DETERMINANTS AND EFFECTIVENESS OF COLLECTIVE ACTION IN COCOA MARKETING AMONG SMALL SCALE PRODUCERS IN KYELA DISTRICT, TANZANIA

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ABSTRACT

Farmer' organisations are seen as key vehicles to achieve intensification and increased market orientation of the smallholder farm sector; however there are contradicting reports regarding the effectiveness of these farmer organisations to achieve these goals. In the study, the role of collective action on cocoa marketing among rural smallholder farmers in Kyela District was analyzed. Cross-sectional household data were used to analyze the effect of farmer group membership on income performance indicator, the socio-economic factors influencing smallholder cocoa farmer's decision to participate in cocoa producer organizations and the challenges facing cocoa farmers' groups in Kyela district. Propensity Score Matching was used to estimate the Average Treatment Effect where as Probit model was used to determine factors influencing farmers to join farmers' organisations. Several econometric techniques such as robustness check, propensity score overlap and balancing properties were used to deal with potential selection bias in estimating the ATE of farmer group membership. The findings indicate that farmer groups have positive impact on income among the group members. Sex, age, formal education, land size owned and distance to the market significantly influenced smallholder cocoa farmer's decision to participate in cocoa producer organizations. Pests and diseases, price instability and poor market are among the challenges facing cocoa farmers in the study area. Establishing a cocoa marketing board, more farmer organisations and investment in rural education and transport infrastructure can help farmers to increase cocoa income in Kyela District.

***Key words**: Collective action, Smallholder farmers, Market Participation, cocoa, Income.*

DECLARATION

I, Emmanuel Mwamalaji, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

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The above declaration is confirmed

_____ _____

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DEDICATION

I dedicate this work to our Almighty God for his Mercy to the extent of making this work done. I also dedicate this work to my brothers Gwalugano and Laurent, my sisters Rose and Happy, mother Ester Itenga, my daughter Miriam and my wife Eva Mhagama for their spiritual and moral support throughout my studies.

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LIST OF ABBREVIATIONS AND SYMBOLS

AIPW	-	Augmented Inverse-Probability Weights
AMSDP	-	Agricultural Marketing System Development Program
ATE	-	Average Treatment Effect
ATET	-	Average Treatment Effect of the Treated
ATT	-	Average Treatment on the Treated
IFAD	-	International Fund for Agricultural Development
IPW	-	Inverse-Probability weights
IPWRA	-	Inverse-Probability-Weighted Regression Adjustment
KDC	-	Kyela District Council
NBS	-	National Bureau of Statistics
NGOs	-	Non-Government Organisations
NIE	-	New Institution Economics
NNM	-	Nearest-Neighbor Matching
NRM	-	Natural Resources Management
PS	-	Propensity Score
PSM	-	Propensity Score Matching
RA	-	Regression Adjustment
SNAL	-	Sokoine National Agricultural Library
SPSS	-	Statistical Package for Social Sciences
Tshs	-	Tanzania Shillings
URT	-	United Republic of Tanzania
USD	-	United States Dollars
WB	-	World Bank

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Almost all African governments began reforming their countries' agricultural systems during the 1980s and early 1990s (Straatz, 1993). Along with agricultural market reforms, the importance of smallholder agriculture has been greatly recognized. According to North (1990) and Barham (2009), smallholder farmers play an important role in the agricultural development simply because they take a great part of actors in this sector. They ascertains that agricultural development will not occur, unless smallholder farmers are engaged and that the major obstacle facing smallholder-led agricultural growth is lack of market access which can be a result of pervasive imperfect markets.

Empirical evidences show a contradicting impact of collective action in improving market access among smallholder farmers because some studies show positive impact in market access and others reveal no significant differences between member participants and non-participants of the groups. Thus, the claim that collective action can reduce the transaction costs and improve bargaining power in negotiations with buyers and intermediaries (Fischer, 2011); and therefore can be a tool for smallholder farmers to engage in markets with high price for their produce which result in high income (Mukundi *et al*., 2013) is also contradicting.

About 50% of the cocoa produced in Kyela District is sold to five major cocoa-buying companies, with middlemen occupying 21% of the crop, 19% is sold to individual traders and agents and only 10% is sold through cooperatives (Nyamora *et al*., 2012). Amounting 80% of buyers visit the growers' farms and buy from them of which in all

cases prices were set by buyers (Daniel, 2013). This is thought to have led to low earning of income which resulted to rising of poverty in the district. Many households in the district have insufficient income to meet their basic health, education and food needs (Nyamora *et al*., 2012). Among the reasons is that farmers are not generally organised into farmers' oganisations and therefore have little bargaining power. Thus, collective actions are thought to be among the solutions for increasing income among cocoa producers in Kyela district.

1.2 Problem Statement and Justification

Kyela district accounts for about 80% of the total national cocoa output; however cocoa producers are not benefiting much from cocoa production (Nyamora *et al*., 2012) because they earn low income from cocoa production. The low income among cocoa producers can possibly be attributed to low producer prices for the crop, A kilo of cocoa averagely sold for USD 1.4 in 2009, USD 2 in 2010 and 2011(KDC, 2011). The world price for a kilo of cocoa was USD 3.6 in 2009, USD 3 in 2010 and USD 3.2 in 2011. In the corresponding high cocoa producing countries such as Côte d'Ivoire was USD 3, 2.5 and 2.8 in 2009, 2010 and 2011 respectively (Nyamora *et al*., 2012). In Ghana the price was USD 2.9, 2.3 and 2.6 in the same years. Also in Brazil the price was USD 3.2, 2.9 and 3 in the listed years.

Comparing these prices; smallholder farmers in the study areas earned low prices in cocoa produces. One of the claimed reasons is that because cocoa farmers in Kyela District are the price takers which can be attributed to their low bargaining power (Daniel, 2013). The low bargaining power can be associated to lack of collective action/ farmers' organisations in Kyela district.

In the mid 2009 a government-led program in Tanzania, the Agricultural Marketing Systems Development Program (AMSDP) – that attempts to increase smallholder

farmers' incomes and food security through improvements in market access (strengthening farmer groups and creating market linkages) came into practice in Kyela district (URT, 2013). In collaboration with partner agency (Techno-serve) formed farmers groups among other targets to improve farmers' market access (Nyamora *et al*., 2012).

However, empirical evidences show a conflicting impact of the groups on market access. According to Verhofstadt *et al.*, (2013) the membership to cooperatives in Rwanda has a positive impact in market access that is; participation in maize cooperatives has led to increased market access of which resulted to a 35% increase in farm income. Similar findings have been reported in the study done by Shifaraw *et al*., (2008) which indicates that members of the agricultural organizations acquires 20 to 25% higher price than non-members who produce legumes in Eastern Kenya. Barham, (2008) findings show that more mature groups with strong internal institutions, functioning groups' activities and a good asset base of natural capital in Northern part of Tanzania are more likely to improve their market situation.

The findings reported in these studies contradict to a study done by Hisatoshi *et al*., (2015) which concludes that agricultural cooperatives in China that intended to improve the economic welfare of farmers, show no significant difference between participants and non-participants of the cooperatives in terms of net income from rice production. Hellin *et al*. (2009) concludes that producer organizations in the maize sector in Mexico are not successful because the cost of the organization is not compensated by an increased income from sales. Also a study which was conducted in Kenya by Mithöfer *et al*., (2014), found that membership in an associations does not impact market participation.

The mixed results with regards to effect of collective action in the reviewed studies implies that collective action may or may not strengthen bargaining power of cocoa producers in Kyela district. Thus the principal purpose of the study was to examine the effect of participation in cocoa organisations on agricultural income among cocoa producers in Kyela District.

1.3 Objectives of the Study

1.3.1 Overall objective

The overall objective of this study was to examine the determinants and effectiveness of collective action in improving agricultural (cocoa) income among smallholder cocoa producers in Kyela District, Tanzania.

1.3.2 Specific objectives

(i) To compare the income of agricultural organisations' participants and non-participants.

(ii) To determine socio-economic factors that influences smallholder cocoa farmer's decision to participate in cocoa farmer organisations.

(iii) To examine the challenges facing cocoa farmers' groups in Kyela district.

1.4 Research Hypotheses

(i) There is no significant difference in income between agricultural organisations participants and non-participants.

(ii) Socio-economic factors have no significant influence on smallholder cocoa farmer's decision to participate in cocoa producer organizations

(iii) **Research Question:**

What are the challenges facing cocoa farmers' groups in Kyela district?

1.5 Conceptual Framework

Modern theory of collective action was developed as a means to overcome free-rider problems and design cooperative solutions for the management of common resources (Coase, 1960). In recent years, the idea of collective action has been applied to group activities that directly or indirectly enhance the production and marketing of agricultural and food products, and reflects a global trend caused by the increased market competition and integration, and marginalization of minorities into modern markets (Gumataw, 2013).

In the marketing literature, collective action has been conceptualized to comprise of group training in production methods, negotiation skills, grading and sorting, and group dynamics which subsequently enhance bulk marketing of products by members of cooperatives or communities in order to reduce transaction costs and enhance economies of scale (Barham, 2007). Thus, collective action is operationalized as an action by members of a group or cooperative who come together to share market knowledge, sell together and develop business opportunities. However this study was based on the New Institutional Economics (NIE) framework which takes into account the role of institutions in the face of imperfect market information and transactions. Theory of collective action falls within the NIE framework since it involves use of institutions to guide groups or individuals with common objective to achieve a common goal (North, 1990).

At the household level, the decision to participate in the producer organisation is grounded on maximization of expected utility. The household will participate if $Ui>Uk$, where $Ui$and Uk represent a household's utility with participation and without participation, respectively. The probability that a household will choose to participate in producer organisation can be expressed as $(Y=1|X)=P(Ui>Uk)$.

A comparative cumulative distribution function evaluated on unknown parameters $\beta'=(\beta i-\beta k)$ is associated with a vector of independent variables X that influence household decision to participate in farmer group. These independent variables may include socio-economic, institutional and technical factors, as well as the "external" policy environment and climatic factors.

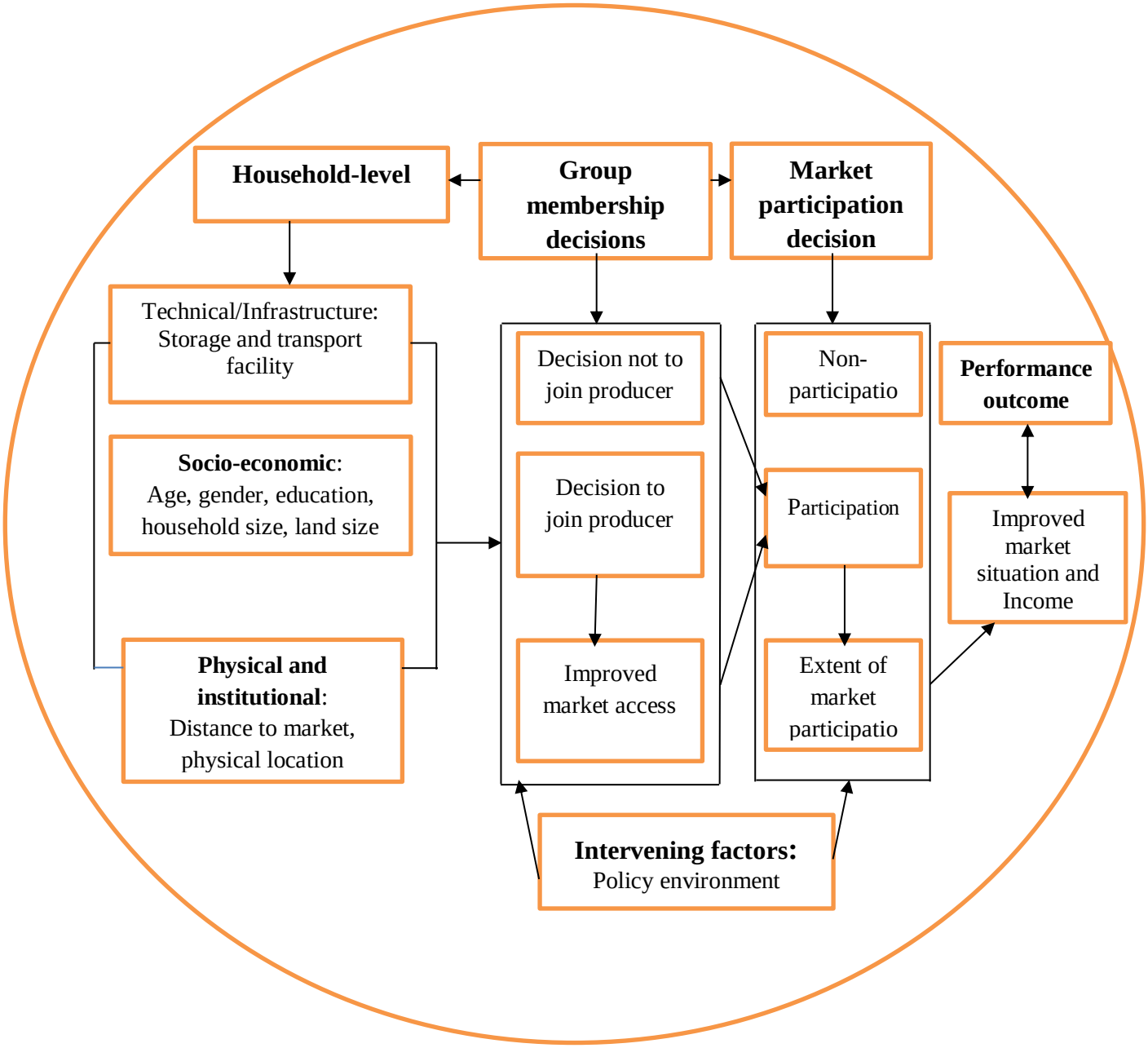

Figure 1: Conceptual frame work; Source: Mukundi *et al.*, 2012; and Barham, 2007

1.6 Organization of the Dissertation

This dissertation has been organized into five chapters. Chapter one takes an introduction part which covers background information, problem statement and justification, objectives of the study, research hypothesis and conceptual framework. Chapter two covers literature review on farmers' organisations in Tanzania, AMSDP, contradicting views on collective action through farmers' organisations, collective action, factors influencing smallholder farmer's decision to participate in producer organisations and empirical Treatment effect analytical tools including PSM.

Chapter three covers research methodology which includes description of study area, research design, sampling procedures, sample determination, data collection, data analysis tools, and the expected signs of the variables coefficients. The fourth chapter encompasses results and discussions which covers socio-economic characteristics of the respondents, factors that influence smallholder cocoa farmer's decision to participate in cocoa farmer organisations in the study area, propensity score matching results and challenges facing cocoa smallholder farmers in Kyela District. Chapter five which is the last chapter in the study contains conclusions and recommendations.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Farmers' Organizations in Tanzania

The country has a long history of farmers' organizations, dating back to colonial period in 1925 when the Kilimanjaro Native Planters Union was formed by small-scale coffee producers. This union was renamed the Kilimanjaro Native Cooperative Union (KNCU). Other early cooperatives included coffee-based cooperatives in Mbeya and Kagera and cotton-based cooperatives around Lake Victoria (Uliwa and Fischer, 2004).

After independence, the Government encouraged the formation of more marketing cooperatives to counter the strength of Asian traders in the market place and increase production of export crops (URT, 1997). During this period, the cotton unions had popular support among farmers because they established independent weighing stations. These stations enabled farmers to check the weight of their cotton before selling it, and thereby avoid dishonest buyers who had tampered with their scales (Uliwa and Fischer, 2004).

Recently, farmers' organisations are seen important machines for farmers to influence policy changes that may support to improve their bargaining power in the input and output markets (URT, 2013). Farmer groups also are thought to provide an opportunity to smallholder farmers to reduce cost of several services such as cost effective delivery of loans, inputs, extension services and market information (URT, 2013).

However, the policy environment is argued to be critical to the development of farmer groups. This is because it provides a fundamental framework of national goals and requirements within which regional and local targets are to be met. The objective of the

National farmer organisations policy is to ensure viability and sustainability of farmer organisations in rural for enhanced crop production, value adding and market access which lead to increased food security and poverty reduction (URT, 2013).

2.2 Agricultural Marketing Systems Development Program (AMSDP)

This program was initiated in 2001 after an agreement was reached between the International Fund for Agricultural Development (IFAD) and the government of Tanzania. The overall goal of the program was "to increase the income and food-security situation of the rural poor in the Northern and Southern Marketing Zones of the United Republic of Tanzania" (IFAD, 2002).

AMSDP suggests involving full rehabilitation agricultural marketing system in Tanzania by making rural markets work better and empowering smallholder farmers within them. Also, AMSDP expects to strengthen producers groups to enable them to have a better bargaining power and more influences on policy formulation, identification of marketing opportunities and price negotiations for both inputs and outputs (IFAD, 2002).

2.3 Effectiveness of Collective Action through Farmers' Organizations on Market Access

As pointed out in the introductory part, the effectiveness of collective action on improving market access is contradicting. There are examples from all over the world of a positive impact of group membership on specific aspects of smallholder farm performance. Ito *et al.* (2012) show that membership in a cooperative has a strong positive effect on the income of watermelon farmers in China. Vandeplas *et al.,* (2013) finds that dairy farmers in India are more efficient and have higher profits when organized in a cooperative.

Holloway (2000) show that cooperatives increase market participation among dairy farmers in Ethiopia. Fisher and Qaim (2012) find that cooperative membership leads to higher prices and higher farm incomes among banana farmers in Kenya. Shiferaw *et al*., (2009) shows that membership in grain cooperatives in Kenya lead to increased adoption of improved varieties, higher producer prices and larger marketable surpluses. Wollni and Zeller (2007) indicate that cooperative membership facilitates access to more profitable markets in the coffee sector in Costa Rica.

But, likewise, there is evidence of lack of success of cooperatives to improve farm performance. Bernard and Taffesse (2012) indicate that grain marketing cooperatives in Ethiopia, while offering higher prices; do not succeed in increasing commercialization. Hellin *et al*., (2009) concludes that producer organizations in the maize sector in Mexico are not successful because the cost of the organization is not compensated by an increased income from sales. The argument for farmers' organisations is that they are realized to be a vital driving machine in terms of increasing intensification and market orientation of the smallholder farmers (Verhofstadt and Maertens, 2013). Collective action benefit smallholder farmers by reducing information, negotiation, monitoring and enforcement costs (which all together are termed as transaction cost) in input and output markets and improving bargaining power in their produce transactions (Markelova *et al*., 2009; Bernard and Taffesse, 2012).

On the other hand, argument against collective action is that, effectiveness depends on group costs. Also efforts of any group to organize collective action are faced with common challenges such as agreement upon rules, ensuring all members are committed to participation, the challenges of free-riding, monitoring for non-compliance, and enforcing rules (Markelova *et al*., 2009 and Stockbridge *et al*., 2003).

2.4 The role of Collective Action on Market Access

Market failures are considered to be among the major threats to Smallholder agriculture for economic development and poverty reduction in developing countries (WB, 2008 and Hazell *et al*., 2010). Among the challenge these countries face toward development, is the need for institutional innovations to overcome market failures. Producer organisations have brought an improved concern from different agricultural stake holders such as donors, NGOs, governments and researchers. The argument prevailing is that producer organisations is an institutional vehicle to improve smallholder agricultural performance through improved market participation (Bernard and Spielman, 2009; Fisher and Qaim, 2012). Theory of collective action falls within the NIE framework because it involves use of institutions to guide groups or individuals with common objective to achieve a common goal (North, 1990). NIE is engaging to several development practitioners particularly for this reason, it is grounded in reality and concerned with the examination of how real institution play out in actual markets and the different channels through which they assist market exchange (North, 1995).

One of the central beliefs of NIE is that there are significant transaction costs involved in most forms of economic activity and that institutions can function to lower these costs. Transaction costs are generally classified into four categories. There are information, negotiation, monitoring and enforcement costs (Barham, 2007). Lack of information on prices and technologies and high transaction costs constraints smallholders' ability to be linked to markets (Gyau, 2013). To address these challenges, market interventions such as collective action is often proposed as a strategy to reduce the costs of market participation, therefore; smallholders when are collectively acting, they are said to be in a better position to reduce transaction costs for their market exchanges.

Collective action is defined as an "action taken by a group (either directly or on its behalf through an organization) in pursuit of members' shared interests" (Marshall, 1988).In general, collective action requires the involvement of a group of people, a shared interest within the group and it involves some kind of common action which works in pursuit of that shared interest. Some of the greatest gains empirically and theoretically on the subject of collective action has been found in the field of natural resource management (NRM). Of particular importance has been the works of Wade (1988), Ostrom (1992), Baland and Platteu (1996) synthesized these works in an effort to identify a common list of enabling conditions for successful collective action outcomes.

2.5 Factors Influencing Smallholder Farmer's Decision to Participate in Producer Organisations

There are different factors that can influence a smallholder farmer's decision to join producer organisations. Distance to market and extension services capture the travel time and associated costs that influence market participation (Olwande and Mathenge, 2010). Long distances are expected to have positive effect on group membership. The variables that capture household and farmer characteristics include age, gender, education level and household size. The age of the household head is used as measure of risk attitude of the farmer. Increase in age of household head is expected to have positive effect on group membership but negative effect on market participation due to risk-averse nature of older farmers (Mathenge *et al*., 2010 and Mukundi *et al*., 2013).

Household size accounts for supply of family labour and household consumption level (Mathenge *et al*., 2010 and Alene *et al*., 2008). Large household size is expected to have positive effect on group membership and market participation if the household provide labour efficiently (labour supplied translated into output greater than household's consumption demand).

Education level of the household is used as a proxy for human capital endowment. Increase in education of the household head (represented by the years of formal schooling) is expected to have positive effect on participation in producer groups. Olwande and Mathenge (2010) point out that education enhances the ability of farmers to utilize market information which could lower transaction cost thereby making market participation worthwhile.

Total land in acres owned by the household head represents physical production resource. Agricultural land resource is expected to have positive effect on group membership. As land owned increases, competition for land resource among the practiced enterprises decreases and increases in output and marketable surplus. This would encourage need for participating in farmer groups because these farmer groups help to lower transaction costs of both inputs and outputs (Olwande and Mathenge, 2010).

2.6 Cocoa Production and Marketing in Kyela District

About 80% of the total national cocoa crop comes from Kyela District which has a near perfect terrain and climate for cocoa (Nyamora *et al*., 2012). The main variety grown is trinitario cocoa beans which are grown organically in a tradition manner largely without inorganic fertilizer and pesticides by smallholders on plots with an average of 0.8 hectare, intercropped with other plants and trees (Daniel, 2013).

Currently middlemen and private buyers are in a powerful position in cocoa market in the study area. The unique flavor of cocoa produced in Kyela District and largely organic production has recently been attracting the attention of the world chocolate market.

Although the country currently has an estimated 0.3% share of the global cocoa market, it commands a 10% share of the world's organic cocoa market (Nyamora *et al*., 2012).

2.7 Review of Empirical Treatment effect Analytical Tools

There are different analytical tools which can d in estimating treatment effect. The most common ones are "matching" methods including propensity score matching (PSM) and nearest-neighbor matching (NNM). Also method such as regression adjustment (RA), inverse-probability weights (IPW), and "doubly robust" methods, counting inverse-probability-weighted regression adjustment (IPWRA) and augmented inverse-probability weights (AIPW) exist in the literature (Rosenbaum and Rubin, 1983; Heckman *et al*., 1997; Takahashi *et al*., 2010)

2.7.1 Strength of regression adjustment estimator

The regression-adjustment model can be specified as

$$\hat{\tau}\, ate, reg = \mathbf{N}^{-1}\sum_{i=1}^{\mathbf{N}}\left[G\left(\alpha_1 + \hat{\mathbf{X}}_i\,\hat{\beta}_1\right) - G\left(\alpha_0 + \hat{\mathbf{X}}_i\,\hat{\beta}_0\right)\right]$$

Ƭate = means the average treatment effect that is averaged in any nonlinear functions in X,

Each summand is the difference in estimate probabilities under treatment and non-treatment for unit i, and the ATE just averages those differences.

The argument behind RA is that it is an exceptionally useful base-case estimator (Rubin, 1973 and Wooldridge, 2010)

2.7.2 Weaknesses of regression adjustment estimators

The usefulness of RA has been periodically questioned in the literature because it relies on specifying functional forms for the conditional means and because it requires having sufficient observations of each covariate pattern in each treatment level (Rubin, 1973; Cameron and Trivedi, 2005; Wooldridge, 2010). Thus, when the overlap assumption is nearly violated, there are very few observations in a treatment level for some covariate patterns, so RA estimators use the model to predict in regions in which there are very little data which is extremely risky (Rubin, 1973; Abadie and Imbens, 2012; Vittinghoff, *et al*., 2012).

2.7.3 Strength of IPW estimators

IPW estimators use weighted averages of the observed outcome variable to estimate means of the potential outcomes. The weights account for the missing data inherent in the potential-outcome framework. Each weight is the inverse of the estimated probability that an individual receives a treatment level. Outcomes of individuals who receive a likely treatment get a weight close to one. Outcomes of individuals who receive an unlikely treatment get a weight larger than one, potentially much larger.

IPW estimators model the probability of treatment without any assumptions about the functional form for the outcome model (Caliendo and Kopeinig, 2005).

An IPW estimator for E (y_1) is given by;

$$\mathrm{E}(y_i) = \frac{1}{\mathrm{N}} \sum_{i=1}^{\mathrm{N}} y_i t_i \Big/ p(\mathrm{X}_i)$$

Where p (xi) is the probability that $t_i = 1$ and is a function of the covariates xi.

t= treatment variable, y_i= potential outcome for both treated and untreated.

2.7.4 Weaknesses of IPW estimators

IPW estimators become extremely unstable as the overlap assumption gets close to being violated. When the overlap assumption is nearly violated, some of the inverse-probability weights become very large. When this situation occurs IPW estimators produce erratic estimates and the large-sample distribution provides a poor approximation to the finite-sample distribution of IPW estimators. This instability occurs even though the functional form for the treatment model is correctly specified (Imbens, 2000; Hirano *et al*., 2003)

2.7.5 Strength of Nearest-neighbor matching estimators

With NNM, the individual from the comparison group is chosen as a matching partner for a treated individual that is closest in terms of propensity score (Caliendo and Kopeinig, 2005). Several variants of NN matching are proposed, such as NNM with replacement and NNM without replacement. NNM with replacement, an untreated individual can be used more than once as a match, while NNM without replacement is used only once. Matching with replacement involves a trade-off between bias and variance. If we allow replacement, the average quality of matching will increase and the bias will decrease (Caliendo and Kopeinig, 2005).

The average treatment effect is estimated as;

$$\tau_1 = \mathbf{E}[y_1 - y_0];$$

And the ATET can be estimated as

$$\delta_1 = \mathbf{E}[y_1 - y_0 \mid t = 1]$$

2.7.6 Weaknesses of NNM

A problem which is related to NN matching without replacement is that estimates depend on the order in which observations get matched(Caliendo and Kopeinig, 2005; Smith and Todd, 2005).This is of particular interest with data where the propensity score distribution is very different in the treatment and the control group. For example, if we have a lot of treated individuals with high propensity scores but only few comparison individuals with high propensity scores, we get bad matches as some of the high-score participants will get matched to low-score non-participants (Imbens, 2000; Caliendo and Kopeinig, 2005).

We can overcome the above problem by allowing replacement, which in turn reduces the number of distinct non participants used to construct the counterfactual outcome and thereby increases the variance of the estimator (Smith and Todd, 2005). Hence, when using NNM without replacement, it should be ensured that ordering is randomly done (Abadie and Imbens, 2012; Vittinghoff, *et al*., 2012).

It is also suggested to use more than one nearest neighbour (`oversampling'). This form of matching involves a trade-off between variance and bias too. It trades reduced variance, resulting from using more information to construct the counter-factual for each participant, with increased bias that results from on average poorer matches (Imbens, 2004 and Smith and Todd, 2005). When using oversampling, one has to decide how many matching partners should be chosen for each treated individual and which weight such as uniform or triangular weight should be assigned to them (Caliendo and Kopeinig, 2005).

2.8 Propensity Score Matching (PSM)

In the present study, the PSM was used to estimate the average treatment effect (ATE) of organisations membership. PSM is not the only suitable for cooperative membership; however the choice was based on the fact that there was no baseline data in the study area to allow for other treatment methods. The PSM method is used even in the absence of the baseline data (Abadie and Imbens, 2011). It involves matching cooperative members with non-members that are similar in terms of observable characteristics (Angrist and Imbens, 1996; Caliendo and Kopeinig, 2008). Propensity score (PS) was estimated as the probability of being a group member, using the vector X as conditioning factors.

Then the ATE was calculated as the average of the outcome differences between treated Y(1) and matched controls Y(0). Different kind of matching algorithms have been developed in the literature such as Caliper and Radius, Stratification and Interval, Kernel and Local Linear, and Weighting (Zhao, 2004 and Caliendo and Kopeinig, 2005). In the study weighting matching algorithm was adopted in which estimated propensity scores was used as weights to obtain a balanced sample of treated and untreated individuals. An estimator was directly implemented as the difference between a weighted average of the outcomes for the treated and untreated individuals (Hirano and Imbens, 2002; Imbens, 2004).

In non-experiment context, the treatment effect specifically average treatment effect is the expected treatment effect expressed as;

$$E[y_i \mid w_i = 1] - E[y_i \mid w_i = 0] \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2.1$$

Applying weaker assumption of mean independence

$$E[y_{i1} \mid w_i] = E[y_{i1}]$$

$$E[y_{i0} \mid w_i] = E[y_{i0}] \quad \text{.....2.2}$$

The propensity score theorem states that if potential outcomes are independent of treatment status conditional on a multivariate covariate vector, Xi, then potential outcomes are independent of treatment status conditional on a scalar function of covariates, the propensity score P(Xi)=E[w_i | Xi](Rosenbaum and Rubin, 1983) . In estimating ATE we begin working with the following expression;

$$\left[w_i - P(X_i)\right]y_i = \left[w_i - P(X_i)\right]\left[(1-w_i)y_{i0} + w_i y_{i1}\right] = w_i y_{i1} - P(X_i)(1-w_i)y_{i0} - P(X_i)w_i y_{i1}$$

.....2.3

Using the fact that $w_i^2 = w_i$ and $w_i(1-w_i) = 0$.

Taking conditional expectation;

$$E[w_i y_{i1} - P(X_i)(1-w_i)y_{i0} - P(X_i)w_{i1} \mid w_i, x_i] = w_i E[y_{i1} \mid w_i, x_i] - (1-w_i)P(X_i)E[y_{i0} \mid w_i, x_i]$$
$$- P(X_i)w_i E[y_{i1} \mid w_i, x_i]$$

.....2.4

Using ignorability of treatment condition and taking expectation conditional on x_i:

$$E[(w_i - P(X_i))y_i \mid x_i] = P(X_i)E[y_{i1} \mid x_i] - (1-P(X_i))P(X_i)E[y_{i0} \mid x_i] - P(X_i)^2 E[y_{i1} \mid x_i]$$
$$= P(X_i)[1-P(X_i)][E[y_{i1} \mid x_i] - E[y_{i0} \mid x_i]] = P(X_i)[1-P(X_i)]ATE(x_i)$$

.....2.5

Solving for $ATE(x_i)$;

$$ATE(x_i) = \left[\frac{[w_i - P(X_i)]y_i}{P(X_i)[1-P(X_i)]} \mid x_i\right] \quad \text{.....2.6}$$

Using the sample analogous principle of the conditional expectations, ATE can be obtained using a weighted average over X using its sample frequency. ATE estimator is given as:;

$$\hat{ATE} = \frac{1}{N}\sum_{i=1}^{N}\frac{\left[w_i - \hat{P}(X_i)\right]y_i}{\hat{P}(X_i)\left[1-\hat{P}(X_i)\right]} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2.7$$

Where:; x_i = conditional variables; $y_i =$ Outcome variables for both treated and control and

$w_i =$ Treatment variable

$\hat{P}(X_i)$ Is obtained in a first stage by fitting the probit model w_i on X_i then we can obtain the predicted value $\hat{P}(X_i) = \Phi\left(X_i \hat{\beta}\right)$ (Rosenbaum and Rubin, 1985; Heckman, 1997; Perez-Truglia, 2009). This method addresses the impacts on farmers without controlling for the endogeneity of group participation; therefore the results of the treated effect can be biased if unobservable factors affect the participation decision. This problem was addressed by robustness checks and propensity score overlap and balancing properties.

2.8.1 Advantages of PSM

It can be used after an intervention has finished, even with unavailability of baseline data, since it is used to reconstruct pre-intervention characteristics. However, this can be imprecise hence common sense should prevail when deciding which variables should be

2.8.2 Disadvantages of PSM

The main weakness of PSM is that, it relies on matching individuals on the basis of observable characteristics linked to predicted likelihood of participation. Thus if there are any unobserved characteristics that affect participation and which change over time, the estimates will be biased and therefore, affect the observed results. In this study this weakness was addressed by robustness checks, propensity score overlap and balancing properties.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Description of Study Area

3.1.1 Location of the study

The present study was conducted in two divisions of Kyela district named Ntebela and Unyakyusa, particularly in three villages called Busoka, Mababu and Kisyosyo village. The district is located in Mbeya region's southern end. Mbeya itself is located in southwestern Tanzania.

The district lies between 9^0 25' and 9^0 40' latitudes south of Equator and 30^0 and 35^0 41' longitudes East of Greenwich meridian. Kyela borders with Makete District and Ludewa District of Iringa region in the east, with Ileje District in the west, and with Rungwe District in the North. On the south of the district, Kyela borders Lake Nyasa and the Republic of Malawi.

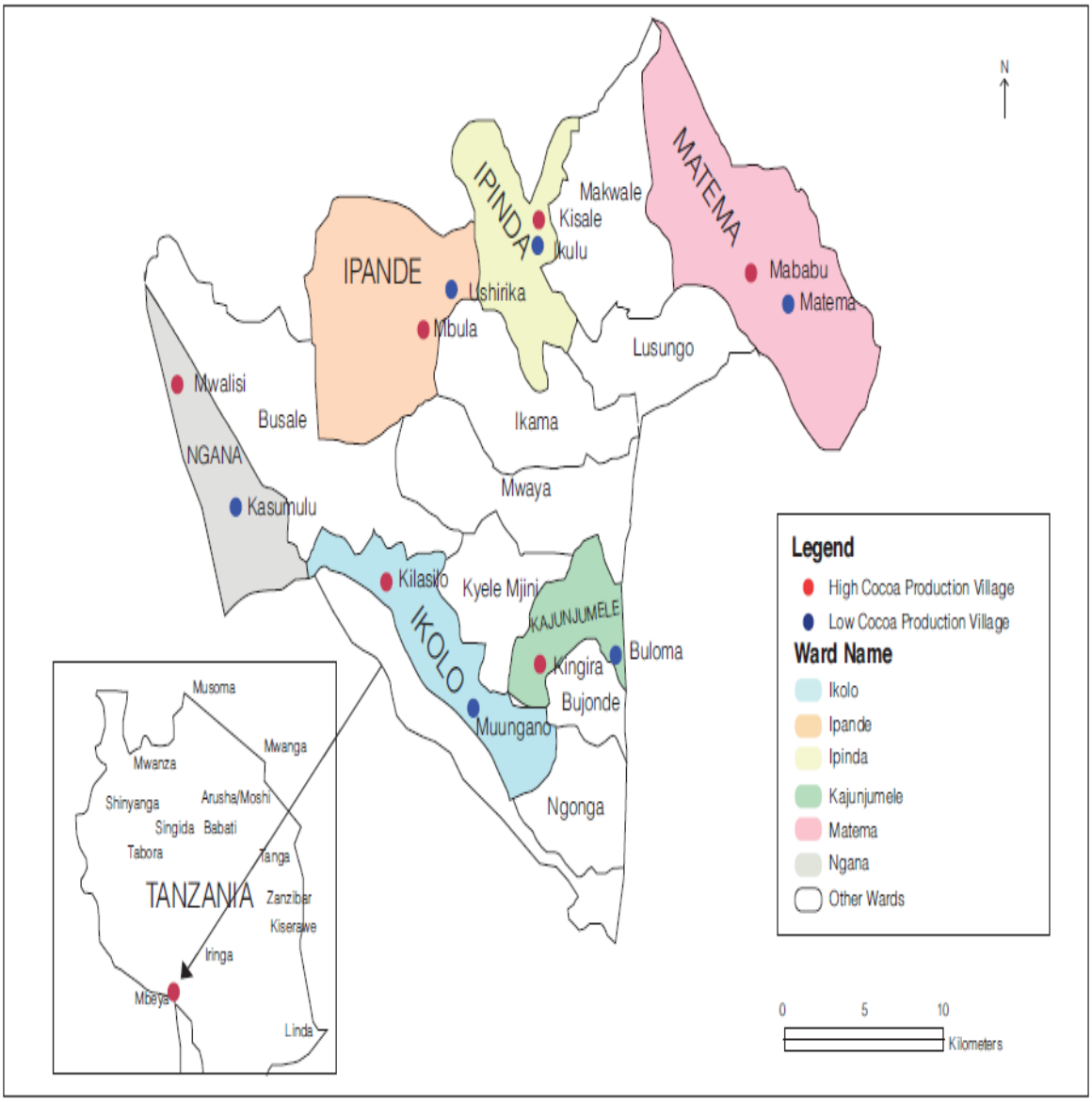

Figure 2: Map of Kyela District showing Ward Boundaries and study sites

Source: Nyamora *et al*., 2012

3.1.2 Population and economic activities

According to NBS (2012), the population of Kyela District was 221490, out of which 106012 were males and 115478 were females. The current population projection is about 282 911 with the growth rate of 2.8% per annum. As for Busale, the Ward has a population of 9246 composed of 4381 males and 4865 females, making 4.2% population of Kyela District. The Household size of Busale ward is 3.7 (URT, 2012). For Matema

Ward, population is 17103 composed of 8145 males and 8958 females making 7.7% of population of Kyela District. The household size of Matema ward is 4.3(NBS, 2012).

The economy of Kyela people depends mainly on agricultural activities, for both crop production and livestock keeping. About 83% of Kyela communities are engaged in agriculture; mostly rice, cocoa and oil palm farming, and 17% are engaged in business, fishing and civil service employment (NBS, 2012). Rice, cocoa and oil palm are the main cash crops used for business transaction, within and outside the district (URT, 2009). Farmers in Kyela District depend heavily on rain fed agriculture due to lack of irrigation.

3.1.3 Research design

The present study adopted a cross- sectional research design. According to Babbie (1994), this method allows the collection of information at once in a single point of time. The design was suitable for this study because of the limited time and financial resources needed during data collection.

3.1.4 Sampling procedures

Two stage stratified sampling method was used to select farm households in this study, the strata was farmers who were group participants and farmers who were not participating in cocoa farmer groups. Kyela District was divided into three growing areas for survey study namely high, normal and low production location. These three villages, whose location represents households that are in high, normal and low production area and where interventions involved in Kyela District, were chosen.

These villages include Mababu, Kisyosyo and Busoka. Then, participants were chosen randomly from the list of organisation members as well as non-organisation members from the list of village members to reflect a balance of population between the two groups. Eventually, the total sample of 182 farmers was obtained for the study of which 100 were group members and 82 were non-members.

3.1.5 Sample size

The sample size was determined using the probability-sampling method given as

$$n = \frac{\left(Nt^2.p.q\right)}{\left(d^2N + t^2.p.q\right)} \quad \text{.....3.1}$$

where N is the number of households in Kyela district, n is the sample size, t is z number which is the required confidence interval (for 95 percent confidence interval t = 1.96), p is possibility for an event to occur (0.5), q is the possibility for an event not to occur (0.5), d (0.075) is an acceptable error rate during sampling (Meral *et al*., 2012).

n= (55373(1.96)2*0.5*0.5)/ (0.075)2*55373+ (1.96)2*0.5*0.5) ≈177 Additional of 23 households was added to have 200 total sample size because impact studies need large sample size; 100 households were members of the groups and 100 was non-members. 23 housed were fairly added because of budget constraint. Eventually at the analysis stage, 18 households were deleted when propensity score overlap and balancing properties was satisfied, thus the total sample size used in the analysis was 182 households of which 100 were group members and 82 non-members.

3.2 Data Collection

3.2.1 Primary data

The study involved multiple data collection tools such as interview schedules, focus group discussion, and information from key informants. The primary data from the interviewees were collected using questionnaires. The tool contained both closed and open ended questions. The open ended questions were used to collect information on the understanding of the respondents concerning better agricultural techniques and sectoral channels through which cocoa is sold. On the other hand, focus group discussions and key informant interviews were used to explore challenges that constrain farmers in cocoa activity.

3.2.2 Pre-testing of the instruments

Before the actual data collection, the instrument for primary data collection was tested by involving members and non-members of the cocoa farmer groups but that was not part of the sample, was targeted to check for validity, suitability, and reliability of information to be collected. The findings were used to revise the tools before the final version of the same which was administered to the research sample.

3.2.3 Data analysis

The collected data were coded using Statistical Package for Social Sciences (SPSS) and analyzed using Stata. Descriptive statistics were carried out to yield means, frequencies, and percentages. To determine factors that influence smallholder cocoa farmer's decision to participate in cocoa producer organizations, probit model (i) was formulated and estimated using Stata.

3.3 Data analysis by specific objectives

3.3.1 Analysis of first objective

The first objective was to compare the income of agricultural organisations' participants and non-participants in Kyela District among cocoa producers. The objective was analyzed using Propensity score matching with probit model as the treatment model to estimate the average treatment effect (ATE).Propensity score was estimated as the probability of being a cooperative member, using the vector X as conditioning factors

$$PS = P(D = 1 \mid X) \quad \text{.....3.2}$$

Then the ATE was calculated as the average of the outcome differences between treated Y(1) and matched controls Y(0).

$$ATE = E[Y(1) - Y(0)] = E[Y(1)] - E[Y(0)]$$

3.3.2 Analysis of second objective

The second objective was to determine socio-economic factors that influence smallholder cocoa farmer's decision to participate in cocoa farmer organisations in Kyela District. The objective was analyzed using the probit model,

$$Y_i = \beta_0 + \beta_1 AGE + \beta_2 SEX + \beta_3 ED + \beta_4 SIZ + \beta_5 LAND + \beta_6 DIST + \varepsilon \quad \text{.....3.3}$$

Where;

Yi = Farmer participation for 1 if household participates in the organisation and 0 if otherwise

β_0=is an intercept.

, β's – are the parameters to be estimated

AGE= Age of household head

SEX= Sex of household head

ED= Years of education of household head

SIZ= Household size

LAND= Size of grown farm land

DIST=Distance to the main market

ε= error term, it stands for the factors which are not captured in the model

3.3.3 Analysis of third objective

Challenges facing cocoa smallholder farmers in Kyela District were counted from the data collection tools. Smallholder farmers were asked to mention the main challenges facing them in cocoa production. Challenges were sorted and ranked according to frequency of being mentioned by farmers using Descriptive analysis.

Table 1: Summary of the independent variables used in PSM, and Probit model

Variable	Description
AGE	Age of household head (Years)
SEX	Sex of household head
ED	Years of education of the household head
SIZ	Household size (Number of people per hhd)
LAND	Size of grown farm land (hectares)
MARKDIST	Market distance (Kilometers)

3.4 Expected Signs of the Variables Coefficients

The age of the household head is used as measure of risk attitude of the farmer. Increase in age of household head is expected to have positive effect group participation due to risk-averse nature of older farmers and wide experience in cocoa cultivation.

Gender of household head is used to capture differences in taste and preference for men and women in farmer group participation. Female headed household are expected to have relatively higher chance of joining farmer groups while male headed household is expected to be less likely to participate in farmer groups. Gender is a vital determinant of household decision to join community associations. This argument could be attributed to the importance of gender in defining specialization of labour supply within a household (Mukundi *et al*., 2012)

Education level of the household is used as a proxy for human capital endowment. Increase in education of the household head (represented by the years of formal schooling) is expected to have positive effect on participation in producer groups. According to Olwande and Mathenge (2010) education enhances the ability of farmers to utilize group and market information which could lower transaction cost thereby making group membership worthwhile.

According to Alene *et al*., (2008) household size accounts for supply of family labour and household consumption level. Large household size is expected to have positive effect on group membership if a household provide labour efficiently. Cocoa land cultivated is expected to have positive effect on group membership. This is because, as land owned increases, competition for land resource among the practiced enterprises decreases and increases in output and marketable surplus.

This would encourage need for participating in farmer groups since farmer group would help to lower the transaction cost of inputs and output (Olwande and Mathenge, 2010). Distance to market capture the travel time and associated costs that influence market

participation (Olwande and Mathenge, 2010). Long distances are expected to have positive effect on group membership.

Table 2: Description and expected sign of variables used in the models

Variable	Description	Expected sign
AGE	Age of household head	(+)
SEX	Sex of household head	(-)
ED	Years of education	(+)
SIZ	Household size	(+)
LAND	Size of grown farm land	(+)
MARKDIST	Distance to the market	(+)

CHAPTER FOUR

4.0 RESULTS AND DISCUSION

4.1 Socio-economic Characteristics of the Respondents

4.1.1 Age of household head

The descriptive analysis results of the study (Table 4.1) shows that, non-group members were averagely younger (by 2.6 years) compared to group members. The observed age difference is significant at 10% and is one of the factors that significantly influences cocoa farmer‘s decision to join/ participate in cocoa farmer organisations in Kyela District.

The present findings confirm the findings of Mukundi *et al*., (2013) and Gyau *et al*., (2013) that agricultural group members are older compared to non-group members because in rural setting, elder famers own enough land compared to younger farmer who mainly rely on inherited land and therefore; the elder farmer finds worthwhile joining farmers' organisations to reduce transaction costs in inputs and output markets.

4.1.2 Experience of the household head

Regarding experience of the household head, the results of the present findings show that household heads who were group members were significantly more experienced compared to household heads who were not participating in cocoa farmers' organisations. One of the reasons is that there is an association between age and experience of the farmer.

Older farmers are experienced compared to younger farmers; this is simply because in rural settings, older household heads have better access to land resource which is an

important factor of production unlike the younger household heads that mainly rely on inherited land (Taruvinga and Mushunje, 2010). This implies that youthful household heads are less likely to join and participate in farmer groups because they are forced to wait longer before they own ample production resources which could enable them to participate in farmer group activities (Mathenge *et al*., 2010; Hisatoshi and Qun, 2015). This study findings confirm the findings of Taruvinga and Mushunje (2010) and Mathenge *et al*., (2010) that household head who are group members are more experienced compared to non-group members.

4.1.3 Land size for cocoa production

The present findings show that the average cultivated land sizes (acres) for cocoa of group members are significantly higher compared to non-group members. One of the reason can be due to the fact that group members were older compared to non-group members and in rural settings, older household heads have better access to land resource which is an important factor of production unlike the younger household heads that mainly rely on inherited land (Taruvinga and Mushunje, 2010;). The findings confirm the findings of Martey *et al*., (2012) and Mukundi *et al*., (2013) that household head who are group members, significantly have larger land sizes for cultivation compared to non-group members.

4.1.4 Distance to the market

The descriptive statistics of the present study show that household head who were group members, were significantly faced with longer distance in kilometers to the market compared to non-group member. The present findings support the findings of Hisatoshi and Qun (2015) and Mathenge *et al*., (2010) that group members were faced with longer distance to the market compared to non-group members. The reason behind is that

distance to the market is an indicator of the relative effect of transaction costs to the household's socio-economic activities. Therefore, as distance of the household to the nearest agricultural market increases, smallholders would be better off by organizing to lower their transaction costs (Markelova and Meinzen-Dick, 2009)

4.1.5 Years of schooling

The findings of the present study show that on average cocoa group members in Kyela District significantly have more years of schooling compared to non-group members. This can be one of the determinants of the group membership in the said District because formal education is an essential requirement for utilization of market information whereby it enhances understanding of market dynamics resulting into informed group and market participation decision (Martey *et al*., 2012 and Mukundi *et al*., 2013). The findings of this study support the findings of Musyoki *et al*., (2013) that household head who participate in group membership have more years of schooling compared to non-group members.

4.1.6 Quantity of Cocoa harvested

The observed descriptive analysis of the present findings show that on average; household heads participating in cocoa farmer groups in Kyela District significantly harvested large quantity of cocoa (kg) compared to non-group members. The observed difference can be attributed to the adoption of improved farming technologies among group members pruning techniques, diseases and pests control techniques and post-harvest loss control conducted by Techno-save as partner agency.

4.1.7 Cocoa price

The present findings show that household members, who were participating in farmer groups, significantly sold their cocoa yield at an average higher price compared to household head who were non-group members. This difference can be due to the reasons that cocoa produced by group members were of good quality compared to cocoa produced by non-group members. Group members receive training on sorting and grading, better fermentation techniques and drying techniques given by partner agency (Techno-save).

Also improved bargaining power as a result of collective action can be another reason as to why group members received higher price compared to non-group members in the study area. The present findings support the findings of Hisatoshi and Qun (2015) and Musyoki *et al*., (2013) that cooperative participants sold their produce at higher price compared to non-cooperative participant.

4.1.8 Cocoa income

Regarding cocoa production; the findings of the present study show that the net cocoa income of group participants is significantly higher than those of non-participants. This can be attributed to higher profitability of cocoa production by group participants, which result from significantly higher price and yield of cocoa production by group members. The observed results of the present study supports the results of Hisatoshi and Qun (2015) and Imbens *et al*., (2012) that group participants were significantly earning higher income compared to no-participants.

4.1.9 Household size

The findings of the present study show that the difference in average household size between cocoa group members and non-group members in the study area was insignificant. However, the household size of the family in the study area was slightly below the national average family size of 5.0 per household in the 2012 population census.

Table 3: Descriptive statistics of group members and non-members

Variable	Group-members	Non-members	Overall	t-value
Age (Years)	55.55	52.93	54.24	1.6608*
Experience (Years)	34.09	30.68	32.39	2.1569**
Land size (Acres)	2.05	1.55	1.80	3.2951**
Market distance (Km)	1.49	0.03	0.76	14.8439***
Family size	4.67	4.56	4.62	0.4471
Years of schooling	7.24	6.11	6.68	2.4684***
Quantity (Kg)	1040.07	701.20	870.64	3.7773***
Cocoa price (TSh)	4,790	3,678.05	4234.03	25.1678***
Cocoa income (TSh)	4,639,661	2,279,465	3,459,563	5.8949***

Note: *, ** and***, *represents significance at* 10%, 5% and 1% *respectively*.

4.2 Factors that Influences Smallholder Cocoa Farmer's Decision to Participate in Cocoa Farmer Organisations in Kyela District

One of the objectives was to determine Socio-economic factors that influence smallholder cocoa farmer's decision to participate in cocoa farmer organisations in Kyela District. Probit regression model was fitted with the data collected through survey and

the results are discussed under their respective sub headings in the following sections. Probit regression results are presented in Table 4.

4.2.1 Sex of the household head

Sex is said to be a vital indicator of household decision making whereby in traditional setup, key decisions in a household are made by men. Sex also depicts preferences of male heads and female household heads. Findings in table 4.2 show that male headed households are less likely to join groups by about 17.78% and the coefficient is significant at 1%. The findings agree with observation of Musyoki *et al.*, (2012) and Mukundi *et al*., (2013) that sex is crucial determinant of household decision to join community associations. This argument could be attributed to the importance of sex in defining specialization of labour supply within rural household.

4.2.2 Land size

Total land in acres owned by the household also was one of the variables included in the probit regression model. Holding other factors constant, positive significant coefficient of the total land owned by the household head implies that per unit increase in the total land of the household head increases the probability of participation in farmer groups by about 6.14%. The findings confirm the findings of Martey *et al.*, (2012) and Mathenge *et al*., (2010) that larger farms have potential for a household to increase its production hence there is a need for market participation of which farmer groups provides opportunity.

4.2.3 Distance to market

Closeness to the market has economic implication on the household farm and market activities (Owuor, 2009).

A positive significant coefficient of the household distance to the market is an indicator of the relative effect of transaction costs to the household's socio-economic activities. The results show that per unit increase in distance to the market increases probability of participation in farmer group initiatives by 71.73%. This result of the present study confirms a result done by (Markelova and Meinzen-Dick, 2009; Mukundi *et al*., 2013) that as distance of the household to the nearest agricultural market increases, smallholders would be better off by organizing to lower their transaction costs.

4.2.4 Education level of the household head

Education level of the household head had positive and significant relationship on the smallholder's decision to participate in the farmer' groups. Results show that household head with formal education and more years of schooling are likely to participate in groups by 9.52%. The result supports findings by Martey *et al*., (2012) and Mukundi *et al*., (2013) that formal education is an essential requirement for utilization of market information whereby it enhances understanding of market dynamics resulting into informed market participation decision.

4.2.5 Age of the household head

Age was one of the variables included in the probit regression model. Holding other factors constant, positive significant coefficient of the household age implies that per unit increase in the age of the household head increases the probability of participation in farmer groups by about 0.64%.

In rural settings, older household heads have better access to land resource, owns capital, experience, knowledge and labour which are important factors of production unlike the younger household heads that mainly rely on inherited land (Taruvinga and

Mushunje, 2010). This implies that youthful household heads are less likely to join and participate in farmer groups because they are forced to wait longer before they own ample production resources which could enable them to participate in farmer group activities.

4.2.6 Household size

With regards to household attributes; the coefficient on number of household members is positive but insignificant relationship on the smallholder's decision to participate in the farmer' groups.

Table 4: Factors influencing farmer's decision to participate in farmer groups

Variable	Coefficient	Standard Errors	P value	Marginal effects
Age of head	0.0288	0.0129	0.026**	0.0064
Sex of head	-1.1501	0.3179	0.000***	- 0.1778
Education level	0.4294	0.2457	0.081*	0.0952
Household size	0.1450	0.0982	0.140	0.0321
Land size	0.2768	0.0950	0.004***	0.0614
Distance to mkt	3.2348	0.8030	0.000***	0.7173
Constant	-4.3176	1.0206	0.000	

Note: *, ** and***, *represents significance* at 10%, 5% and 1% respectively. Log likelihood = -27.1388 ; $\chi 2 = 63.95$ and Pseudo R2 = 0.7833

4.3 Propensity Score Matching Analysis Results

The first objective was to compare the income of agricultural organisations' participants and non-participants. The propensity score matching was used to estimate the Average Treatment Effects (ATE) on income of farmer group membership in Kyela District. The

ATE was calculated as the average of the income differences between cocoa farmers who are cocoa group members (treated Y (1)) and farmers who non-members (matched controls Y(0)). The propensity score matching coefficient of sampled respondents which is referred to as the average treatment effect (ATE) was positive amounted to TSh 1211344 (Table 5).

This result indicates that being a group participant, a cocoa smallholder farmer in Kyela District earnsTSh1211344 per year more than non-group cocoa farmer. This observed difference is significant at 1%. The observed findings confirm those obtained through descriptive statistics which show that group members earn more cocoa income compared to non-group members. The reason behind can be due to low cocoa transaction costs and large price for group members compared to non-members which is the result of increased bargaining power among cocoa group members.

Table 5: The difference in income of agricultural organisations' participants and non-participants (n=182)

Variable	Coefficient	Standard Error	P-value
Cocoa income	1211344	423453.9	0.004***

Note:*, ** and *** *represent significance at 10%, 5% and 1% respectively.*

4.4 Challenges facing Cocoa Producers in Kyela District

In the study, 182 respondents were asked if they face any Challenge/ Challenges in cocoa activities. The findings revealed that 99.5% of the respondents said yes while only 0.5% said no meaning that they do not face any challenge. This implies that almost all Cocoa producers face different challenges in Cocoa production. However, to determine the intensity (which challenge is facing more farmers), the percent of farmers faced by a

specific challenge was computed for each challenge given the number of respondents because most challenges are shared by many respondents.

4.4.1 Pests and disease

Of all the challenges, pests and diseases was reported by 86% of the Cocoa farmers as the major challenge (Table 6). The frequent invasion of pests and diseases lead to significant loss of cocoa production and therefore lead to loss of cocoa income among cocoa farmers in Kyela District. This is due to the fact that pests and diseases caused remarkable losses of seedlings as farmers applied no agrochemicals. To overcome this problem, farmers used local methods such as to bring out the affected cocoa pod sand other local methods because cocoa produced in Kyela District is organic. However these local methods do not bring much success despite it cost farmers.

4.4.2 Price instability

Price instability marks the second largest challenge in the study area. The frequent rise and fall of price was reported by 82.5% of the Cocoa farmers as the major challenge (Table 6).

The abrupt frequent fall of prices lead to significant loss of cocoa revenue largely to non-group members. This calls for initiatives to secure guard cocoa producers.

4.4.3 Poor market

Table 6 presents the summary of challenges which cocoa farmers face in Kyela District. Twenty percent (20 %) of cocoa farmers mentioned lack of reliable market as one of the challenges of growing cocoa in the District. They claimed that middlemen occupied a large share in the market and therefore they set price of cocoa to maximize their profit.

Sometimes they lend money to farmers in return of cocoa produce at very low price. However, the study found out that all farmers who face this challenge are the non-group members in cocoa production.

4.4.4 Lack of government support

The issue of lack of government support in terms supervising and regulating cocoa buyers was also reported by 16% of the respondents (Table 6). It was learnt that four companies were dominating as main cocoa buyers in the Kyela District. These companies include Bio lands International, Hai Tanzania Company, Olam Tanzania Limited and Mohammed Enterprises Ltd. How eve rall non-group members reported to sale their produce through middlemen and very rarely they sale through the listed companies. These middlemen are not supervised and regulated and therefore, they set very low price which reduces farmers' cocoa income.

4.4.5 Unavailability of better farm implements

In the study area, farmers did not have important farm implements to simplify farming facilities. It was observed that about 10.5% of the respondents revealed that lack of pruning facilities impinged on their efforts to improve cocoa production and 1% revealed that lack of harvesting facilities hindered to increase output (Table 6).

4.4.6 Lack of storage facilities

About 10% of the respondents reported that lack of storage facilities impede to increase cocoa income (Table 6). They asserted that they are forced to sale their cocoa produce even if the price is very low because they do not have an option to store their produce in order to wait for when the price is gone up. However, this challenge is common only to

non-group member of cocoa because all cocoa groups from which sample was drawn they do provide storage service to group members.

4.4.7 Impact of Climate change

The impact of climate change is global in nature and it affects the most vulnerable poor farmers in Africa. This is supported by 5% of the respondents in the study area. They ascertain that changing climate have significantly brought to loss of cocoa yields and other crops in Kyela District.

4.4.8 Low knowledge of production

Another challenge which was reported by 1.5% of the respondents was low knowledge of production. Alost all cocoa farmers practice local cocoa farming including local seeds and no-use of industrial inputs. This impedes to increase cocoa yield.

4.4.9 Poor transport infrastructure

As well as 1.5% of the respondents revealed that transport system is the challenge toward earning high income from cocoa production. The respondents reported that the problem become serious in rainy season when they are searching for market.

Table 6: Challenges facing cocoa smallholder farmers in Kyela District (n=182)

Challenge	**(%)**
Pests and diseases	86
Price instability	82.5
Poor markets	20
Lack of government support	16
Unavailability of better farm implements	11.5
Lack of storage facilities	10
Climate change	5
Low knowledge of production	1.5
Poor transport system	1.5

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The first objective of this study was to compare the income of agricultural organisations' participants and non-participants in Kyela District. It was hypothesized that there is no significant difference between cocoa organisations participants' income and non-participants in Kyela District.

The findings indicate that smallholder cocoa farmers who participated in cocoa farmer groups earn more income of aboutTSh1211344 per year than non-participants. The observed difference is significant at a significance level of $p<0.01$. On the basis of these findings, the hypothesis that there is no difference between cocoa organisations participants' income and non-participants in Kyela District was rejected.

The second objective was to determine socio-economic factors that influences smallholder cocoa farmer's decision to participate in cocoa farmer organisations in Kyela District. It was hypothesized that socio-economic factors have no significant influence on smallholder cocoa farmer's decision to participate in cocoa producer organisations in Kyela District.

The findings indicated that distance to market have an influence on smallholder cocoa farmer's decision to participate in cocoa producer organisations in Kyela District at a significance level of $p < 0.01$. It was revealed that sex of the household head have an influence on smallholder cocoa farmer's decision to participate in cocoa producer organisations where male headed households are less likely to join groups at $p < 0.01$.

It was also observed that land size and formal education of the household heads have an influence on smallholder cocoa farmer's decision to participate in cocoa producer organisations in Kyela District. The revealed influences were significant at the significance level of $p<0.01$ for the land size and $p<0.1$for formal education. Age of the household head was significant at the significance level of $p<0.05$. On the basis of these findings, the hypothesis that socio-economic factors have no influence on smallholder cocoa farmer's decision to participate in cocoa producer organisations was also rejected.

The third objective was to examine the challenges facing cocoa farmers in Kyela district. About 86% were faced with pests and diseases challenge, 82.5% price instability, 20% poor market, 16% lack of government support.

Also 10.5% were faced with unavailability of better farm implements, 10% lack of storage, 5% climate change, 1.5% low knowledge of cocoa production and 1.5% poor transport system.

The results of the study support the idea that agricultural cooperatives/ organisations can be an important institution to reduce transaction cost among smallholder farmers. Collective action is sometimes indicated as a prerequisite for organisations to be successful – likely as a reaction on the failure of government-controlled agricultural cooperatives in centrally-planned economic systems. The results indicate that it is importance for organisations to function in a way that is compatible with famers' individual incentives.

5.2 Recommendations

On the basis of the study, the following recommendations are made;

(i) To establish a cocoa marketing board: Most of cocoa produced in Tanzania is consumed abroad, thus the Ministry of Agriculture and Food Security should create a cocoa board to promote Tanzania's cocoa industry and markets.

(ii) To establish more farmers' organisations: Farmers' incomes are limited by high transaction costs and low bargaining power which lead to low price of cocoa, disorganised pricing systems, and growers are price takers. Currently almost all non-organisation participants cocoa farmers sale their cocoa produces through middlemen and very rarely they sale through registered companies. The establishment of farmer's organisations could help to reduce the transaction costs and increase their bargaining power through collective action.

(iii) Investment in rural education and transport infrastructure: This is very essential for the collective action to achieve market linkage and informatory roles among smallholder farmers.

(iv) Limitations and future studies: The study was trying to address the role of collective action in cocoa marketing among cocoa smallholder farmers in Kyela District.

Basically, the study was narrowed down to treatment effect on income among cocoa farmer organisations where Average Treatment Effect (ATE) was estimated using propensity score matching. In this study, Average

Treatment on the treated (ATT) was not estimated due to the fact that there was no baseline data to be able to estimated difference-in-difference.

(v) Further studies should be carried out to investigate the role of collective action by estimating ATT (Difference-in-difference estimation).

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APPENDIX

Appendix 1: Farmers questionnaire

Questionnaire No

Collective action, transaction costs and market access in Kyela District Tanzania

PART I: SURVEY INFORMATION AND HOUSEHOLD CHARACTERISTICS

I-A: INTERVIEW INFORMATION

Interviewer's name	
Name of head of household	
Village name	
Name of sub-village (hamlet)	
Name of ward	

DATETIME START INTERVIEW END

COMPLETION STATUS

1=Complete with selected household

2=Complete with replacement-refusal

3=Complete with replacement-not found

4=Incomplete

I-B: SOCIAL ECONOMIC PROFILE

1. Name of farmer group …….

2. Core Commodity (s) ……

3. Type of an organisation.....

4. Sex of household head, 1= Male 0 = Female.....

5. Age of household head in years……..

6. Highest education attained; 1=no formal education, 2=primary, 3=secondary, 4=beyond secondary.....

7. Household size……..

8. Number of household workers……..

9. Occupation (1 = day laborer, 2 = Paid employment, 3 = Studying, 4= Operate own enterprise 5= home maker, 6 = other specify) ……..

10. Size of grown farm land (Acres)…….

11. Willingness to accept new agricultural techniques; 1= less, 2=normal, 3=very willing, 4=not willing……With any answer above, why? Explain…….....

……

……

PART II: IMPACT OF FARMER' GROUP ON MARKET ACCESS

II-A Market access

1. Price of cocoa in Tshs per kilogram……

2. What is the cost of land used for cocoa production? .....

3. What is the cost of cocoa seeds used in your farm? ……

3. What is the cost of fertilizer use per year?.....

4. How much it cost for the extension services per month? ……

5. How much it cost for the pest control per month? …….

6. How much does it cost for weed control per month? …….

7. How much does it cost for disease control per month? ……

8. What is the amount of cocoa in kilogram sold per month? .....

II-B Market participation and Transaction cost

9. How much does it cost to store cocoa per month? .....

10. How much does it cost to advertise cocoa to the major buyers per month? .....

11. How much does it cost to deliver cocoa to the major district market per month? .....

12. The amount of information cost per month

The costs of obtaining price and product information ……..

The cost of finding a buyer/seller ……..

13. The amount of negotiation cost per month

Commission costs ……

Drawing up contracts costs ……

Or the costs and time spent bargaining over the exchange …….

14. The amount of monitoring and enforcement costs per month

All the costs necessary to enforce the exchange or contract …….

15. Do you think the organization to which you belong has made any contribution towards the reduction of transaction cost? 1=Yes, 0=No…….I f Yes/ No why? Explain……

……

…….

16. What is the amount labour used to harvest cocoa per month? .....

17. What is the harvest charge per labour per month? ……..

18. What materials/tools if any which are used in harvesting and their respective costs?

(i)…….....Cost……

(ii)……Cost……....

(iii)……Cost…….

19. What is the cost of processing cocoa before selling (in Tshs)? ……..

20. Are there any sectoral channels through which cocoa is sold; 1=Yes, 0=No……; If yes which channels do you use? List them,

(i)……

(ii)……..

(iii)…….

(iv)…….....

21. What is the distance (in kilometer) from group meeting location/ home (for non-members) to the major district market? .....

22. What time in hours it takes to get to the major district market? .....

23.How is the road conditions from group meeting place/ home to major markets?

KEY:

1 = Bad; Group meeting place and surrounding area connected by dirt road only. Road is uneven, difficult to maneuver, and may not be passable during the rainy seasons.

2 = Average; Group meeting place and surrounding area connected by gravel road. Road is fairly flat and accessible most of the year

3 = Good; 2 kilometers or less from a paved road that connects to the major district market …….

24. Is the Partner agency (Techno serve) actively managed to link your group to other chain actors (for ex-ample buyers)? (0 = No, 1 = Yes) …….

25. Do you think the organization helped you easy access the market? (5=Very much, 4 = Much, 3.Somehow, 2. Little, 1. Very little, 0= I do not know)……

26. Do the organization you belong to offer market information service with other channels (eg. Buyers)? 1=Yes, 0=No

If yes; 1= little, 2= Somehow, 3= very much…….

27. I s the organization you belong to offer negotiation service with buyers? 1=Yes, 0=No …….

If yes; 1= little, 2= Somehow, 3= very much…….

28. Does the organization you belong to offer monitoring and enforcement service with buyers? 1=Yes, 0=No…….

If yes; 1= little, 2= Somehow, 3= very much…….

29. Does the organization you belong to offer processing skills service? 1=Yes, 0=No…….

If yes; 1= little, 2= Somehow, 3= very much…….

30. Does the organization you belong to offer storage service? 1=Yes, 0=No…….

If yes; 1= little, 2= Somehow, 3= very much…….

31.What are challenges do you face in Cocoa activity? (List them)

(i)…….

(ii)……

THANK YOU FOR YOUR COOPERATION