount of credit allocated for tea production. This would decrease the investment in tea production projects by 50.8% and 61.3% respectively when other factors are held constant. The implication of the results on the credit diversion is probably due to some farmers who may use tea plantations as collateral to engage in juggling of credit to other than tea farming uses. Though it is against the contract and it may affect future borrowing, Li et al. (2021) argued that credit household users hold an innermost capacity, which is acquired from experience to make rational decisions to maintain a certain well-being and to engage in a certain range of economic activities. The remaining factors such as (a) gender and age of the household head, (b) family size, (c) experience, and (d) size of tea plantations owned have logical and explainable coefficient signs but they are not statistically significant.

6.0 Conclusions and Recommendations

This paper examines responsible factors influencing the utilization of credit for tea production in the tea sector in Nyaraguru district of the southern province of Rwanda. The study used data collected from a sample of 358 tea-farming households and a fractional regression model was used to estimate the marginal effect. The farmers were randomly chosen.

The results show that there is a gap in credit utilization for planned tea projects in the study area. Around 58.4 % of farmers had utilized accessed credit for intended tea projects against 41.6 % who diverted credits. Factors such as (a) access to credit in groups, (b) receiving a desired credit amount, (c) participating in training on good agricultural practices and credit management, (d) cost of farm inputs, and (d) type of sources of credit were all positive and significantly influenced utilization of accessed credits for intended tea-farming projects. The results revealed that both off-tea farming businesses and large credits increased incidences of credit diversion among tea-farming households in the study area.

Our study revealed that there is still a long way to go for tea-farming households to fully utilize received credit for primarily tea production. Promoting tea cooperatives and their role in credits distribution and management for effective utilization is recommended. Much of the work lays on the shoulders of the Government to put in place policy frameworks that can improve management and accountability of tea farmers' organizations as emerging players in the tea sector. Further, tea funding mechanisms should consider the economic and social attributes that may have real-valued utilities for household farmers to reduce incidences of credit diversion from intended projects.

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