

UNIVERSITY OF GHANA

COLLEGE OF BASIC AND APPLIED SCIENCES

**CONTRACT FARMING AND RICE QUALITY UPGRADING: ASSESSING
SMALLHOLDER FARMERS' MOTIVATION, PERFORMANCE AND
CONSTRAINTS UNDER THE BUSINESS SERVICES AND FARMERS'
ORGANISATION (ESOP) IN TOGO**

BY

KOKOU EDOH ADABE

(ID. 10444652)

**THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN
PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF
PhD AGRIBUSINESS**

DEPARTMENT OF AGRICULTURAL ECONOMICS AND AGRIBUSINESS

DECEMBER, 2017

DECLARATION

This thesis entitled “Contract Farming and Rice Quality Upgrading: Assessing Smallholder Farmers’ Motivation, Performance, and Constraints under the Business Services and Farmers’ Organisation (ESOP) in Togo” is the results of research work undertaken by Kokou Edoh Adabe in the Department of Agricultural Economics and Agribusiness, University of Ghana, under Supervision of Dr. Irene S. Egyir, Dr. John K.M. Kuwornu, Dr. H. Anim-Somuah and Dr. Abbevi G. Abbey. It has never been submitted in whole or in part for any degree in this University or elsewhere. References to other people’s work are duly acknowledged.

.....

KOKOU EDOH ADABE

(PhD Candidate)

This Thesis has been submitted for examination with our approval as supervisors:

.....

DR. IRENE S. EGYIR

(Principal-Supervisor)

.....

DR. JOHN K.M. KUWORNU

(Co-Supervisor)

.....

DR. H. ANIM-SOMUAH

(Co-Supervisor)

.....

DR. ABBEVI G. ABBEY

(Co-Supervisor)

ABSTRACT

Contract farming is emerging as a promising way to upgrade domestic rice quality in Togo. The Non-Government Organisation '*Entreprise Territoir et Développement*' (ETD) has started promoting a kind of contract farming scheme called '*Entreprise de Service et Organisation de Producteurs*' (ESOP) in the country. The rewards from contract farming could be substantial for smallholder farmers; yet there is a serious concern about the farmers' ability to stay in the partnership for long term because of constraints that they face. Based on the Modern Contract Theory and the Impact Evaluation Theory, this study sought to address the following issues: farmers' motivation to work under ESOP's contract farming, the impact of ESOP contract farming on farmers' performance and the constraints that farmers face in ESOP's contract farming. Primary data were collected from a total of 414 smallholder rice farmers comprising 186 ESOP contract farmers and 228 non contract farmers selected using a multiple stage sampling techniques in three (3) out of the five (5) Regions in Togo. Farmers' motivation and constraints under ESOP contract farming were assessed using Factors Analysis and Cluster Analysis. The impact of contract farming on farmers performance was assessed using the Propensity Score Matching Model and the Endogenous Switching Regression Model to compare the results. The results showed that i) incentive elements in the ESOP contract terms, the prevailing input output market condition in the country and farmers' need for a reliable source of income were behind their motivation to work under ESOP contract farming, ii) by participating in ESOP contract farming, the rice yield was increased by 14%, revenue by 32%, net benefit by 92,200 FCFA/Ha, and paddy quality upgraded from grade IV (poor) to grade I (premium), iii) ESOP contract farmers face three groups of constraints: a) the price formula used by ESOP is not satisfactory b) ESOP shows no respect to the agreed payment mode and c) lack of solidarity within the Farmer Based Organisation. If these constraints are not well addressed, the ESOP rice contract scheme will gradually collapse because about 45% of farmers will exit due to the lack of appropriate incentive elements in the contract, 28% because of lack of cash and carry method of payment, and 27% because of lack of solidarity within the Farmer Based Organisation. The findings suggest that a policy intervention that facilitates capital access by ESOP from Financial Institutions is needed to avoid the contract scheme's collapse. A new design of contract should include more incentive elements such as the split quality premium price, the respect of the contract in terms of cash and carry payment method and training on solidarity within the Farmer Based Organisation.

DEDICATION

This thesis is dedicated to my beloved mother, the late Kponvi Ama.



ACKNOWLEDGEMENTS

This thesis has received support from many people and organizations. I am profoundly grateful to *Programme de Productivité en Afrique de l'Ouest Projet Togo* (PPAAO-Togo) and *Institut Togolais de Recherche Agronomique* (ITRA) for the scholarship received for this PhD programme. Special thanks go to my committee of thesis supervisors : Dr. Irene S. Egyir, Dr. John K. M. Kuwornu, Dr. H. Anim-Somuah and Dr. Abbevi G. Abbey for their valuable comments on my work and for their many years of guidance.

I express my profound gratitude to the Head of Department of Agricultural Economics and Agribusiness, Professor Daniel Sarpong, and to all the staff of the department for their sincere support and advice during my PhD programme. I thank all the staff of International Food Policy Research Institute (IFPRI-Accra) for the sincere support received during my six months internship programme at their Institute. I am grateful to my PhD colleagues from ITRA: Komla Ablede and Kossi Koudjega for the various modes of support they gave me.

I am grateful for the support and collaborative exchange from my fellow PhD students, especially Alfred Asuming Boakye, Isaak Manu, Mavis Boimah, Akua Agyeiwaa, Alhassan Andani, Nana Kofi Safo, Ayerakwa Hayford Mensah, Emmanuel Bimpeh, Richard and Amevenku from Ghana, Essossinam Ali from Togo, Jaures Amegnaglo, Armel Novide and Guilbert Adimoti from Benin; Mohamed Porgo and Janvier Metouole from Burkina Faso, Kemeze Francis and Sandra from Cameroon. I express my sincere gratitude to my family members and my beloved Romualdine for their support and encouragement. My sincere thanks go to the Togo Ministry of Agriculture, to ETD, to ESOP and to all the farmers and friends who facilitated my field work and data processing. May anyone who contributed to the success of this thesis find here my sincere thanks.

K. E. Adabe

TABLE OF CONTENTS

DECLARATION	i
DEDICATION	iii
ACKNOWLEDGEMENTS	iv
LIST OF TABLES	ix
LIST OF FIGURES	xi
LIST OF ABBREVIATIONS	xii
CHAPTER ONE	2
INTRODUCTION	2
1.1 Background of the Study	2
1.1.1 Presentation of Togo and its agricultural profile	2
1.1.2 The rice sector in Togo	3
1.1.3 Contract Farming	6
1.1.3 ESOP contract farming	7
1.2 Problem Statement	8
1.3. Objectives of the Study	10
1.4 Relevance of the Study	11
1.5 Organization of the Thesis Report	13
CHAPTER TWO	15
LITERATURE REVIEW	15
2.1 Introduction	15
2.2 Contract Farming	15
2.2.1 Definition and typology of contract farming	15
2.2.2 Conditions under which contract farming is viable	19
2.2.3 Motivation Factors for Contract Farming	21
2.2.4 Constraint Factors in Contract Farming	29
2.2.5 Impact of Contract Farming on Farmers	31
2.3. The Domestic Rice Sector in Togo	36

2.3.1 Overview of the Togolese domestic rice sector.....	36
2.3.2 Constraints in domestic rice value chains.....	37
2.3.3 Pattern to upgrade domestic rice quality	39
2.4 Reviews of Methodological Approaches in Contract Farming.....	41
2.4.1 Motivation and constraints in contract farming identification approaches ..	41
2.4.2 Impact Evaluation approaches.....	45
2.5 Reviews of Theoretical Approaches	48
2.5.1 Modern contract theory	48
2.5.2 Impact evaluation theory	53
CHAPTER THREE	59
METHODOLOGY OF THE STUDY	59
3.1 Introduction	59
3.3 Conceptual Framework of the Study.....	59
3.2 Methods of Data Analysis	63
3.2.1 Analysis of farmers' motivation and constraints: Factor Analysis and Cluster Analysis	63
3.2.2 Analysis of the impact of ESOP: Propensity Score Matching (PSM) and Endogenous Switching Regression Model (ESRM)	70
3.2.3 Analysis of farmers' constraints: Factor Analysis and Cluster Analysis	85
3.4 Method of Data Collection.....	85
3.4.1 Description of the data collection process	85
3.4.2 Instrument for data collection.....	86
3.5 Description of the Study Area.....	88
3.6 Sampling Technique.....	88
CHAPTER FOUR.....	92
RESULTS AND DISCUSSION	92
Introduction	92
4.1 Presentation of the Profile of Respondents	92
4.1.1 Socioeconomic characteristics.....	92

4.1.2 Agriculture technologies used by farmers	95
4.1.3 Presentation of the input, the cost and the performance in rice production .	96
4.2 Rice Farmers' Motivation for Contracting with ESOP	100
4.2.1 Presentation of farmers' motivation factors	100
4.2.2 Latent factors behind farmer's motivations.....	101
4.2.3 Variation in Farmers' motivation to contract with an ESOP.....	106
4.3 The Impact of ESOP Contract Farming on Rice Farmers' Performance.....	110
4.3.1 Probability of participation in ESOP contract farming	112
4.3.2 Estimation of the average treatment effect of ESOP contract farming on farmers' performance	114
4.3.3 Factors affecting yield performance	116
4.3.4 Factors affecting farmers' revenue and net benefit performance	119
4.3.5 Factors affecting the paddy purity performance.....	122
4.3.6 Participating in ESOP contract and paddy quality upgrading	124
4.4 Constraints that Rice Farmers' Face with ESOP Contract Farming	126
4.4.1 Rank of constraints in ESOP rice contract farming.....	126
4.4.2 Latent factors behind the constraint ESOP farmers faced.....	128
4.4.3 Variation in constraints according to ESOP farmers socioeconomic and environmental conditions	130
4.4.4 Constraints of non ESOP contract farmers.....	133
CHAPTER FIVE	137
CONCLUSION AND RECOMMENDATIONS	137
5.1. Introduction	137
5.2 Farmers motivations for working under ESOP contract farming in Togo	137
5.3 The impact of ESOP contract farming on rice farmers 'performance.....	139
5.4 Farmers constraints under ESOP contract farming in Togo.....	141
5.5 Conclusion.....	142
5.6 Recommendations	143
5.5 Future Research.....	146

REFERENCES 147

APPENDICE..... a



LIST OF TABLES

Table 2. 1: Contract farming models and their characteristics.....	17
Table 2. 2 : List of impact evaluation approaches and their assumptions	55
Table 3. 1 : List of motivation factors for contract farming	63
Table 3. 3: List of constraints farmers face in contract farming.....	64
Table 3. 4: Independent variables description in Probit model	71
Table 3. 5: Standardised bias check of independent variables.....	75
Table 3. 6: Joint significance test and Psoeud-R2 test.....	75
Table 3. 7: Outcome variables description (Yi).....	76
Table 3. 8: Variables used in switching regression model.....	81
Table 3. 9: Descriptive statistics of variables included in the Switching regression models	82
Table 3. 10: List of contract scheme in Togo and year of creation	90
Table 3. 11: Sample size and distribution.....	90
Table 4.1: Respondent demographic characteristics	93
Table 4.2: Social and infrastructure environment.....	94
Table 4.3: Asset and wealth indicator of respondents	95
Table 4. 4: Agriculture technology used by respondents.....	96
Table 4. 5: Quantity of input used in rice production	97
Table 4.6: Rice production Cost structure of respondent	98
Table 4.7: Performance indicators	99
Table 4. 8: Descriptive statistics of ESOP contract farmers’ ex-ante motivation factors	101
Table 4. 9: Rotated component matrix for ESOP contract farmers’ ex-ante motivation	102
Table 4. 10: Cluster mean scores for motivation factor scores derived from K-mean clustering for ESOP contract farmers	107
Table 4. 11: Motivation cluster membership by characteristics of contract farmers.....	109
Table 4. 12: Factors affecting participation in ESOP rice contract farming, results from Probit model use in PSM and the selection equation from ESRM.....	113
Table 4. 13: Estimation of average treatment effects (ATE) of ESOP contract on farmers performance, results from PSM and ESRM	116
Table 4. 14: Factors affecting farmers paddy yield performance, results from switching regression	117
Table 4. 15: Factors affecting farmers revenue and net benefit performance.....	121

Table 4. 16: Factors Affecting Farmers’ paddy Purity Performance, results from switching regression.....	123
Table 4.17: Paddy quality upgrading, results from endogenous switching regression and AGMARK Standards	125
Table 4.18: Farmers’ Constraints under ESOP rice contract farming	127
Table 4.19: Rotated component matrix of constraint of being in ESOP contract farming	129
Table 4. 20: Cluster mean for constraints factor scores derived from K-mean clustering for contract farmers.....	131
Table 4. 21: Constraints cluster membership by characteristics of contract farmers	132
Table 4. 22: Reasons why farmers are not in ESOP contract	134
Table 4. 23: Rotated Component Matrix of constraints for not being in ESOP contract farming.....	135



LIST OF FIGURES

Figure 3. 1 : Conceptual Framework for contract farming and rice quality upgrading 61

Figure 3. 2 : Map of Togo with ESOP Contract Scheme locations 89

Figure 4. 1 : Rice production cost in percentage98

Figure 4. 2 : Bowls used by traders (at the left a normal bowl, at the right a distorted bowl) 104



LIST OF ABBREVIATIONS

AGMARK	: Agriculture and Marketing
CA	: Cluster Analysis
CAGIA	: Central d'Achat et de Gestion d'Intrants Agricoles
CF	: Contract Farming
CIDR	: Centre International de Développement et de Recherche
DSID	: Direction de la Statistique de l'Information et de la Documentation agricole
ESOP	: Entreprise de Services et Organisations de Producteurs (Business Services and Farmers' Organisation)
ESRM	: Endogenous Switching Regression Model
ETD	: Entreprises Territoires Développement
FA	: Factors analysis
FAO	: Food and Agriculture Organisation
FAOSTAT	: Food and Agriculture Organisation Statistics
FBO	: Farmer Base Organisation
FCFA	: Franc des Communautés Financières Africaines
GRISP	: Global Rice Science Partnership
IRRI	: International Rice Research Institute
ITRA	: Institut Togolais de Recherche Agricole
MAEP	: Ministère de l'Agriculture de l'Elevage et de la Pêche
NERICA	: New Rice for Africa
NGO	: Non Government Organization
NRDS	: National Rice Development Strategy
PCA	: Principal Component Analysis
PSM	: Propensity Score Matching
PPAAO-Togo	: Programme de Productivité Agricole en Afrique de l'Ouest- Projet Togo

PNIASA :Programme National d'Investissement Agricole et Sécurité Alimentaire

RNA : Recensement National de l'Agriculture

USDA : United States Department of Agriculture

WTO : World Trade Organization



CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

1.1.1 Presentation of Togo and its agricultural profile

Togo is a small country (56.600 km²) in West Africa and bounded in North by Burkina Faso, in the South by the Gulf of Guinea, , in the East by Benin and in the West by Ghana. The country is divided into five (5) Regions (the Maritime Region, the Plateaux Region, the Central Region, the Kara Region and the Savannah Region). Agriculture represents 30.9% of GDP in Togo; approximately 60% of the population are in agriculture, and 87% of the active population are in subsistence agriculture (RNA, 2013). Agriculture in Togo consists of about 90% of smallholders who use traditional techniques. Total available land is 3.4 million of hectares, but only 1.54 million hectares (45%) was cultivated in 2012 (RNA, 2013). The staple crops are cultivated on about 1,387,000 hectares against 154,000 hectares for cash crops (RNA, 2013).

The national agriculture production is estimated at 3,583,299 Metric Tonnes for 2014-2015 among which staple crops represented 92% (USDA, 2015). The overall yield of various crops is very low (1-2 Mt/Ha for cereals, 0.5-1 Mt/Ha for leguminous plants and about 10 Mt/Ha for tubers and roots such as cassava and yam (RNA, 2013). Climate change really affects agriculture production throughout the country with a real effect in the south of the country. In the south, the Maritime and Plateaux Regions, the second rainy season has almost disappeared (RNA, 2013). The smallholders who

produce an important share of staple crops are very poor compared to the poor in urban areas.

Market liberalization and urbanization have profoundly influenced the food consumption pattern in the country. Driven by World Trade Organization (WTO), market liberalization has resulted in opening the expansion of an international market, deregulation of domestic food markets and changing food habits (Simmons, Winters, & Patrick, 2005). Crops that were not initially in the population's food habit consumption are increasing drastically. Rice is one of these crops.

1.1.2 The rice sector in Togo

In Togo, after maize and sorghum, rice is the most important cereals consumed . Its consumption is increasing faster than any other crop. From 1989 to 2011, rice consumption increased from 64,000 Mt to 155,000 Mt (USDA, 2015). The rapid urbanization, the convenience, the easiness and rapidity of cooking rice are the key factors behind the increase of urban rice consumption (Seck, Touré, Coulibaly, Diagne, & Wopereis, 2013). Togo mostly depends on imported rice, which represents about 60% of the country's need (FAOSTAT, 2015).

Because Togo depends on imported rice, the country suffered from the hikes in world rice prices in 2007/2008. After that crisis, Togo Government with the assistance of Donors invested in the rice sector. The aim was to double domestic rice production from 2008 to 2018. A National Rice Development Strategy (NRDS) was therefore launched in 2010. The production targeted in NRDS were 85,540 Mt for 2008, 151,083 Mt for 2013 and 232,750Mt for 2018 (Demont, 2013; MAEP, 2010). The investment initially focussed on production. There was little attention of quality

performance nor any clear marketing strategies, which are both critical to consumers preferences (Demont, 2013; Demont & Neven, 2013).

The investment focussed on lowland management and irrigation schemes for rice production (Demont, 2013; MAEP, 2010). Elbehri (2013) indicates that when critical complementary measures (such as strengthen producers' organization, upgrading rice quality, developing marketing strategies, etc.) are absent, investment in the production will only produce reverse/opposite effects that he calls 'disincentives'. For Barrett (2008), investments in productivity is sustainable only if there is a market absorbing the surplus created. Currently a market exists, but domestic rice is far from meeting consumers' preference because of its poor quality (Fiamohe, Seck, Nakelse, & Diagne, 2013). In urban markets where an important share of rice is sold, consumers are increasingly demanding quality rice, more than ever before. Domestically produced rice fails to meet the consumer's quality preference. Demont (2013) explains that as far as production and processing are unable to assure minimal quality standards, increase in production volume will rapidly saturate local markets and erode prices. When the price gets low, it will compromise farmers' willingness to invest in quality improvement, and then also in productivity. In this way, the production target set by National Rice Development Strategy (NRDS) will not be achieved.

To produce high quality rice, improvements must be made in production, in variety selection, in weed and insect control, harvesting, processing (threshing, drying, storage practices, milling), and in marketing (transportation and selling) (IRRI, 1985). Futakuchi, Manful, and Sakurai (2013) demonstrate that local rice quality is affected along the entire value chain (from varieties selection, production, harvesting, milling/processing and marketing). They observe that rice farmers will be more

motivated to invest in quality if only there is a price incentive for high quality rice. In their study, Fiamohe et al., (2013) show that consumers in Togo are willing to pay a premium for domestic rice cleanness at 231.2 FCFA/Kg and whiteness at 263.5 FCFA/Kg

In recent years, development planners, researchers, as well as policy makers have considerably increased their interest in contract farming as a mechanism to govern linkages between farmers and agribusiness firms and to upgrade domestic rice quality (Colen, Demont, & Swinnen, 2013; Demont 2013; Demont & Neven, 2013; Fiamohe et al., 2013;). According to Kirsten and Sartorius (2002) producers have to shift from a philosophy of '*here's what we produce*' to a situation that asks '*what do the consumers want?*' Global Rice Science Partnership (GRISP, 2010) propose that by linking production, processing, and marketing through contract, the quality requirement could be met and urban consumer preferences satisfied. For Tollens et al. (2013) institutional innovations, such as contract arrangements, are needed in order to improve quality of local rice, and this will help to make producers more responsive to consumer preferences. The economic value of rice depends on its cooking and processing quality, which can be measured in terms of water uptake ratio, grain elongation during cooking, solids in cooking water and cooking time (Oko, Ubi and Dambaba, 2012). Consumers' choice of rice varieties are largely but the only based on grain and cooking qualities. The other important quality attribute of rice are chemical, cleanness, and physical (presence of foreign elements. This study focus on physical attribute of rice (in terms of presence or not of foreign elements)

1.1.3 Contract Farming

Contract farming is an agreement between two parties, a producer and a buyer. A buyer commits to buy the output according to a pre-agreed pricing mechanism, quality and quantity at a defined time from a producer. To assure such quality, a buyer provides farmer with input as credit and gives him production advices.

Throughout the world, contract farming is practised in various countries as a means to link smallholders to lucrative market for increased incomes (Barrett et al., 2012; BIRTHAL, Jha, TIONGCO, & NARROD, 2008; Kumar, Chand, Dabas, & Singh, 2010). It is a means to provide agro industrial firms with various quality raw materials (Saenger, Qaim, Torero, & Viceisza, 2013).

In Latin America, many agro industrial firms have contracted smallholders to cultivate cash crops, such as strawberries in central Mexico, snow peas in Guatemala, basil and tomatoes in Baja California on plots of less than one hectare (Key & Runsten, 1999). In India, contract farming has played an important role in including small scale wheat seed producers in the Agro-food marketing system for quality improvement (Kumar, Chand, Dabas, & Singh., 2010; Singh, 2002).

In Africa, the expansion of contract farming was encouraged by foreign exchange shortages and structural adjustment programs which considered it an appropriate tool that could help to achieve economic growth (Porter & Phillips-Howard, 1997). Contract farming is therefore being implemented in counties such as Nigeria, South Africa and Zimbabwe (Porter & Phillips-Howard, 1997), Ghana and Mozambique (Barrett et al., 2012) with satisfying results.

1.1.3 ESOP contract farming

Since 2004, a kind of contract farming called the *Enterprise de Service et Organization de Producteurs* (ESOP) contract model has been implemented in countries such as, Benin, Ethiopia, Madagascar and Togo with the support of *Centre International de Developpement et de Recherche* (CIDR). In Togo, ESOP contract farming largely expended in the staple food value chain (du Breuil & de Romémont, 2007). The ESOP contract farming model is an innovative mechanism to include smallholder producers in a dynamic staple food value chain and help to enhance their performance for quality improvement. The ESOP contract concept is to create Business services and Agro-food enterprise and link smallholder farmers to them in order to enhance farmers' performance for quality upgrading and facilitate urban market access with quality product.

The ESOP Contract model is based on two pillars. First, it seeks to organize smallholder farmers to become a viable economic actor. Second, it promotes market oriented private enterprises that could provide viable services to smallholder farmers, and for these enterprises to supply competitive products to market for urban consumer.

In Togo, the ESOP Contract model is promoted by a nongovernment organization (NGO) called *Entrepise Territoire et Developpement* (ETD). The ESOP contract scheme covers a broad range of value chains in Togo. In 2015, nine different value chain (grain rice, seed rice, soya, seed maize, cassava, peanut, honey, meat and provender) were covered, and 35 small and medium agro-food enterprises were created (ETD, 2015, 2017). Twenty of these small and medium agro-food enterprises are working in soya bean, seed maize, cassava, peanut, honey, meat, and other provender

value chains. The last fifteen of these small and medium agro-food enterprises are working in rice milling, packaging and marketing.

The ESOP rice contract scheme is emerging as a promising way to provide farmers with quality input, credit, extension services as well as sufficient knowledge for rice quality improvement and facilitate farmers' access to niche markets for higher revenue (Bellemare, 2012; ETD, 2014; Oya, 2012; Setboonsarng, Leung, & Stefan, 2008). From 2004 to 2015, about 15 ESOP rice contract schemes have been promoted, and more than a thousand farmers are working now under ESOP rice contract scheme in Togo. These enterprises are expected to champion a viable quality base for a rice value chain and reduce the share of domestic rice that passes through small millers who are unable to sort quality rice (ETD, 2017).

1.2 Problem Statement

The rewards for being in a contract scheme could be substantial for small farmers who have the ability to be a part of it, but there are serious concerns about their ability to stay in the scheme for a long term (Kherallah & Kirsten, 2002). Evidence from empirical studies shows that most of contract schemes eventually collapse when contracts are designed without consideration to farmer motivation and preference (Eaton & Shepherd, 2001, 2001; Will, 2013). This is especially true when it comes to contract farming of staple foods such as cereals (Colen et al., 2013; Minot, 2007; Kirsten & Sartorius, 2002; Miyata, Minot, & Hu 2009 ; Swinnen, Vandeplas, & Maertens, 2010). The ease with which cereals can be stored and sold create opportunistic behaviour (side-selling) among farmers and this leads the contract schemes to collapse (Colen et al., 2013; Kirsten & Sartorius, 2002) . There are cases where contract farming lead farmers to incur debt Eaton and Shepherd, (2001). A

report from ETD (2014) shows that ESOP programme managers have reported losses due to farmers' violation of the contract by side-selling their crop. Farmers also report losses because the ESOP administrators did not share the cost of failed crops or did not buy the produce at the right time after harvest (Kluvi, 2013).

There are also controversial results on impact of contract farming on farmers' performance (Kherallah & Kirsten, 2002). In Benin, Velde and Maertens (2014) reported a positive impact of contract farming on selected farm performance indicators and income. Similarly Honfoga, Rodrigue, Anselme, and Anick (2016) found a positive impact of contract scheme on farmers' well-being. In Cambodia, Cai, Ung, Setboonsarng, and Leung (2008) encouraged farmers to move out of the contract because they can earn more revenue by staying outside the contract scheme.

In Togo, farmers' motivation and the impact of the ESOP contract arrangement on farmers' performance has not been assessed. The constraints that farmers face in the contract scheme are not documented. Well informed researchers show that having information on farmers' motivation for contract farming could serve as starting point for broadening existing ones (Eaton & Shepherd, 2001; Will, 2013). Many researches have been done on contract farming around the world. Yet, Eaton and Shepherd, (2001) acknowledge that the advantages, disadvantages and problems arising from contract farming can vary according to each country's physical, social and market environments or conditions. Hence there is the need to investigate the issues case by case. Assessing rice farmers' motivation, performance and constraints under ESOP Rice contract, farming for rice quality upgrading in Togo is a critical issue.

Research questions

The key research question: what are farmers' motivation, performance and constraints as they farm rice for the domestic market under the ESOP rice contract and how do they react to rice quality upgrading? The specific research questions are:

- 1) Why do smallholder rice farmers work under ESOP rice contract farming in Togo?
- 2) How does participating in ESOP rice contract farming enhance smallholder farmers' performance?
- 3) What constraints do smallholder rice farmers face under ESOP Rice contract farming?

1.3. Objectives of the Study

The main objective of this study is to assess the effect of ESOP rice contract farming on the quality of rice produced in Togo. The specific objectives of this study are to:

- 1) Assess smallholder rice farmers' motivation for contracting with ESOP.
- 2) Determine the impact of ESOP contract farming on performance of smallholder rice farmers.
- 3) Assess constraints smallholder rice farmers face in working under ESOP rice contract farming.

Hypothesis

The main hypotheses: Contract farming enhances rice smallholder farmers' performances for paddy rice quality upgrading:

1. Smallholder rice farmers are motivated to engage in contract arrangement with ESOP because of the incentive in ESOP contract terms, input output market condition in the country and the direct benefit such as higher price and training.
2. ESOP contract farming improves smallholder rice farmers' performance in term of yield, revenue, net benefit, and paddy purity.
3. ESOP Contract farmers face some constraints in their relationship with ESOP, these constraints are related to equitable distribution of incentives in the contract terms, the payment mode, lack of solidarity within the Farmer Based Organizations, and lack of cash and carry.

1.4 Relevance of the Study

Contract farming, is a rural development tool (Barrett et al., 2012; Porter & Phillips-Howard, 1997; Will, 2013). It is mostly used to enhance farmers' performance for agriculture quality improvement in developing countries (Will, 2013). The growing number of ESOP rice contract farming schemes in Togo aim to upgrade the local rice quality and to facilitate smallholder farmers' access to niche market and to build quality based value chains (ETD, 2013). To upgrade the local rice quality, ESOP contract model organizes farmers into a farmer base organization, provides them with quality input (seed rice, facilitate their access to fertilizer) and gives them advice on rice production). Finally, ESOP buys the output (paddy) from the contracted farmers, mills and brands the rice as "Riz Delice". There is an on-going debate about how to restructure contract schemes to upgrade staple food quality and to provide viable opportunities in the niche market for small-scale farmers (ETD, 2017). In Togo, there is a paucity of studies that provide a clear understanding of farmer motivation to engage in contract farming of staple foods, the impact of such contract scheme on

farmers' performance, and the constraints that they face (du Breuil & de Romémont, 2007). This study fills that gap by assessing farmers' motivation, performance and constraints under ESOP contract farming. The study is also relevant in that it contributes to knowledge on the ESOP contract restructuring debate.

Understanding farmers' motivation is important because it helps agribusiness firms to increase farmers' participation in the contract scheme, reduce contract exit and enhance farmers' performance for quality improvement (Abebe, Bijman, Kemp, Omta, & Tsegaye, 2013; Masakure & Henson, 2005; Will, 2013). This study is relevant because it will contribute to understanding that incentive element in the ESOP contract terms that were behind their motivation to work under ESOP contract farming scheme. To upgrade the ESOP contract scheme, special attention should be focussed on these identified elements in the contract terms to reduce contract exit.

The benefits that farmers draw from contract farming could be a motivating force for NGOs and policymakers that care for farmers' income and poverty reduction to strengthen the ongoing contract scheme (Will, 2013). The study shows that the overall impact of ESOP contract farming on farmers performance is positive (increase in yield by 14%, increase in revenue by 32% and improvement in rice quality upgrade from poor to premium quality). These findings constitute a huge contribution to knowledge. Promotion of the ongoing contract scheme will have a positive effect not only on domestic rice quality improvement but also on farmers' income. The increase in income will contribute to reduce rural poverty.

Better information on farmer's constraints can be used by agribusiness firms and policy makers to enhance the sustainability of the contract scheme and reduced contract exit or break and to build a strong and sustainable quality rice value chain

(Barrett et al., 2012; Minot, 2011; Oya, 2012; Porter & Phillips-Howard, 1997). The identified constraints faced by farmers in the ESOP contract scheme are the price formula used by ESOP, no respect of the agreed payment mode by ESOP and lack of solidarity within Farmer Based Organization. It will be very useful for ESOP, ETD and policymakers to enable the institutional and financial environment to improve contract scheme. If these constraints are not well addressed, the ESOP rice contract scheme will gradually be disrupted.

The study's originality as well as its value makes it highly relevant. Most contract farming studies has focussed on non-traditional cash crops (Barrett et al., 2012; Henson, Jaffee, Cranfield, Blandon, & Siegel, 2008; Porter & Phillips-Howard, 1997; Tonts, 2007). This study, however, investigates the staple food quality improvement by means of a contract scheme. The study sets the base on how contract farming contributes to upgrading rice quality by reducing foreign matter in paddy rice. It also underlines the constraints that farmers face in their relationship with the contractor (ESOP). All the issues are addressed in order to avoid the ESOP contract scheme being disrupted.

1.5 Organization of the Thesis Report

This report is organized into five chapters. Apart from the first chapter, the second chapter presents a review of relevant literature. Farmers' motivation for engaging in contract farming, the impact of contract farming on smallholder farmer performance as well as constraints that farmers face in working under contract farming are discussed. The chapter also reviews the methodological approach used in similar empirical studies. The third chapter describes the methodology of the study. The results and

discussion are presented in chapter four. Finally, chapter five provides a summary of the study, the conclusion and recommendations for stakeholder actors.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the contract farming concept as well as factors that motivate or constrain smallholder rice farmers' to engage in a contract farming scheme. The impact of contract farming on farmers' performance for quality upgrading is highlighted. The chapter also reviewed the problems of the Togo rice sector and the role that contract farming can play in rice quality upgrading. Finally, relevant methodological approaches used in empirical studies on a contract farming are reviewed.

2.2 Contract Farming

2.2.1 Definition and typology of contract farming

Definition

A definition of contract farming is often confused because there are so many different types of contracts and actors (international aid agencies, private sector firms, public sector firms and parastatals). Eaton and Shepherd (2001), and Minot (2007) suggest a definition that provides insight into contract farming.

Eaton and Shepherd (2001) define contract farming as an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices. The arrangement also invariably involves the purchaser in providing a degree of production support through the supply of inputs and the provision of technical advice.

Minot (2007) defines contract farming as agricultural production carried out according to a prior agreement in which the farmer commits to producing a given product in a given manner and the buyer commits to purchasing it. Often, the buyer provides the farmer with technical assistance, seeds, fertilizer, and other inputs on credit and offers a guaranteed price for the output.

From the two definitions, it is understood that contract farming is an agreement between two parties, a producer and a buyer. A buyer commits to buy the output according to a pre-agreed pricing mechanism, quality and quantity at a defined time from a producer, after providing him or not with input as credit and production advice. Producers' commitment to provide a specific commodity at quantity and at quality standards as determined by contractors, and the contractor commitment to provide support to the farmer's production and purchases the commodity constitute the basis of contract arrangement.

Typology of contract farming

There are various type of contract farming depending on the degree of formality in the contract itself, the objectives of the agreement and the different actors involved in the contract scheme (Eaton & Shepherd, 2001). The contract farming arrangements are can be classified based on: (i) forms and actors included in the contracts, (ii) the objectives behind the contract schemes and (iii) the ways for price determination

i. Based on forms and actors included in the contracts

Contract farming arrangements can be broadly classify in five models (Table 2.1): Informal model, intermediary model, multipartite model, nucleus estate model and centralize model (Eaton and Shepherd, 2001; Technoserve and IFAD, 2011; Will ,2013)

Table 2. 1: Contract farming models and their characteristics

	Informal model	Intermediary model	Multipartite model	Centralized model	Nucleus estate model
	Increasing buyer investment				
	← Increasing risk of inconsistent supply				
Input/credit	○	◐	◑	◒	◓
Extension services	○	◐	◑	◒	◓
Use of contracts	○	◐	◑	◒	◓
Farmer grouping	○	◐	◑	◒	◓
Grower management	○	◐	◑	◒	◓
Centralized production/processing	◐	◑	◒	◓	●
Post-harvest logistics (packaging, transport)	◐	◑	◒	◓	●
			Summary:		
	speculative, seasonal sourcing on an ad-hoc or semi-formal basis and spot-market transactions; few if any inputs/services provided to farmers; minimal firm/farmer coordination; little to no product specification by buyer	semi-formal to formal subcontracting by buyers to partner intermediaries (e.g. lead farmers, farmer groups, buying agents) who manage outgrowers & provide services; limited direct firm/farmer interaction; enhanced but limited product specification	buyer sources from farmers & farmer groups; technical assistance/ input/credit provision & grower management via 3rd parties; limited firm/farmer coordination; higher level of product specification necessitates close monitoring/supervision of production	buyer provides technical assistance/inputs directly, purchases crop, handles many post-harvest activities; farmers provide land & labor; high degree of firm/farmer coordination; strict product specifications monitored by inhouse technical staff; often linked to processing	buyer operates centralized production and processing (estate), supplementing throughput via direct contracting with outgrowers; buyers often own/control land used by farmers who supply labor; buyer provides technical assistance/inputs/ credit; close monitoring/supervision
			Pros:		
	little to no buyer investment in technical/ financial support; low operational costs; high level of sourcing flexibility	reduced risk, assuming effective management; minimal buyer investment in technical/financial support; marginally improved supply chain management; low cost of switching to new partners	limited investment & reduced costs due to partner cost-sharing; reduced risks (vs commercial production) due to geo-dispersal of outgrowers	enables high level of control over product quality & volumes; frequent interaction with farmer inhibits side-selling	high level of control over supply chain; simplified technical assistance/extension/farmer oversight; reduced risk of supply rupture
			Consequences:		
	limited control over production (i.e. products, varieties, quality, etc.); high risk of supply ruptures; strong buyer competition	lower buyer visibility among farmers; marginal control over production (volumes, quality)	greater risk of side-selling; no core production, reliant on smallholder production; high transport costs	high level of investment for in-house technical assistance and pre- and post-harvest logistics and related infrastructure	requires heavy investments (land, labor) in production; higher crop-related risks; limited flexibility/options in selecting outgrowers

Note: =inputs =outputs = Processing
 ○ = Never ◐ =Rarely ◑ =Sometimes ◒ =Often ● =Always
 Source: Adapted from Technoserve and IFAD (2011) and from Will (2013)

ii. Based on the objectives behind the contract schemes

Minot (1986) distinguished three types of contracts farming schemes, namely resources providing contracts, market specification contracts and production management contracts.

- a.* Resource-providing contracts aim to provide resources such as input and technical packages as credit, to specify the sort of crops to cultivate and to define production practices and the quality standard of the product.
- b.* Market specification contracts are future purchase agreements which determine the timing, price, and quantity of commodities to be sold. According to Minot (2011), this type of contract farming makes sense when market coordination is needed. The farmers do not need assistance in obtaining inputs. The buyer is not concerned about production methods other than the product quality that can be measured at harvest.

Production management contracts are associated with large outgrower and nucleus-estate schemes directly shaped to regulate the production and the labour processes of the grower.

iii. Based on the ways for price determination

Minot (2011) determined three types of contract: Fixed-price contract, Formula-priced contracts and Split-payment contracts. These models seem to be more based on contract attribute than contract specification.

- a.* Fixed-price contracts: The buyer has fixed the price before or at the time of planting. This has the advantage of reducing the risk to farmers. The disadvantage from this type of contract farming is that when the market price at harvest time is higher, farmers violate the terms of the contract by side selling

part or all of their harvest on the spot market (Prowse, 2012). Conversely, the buyer is tempted to purchase supplies from spot market rather than from the contracted farmers, when the market price is lower.

- b.* Formula-price contract: Contract farming schemes can rely on formula pricing to avoid side-selling problems. In such circumstance, the price is based on the market price plus a premium. This formula assures farmers that they will be better off with the contract farming production than with the market.
- c.* Split-payment contract: In this system, two or more payments are made to the farmer by the buyer. A fixed payment firstly determined before the production and a second payment that varies depending on the sales price realized by the buyer. Export crops and cotton firm usually use such type of system. Most of the time, contract farming is applied especially for non-traditional/cash crops and the perishable agricultural commodities that need to be processed. Nevertheless there are some cases where traditional crops (maize, rice, etc.) are grown under contract (Cai et al., 2008).

2.2.2 Conditions under which contract farming is viable

Porter and Phillips-Howard (1997) analysed the success of contract farming schemes and made some recommendations for the effectiveness of the outgrower schemes:

- i.* Appointments of contract scheme staff should include indigenes' of the area, this will facilitated communication between contracting farmers and the company, training could enable such appointments.
- ii.* The contract schemes must enable or allow the production of other crops which constitute alternative income sources for farmers.

- iii. In terms of food security, it is important to ensure that farmers avoid food shortages (which force up food price) by maintaining the various food crop productions.
- iv. Relocation of land should be preceded by a careful cadastral survey to ensure proper compensation for farmers who lose a portion of their land and fairness in subsequent allocations. Women's right to land must be protected
- v. Contracts should be signed by women also, and payment made to them when they are responsible for crop production.
- vi. A participatory monitoring of individual schemes must be introduced with inclusion of representatives from small growers and labourers.
- vii. Quality standards should be jointly enforced by the company and representatives of the growers.

Minot (2007) discusses various conditions under which contract farming is profitable for the farmer and the contractor. Three factors that are very important for the success of contract are: the type of buyer, the type of commodity and the type of destination market.

On type of buyer, Minot (2007) observes that it is not profitable to contract with traditional wholesalers or small and medium-scale buyers. It is best suitable for large-scale processors, because they have a large capital-incentive to contract and provide technical assistance to ensure product quality and a team to collect the product. Miyata et al. (2009) investigated how Contract Farming linked Smallholder Farmers to Packers, and Supermarkets in China. They found little evidence that firms prefer to work with larger farmer. The study showed, however, that farmers are better off only

of the product price is high enough to compensate for their effort and investment in contract farming.

On type of commodities, Minot (2007) says that it is not interesting to contract when the product is homogenous, non-perishable, quality is easily observed, the producers are familiar with the production methods and the market equipment. This is because the transaction cost will be low. In contrast, contract farming is suitable for high-quality fruits and vegetables, spices, flowers, tea, tobacco, perishable commodities, organic products, seed crops, and other quality-sensitive commodities (Barrett et al., 2012; Minot, 2007; Porter & Phillips-Howard, 1997; Saenger et al., 2013).

The destination market is also a factor that justifies contract farming success. According to Minot (2007), contract farming is suitable when the final market is more quality sensitive. The same commodity sold in spot markets for local consumers can be grown under a contract scheme for upscale urban supermarket and export.

2.2.3 Motivation Factors for Contract Farming

Viewed through the economic lens, maximizing profit is the main reason which motivates contracting parties to sign the agreement. For Eaton and Shepherd (2001), well-managed contract farming is an appropriate way to promote and coordinate agricultural production and marketing. Motivation for contract farming can be seen at both the farmers' level and at the processor's level. Bogetoft and Olesen (2002) studied ten rules of thumb in contract design and came to a conclusion that the two parties' preferences for a particular contract attribute motivate them to engage in contract agreement. For these authors, each of the contract parties try to maximize his profit but it is difficult to redistribute the total benefit without negatively affecting any of the contracting parties (Bogetoft & Olesen, 2002). It is not easy for a contract to

become 'Pareto efficient' because no one can become better off without someone else becoming worse off.

In their studies on why smallholders grow under contract, Masakure and Henson (2005) identified eleven factors that motivate small-scale producers to contract with agro-system companies in Zimbabwe. The factors are listed as follow: get satisfaction from growing export crops, lack of alternative sources of income, benefits to other farmers, stepping stone to other projects, guaranteed minimum prices, acquired knowledge for use on traditional crops, acquire knowledge for growing new crops, reliable supply of inputs, guaranteed market for crops, no need to transport crops to market and to earn extra income.

In their analysis, Masakure and Henson (2005) found that these eleven factors explain four broader latent motivation factors: i) market uncertainty, ii) indirect benefit, iii) direct income benefit, and iv) intangible and/or latent benefit. The issues broaden on accessing transport, gaining a reliable supply of inputs, the prevailing nature of the local markets, and uncertainty associated with market demand and prices. Though these authors' study focussed on non-traditional crop (vegetables that are produced for export), it had a big lesson for staple food produced under contract.

Schipmann and Qaim (2011) identified four contract attributes that are important to farmers' motivation for contract farming. These are i) relation to the trader, 2) input provision, iii) payment mode and iv) price.

Puspitawati (2013) conducted an in-depth study on potato farmers' motivation to contract with an agro-food company in Indochina. He came out with sixteen motivation factors that motivated famers to engage in contact farming arrangement. Here too, the issue of gaining reliable input (potato seed) and guarantee market

emerged as the main concern of potato producers. Other issues identified were uncertainty with the market and prices.

Various strategies to motivate farmers to participate in contract arrangement and invest in quality improvement could be considered. Abougamos, White, and Sadler (2012) in their study identify three strategies that could be considered: The first one is to provide farmers with an incentive to deliver quality paddy, the second is to provide farmers with assets (plastics or tarpaulin) for threshing and drying on , the third is to develop extension services to train farmers on quality paddy production. The combination of these strategies makes a contract more attractive for farmers to engage in .

It is clear that market uncertainty, indirect benefits, direct income benefits and intangible and/or latent benefits constitute the main motivation factors for engaging in a contract scheme.

Market Uncertainty: Puspitawati (2013), like Masakure and Henson (2005), found that market uncertainty is the first broad latent factor to motivate small farmers to contract with a processor. A guaranteed market for crops, guaranteed minimum prices, provision of reliable input supply, and someone to buy the harvest crop at home (no need to transport crops to market) were the principal motivation for contract farming.

Many authors also view contract farming as a means to link producers with agricultural markets, especially in developing countries (Kirsten & Sartorius, 2002; Torero, 2011; Will, 2013). In developing countries, farms are small and they mostly produce for their own consumption or sell at low price in local markets. Contract farming offer them a unique opportunity to produce higher quality varieties and sell them at a high price to a processor (Miyata et al., 2009; Wang, Wang, & Delgado,

2014). By organizing farmers into a farmer base organization, providing them with quality input (seed rice, facilitate their access to fertilizer) and giving them advices on rice production, contract farming offered contract farmers the opportunity to produce high quality rice. Contract farming is a fine means that helps smallholder farmers to reach new lucrative markets that are unavailable otherwise (Eaton & Shepherd, 2001). The access to such a market motivates farmers to engage in contract farming (Will, 2013).

The most obvious economic incentive for participating in a particular contract arrangement is the output price (Saenger et al., 2013 Schipmann & Qaim, 2011). The main drivers of farmers' motivation for contracting are: the best price for the higher grade, the specification of price in advance, and input supply (Eaton & Shepherd, 2001; Saenger et al., 2013). The best price for the higher grade is the best motivation. The difference in the price obtained by contract farmers and noncontract farmers may not be the main motivation factor of farmers' contract choice. Price risk reduction (by specification of prices in advance) may be the main motivation (Saenger et al., 2013; Schipmann & Qaim, 2011). Guaranteed minimum prices for the output, motivate farmer to engage in a contract arrangement. There were some cases where the State provided financial incentives to farmers. With that support, farmers adapted their production to reach market requirements. The incentive programme focussed on a quality evaluation and a certification system and its administration came from a trusted company. Prowse (2012) shows that incentive to engage and honour contracts must include longer-term reputation and credibility rather than short-term financial interest.

Due to uncertainty in input markets, input supply can be the main motivation for farmers to participate in the contract schemes (Eaton & Shepherd, 2001). Poor seed

and fertilizer markets severely constrain staple crop production in rural area. Providing a reliable input system is therefore a motivating factor for contract farming (da Silva & Rankin, 2013; Masakure & Henson, 2005). Certain famers' tendency to divert input supplied has caused processors to limit input supplied to seed and essential agrochemicals (da Silva & Rankin, 2013; Eaton & Shepherd, 2001).

Due to the state of road and transportation cost, farmers find it profitable to sell their product at home rather than taking it to the market place where there is no guarantee they can sell all. In Zimbabwe, for example, farmers felt that they were excluded from more lucrative urban markets in Harare, due to distance and transport costs (Masakure & Henson, 2005). When processor proposed to collect the product at home farmers were more motivated to engage in such contract arrangement.

Indirect Benefits: Some indirect benefits the farmer can draw from contract farming motivate their decision to engage in contract farming arrangement with a processor (Silva & Rankin, 2013, Saenger et al., 2013). Masakure and Henson (2005) identify two main indirect benefits farmers acquire when they engage in contract farming. These are: i) acquire knowledge on how to grow the contract crop and ii) 'stepping-stone' to other projects. Evidence showed that government agents were less effective in providing extension service. When well designed, a contract farming scheme provides extension services and training to farmers. Therefore, the processor, by offering alternative extension services to farmers, helps them to acquire new knowledge. Reliable and up-to-date sources of agronomic advice that the processor provides, therefore motivates farmers to engage in contract farming. Farmers gain experience and become more efficient in farming activities such as ridging, fertilizing, transplanting, pest controls, harvest and postharvest activities such as threshing,

winnowing, and drying (Eaton & Shepherd, 2001). The high yield that occur due to good agricultural practice in contract farming generate high profit, this motivates farmer participation in contract (Schipmann & Qaim (2011).

Farmers in developing countries are experiencing difficulties in accessing credit from formal financial institutions. By offering credit directly to farmers, the processor motivates them to participate in contract farming scheme (da Silva & Rankin, 2013; Eaton & Shepherd, 2001). Sometimes, processors can make arrangements with commercial banks or with government as guarantee to provide credits to farmers; this motivates farmers to participate in contract farming (da Silva & Rankin, 2013; Eaton & Shepherd, 2001). An arrangement is made by other parties to access credit for fertilizer purchase; this also motivated farmers for contract farming.

Direct Economic Benefit: According to Masakure and Henson (2005), contract farming is seen as extremely valuable by farmers because of the direct benefit they draw from it. Therefore economic incentive can be motivation factors for farmers participation in a contract scheme (da Silva & Rankin, 2013; Saenger et al., 2013; Will, 2013). When there is lack of alternative sources of income, of earning extra income from the contract crop, these motivate farmers to engage in a contract farming scheme (Masakure & Henson, 2005).

Other authors look at financial incentives as the only means to motivate farmers to engage in contract farming and invest in quality performance (Baumann, 2000; Saenger et al., 2013) although financial incentive has its limits. Gneezy, Meier, and Rey-biel (2011) studied when and why incentives work or do not work to modify behaviour. Though their study focussed on students' behaviour in response of their fathers' financial incentive to read, the study has important lessons for the agricultural

sector. Based on the principal agent theory, incentives might have the desired effects in the short term, but weaken intrinsic motivation (Gneezy et al., 2011). For these authors monetary incentives from the principal may change how tasks are perceived by agents, with negative effects on behaviour in some cases (Gneezy et al., 2011).

Given the cost constraint faced by firms in the rice market (price taker) and the tremendous concurrence of imported rice, firms could find it difficult to increase the certain price level incentive for quality rice production. Yovo (2010) investigated price incentive, profitability and competitiveness in rice production in the south of Togo and found that a price incentive increased rice profitability but not necessarily the competitiveness of local rice, which mostly depends on quality improvement. He concluded that there is a need to improve local rice quality/rice relationship. This conclusion is also supported by Tabone, Koffi-Tessio, and Diagne (2010). In such circumstances, other forms of incentives are better alternative to be used.

Gneezy et al. (2011) identified two kinds of effect of monetary incentive: the standard direct price effect, and an indirect psychological effect. The standard direct price effect makes the incentivized behaviour more attractive, while the psychological effect can sometimes work in the opposite direction to the price effect and can crowd out the incentivized behaviour. This means that an incentive can reduce motivation or effort to undertake a task during a short run when such incentives are in place (Gneezy et al., 2011). The authors also recognize that incentives could foster good habits for a long time. They conclude that when individuals experience the positive aspect of the incentive, their motivation to continue their improved habits will increase enough even without the extrinsic motivation.

What is clear is that contract farming have to create enough value in the chain for possible interlink among actors. The problem is that staple crops such as rice are characterized by limited quality upgrading potential and low value (Colen et al., 2013). Most of price set ups in staple crop contracts are based on the market price. For Wang et al. (2014) there is no expected price advantages in contract farming in circumstances where the contract price is set up based on market price. It is not easy to base quality upgrading only on price incentive; other incentive means are needed. Contract farming can develop a broad variety of incentive instruments such as input supply, field visits and advice, quality assessment, guaranteed market and incentive to cash and carry, with the aim to produce high-quality output (Bellemare, 2012). The theoretical model developed by Deng and Hendrikse (2013) suggests that, in a situation where economics incentives are less effective for product quality provision, social capital is especially valuable. This is true in a case where farmers' subjective risk toward quality uncertainty is high.

Intangible Benefits: Intangible benefits, such as getting satisfaction in growing a quality product under contract, or see benefits to others, may motivate farmers to engage in a contract farming scheme. Deng and Hendrikse (2013) studied the interaction between social capital, quality premiums and pooling and their influence on cooperative member's decisions regarding their product quality. They found that the social motivation in cooperatives can guarantee high quality product when the level of social capital is high, even while economic incentive are weak. But when the level of social capital declines, their findings showed that, to maintain the product quality, an income rights structure with stronger quality incentives must be adopted by the cooperative.

Processor Motivation for Contract Farming: Farmers are not the only ones who have motivation for contract farming; processors, firms or buyers also have. Most of the time processors have their own quality standards that are not easy to meet when buying raw material in spot markets. Singh, (2002) recognized that the availability of quality raw material constitutes a huge problem for agribusiness or processor firms, and contract farming has emerged as prerequisites for them whether operating in the domestic or the international market. Small farmers and their families are more likely to produce high-quality when well trained (Singh, 2002). Increase in product quality is one of the most important reasons for them to contract (Eaton & Shepherd, 2001). Desired quality and supply of continuous quantities are often not available on the open market.

2.2.4 Constraint Factors in Contract Farming

The question of a contract enhancing small farmers' performance has received conflicting answers in the available literature. Contract farming can lead to some problems for the parties involved in staple food chains, especially for farmers and contractors.

Constraints Faced by Farmers

To da Silva (2005), the major constraints that farmers face in their contract relationship with a processor are the irregular payments, the low contract price, a manipulation of norms by firms, and a high product rejection rate, unawareness of the potentiality of the crops and poor technical assistance.

Eaton and Shepherd (2001) state that when production is based on a new variety, there is a risk of both market failure and production problems. New crop varieties may need

more investment from the farmer to meet the quality requirement set by the contractor. This may lead farmers to be indebted because of excessive credit advances and production problems.

Farmers lose their freedom to sell in the spot market and this may weaken their bargaining power. Complex price determination mechanisms, most of time, are not well understood by farmers and could affect their benefits.

Farmers' independence preference and price can be the reason for withdrawing (Schipmann & Qaim, 2011). Input supply or technological assistance may make farmers too vulnerable to manipulation of productivity. The facility to credit through input provision may increase farmers indebtedness (Sopheak, 2014).

Constraints Faced by Contractors: Firms can face farmers' opportunistic behaviour (side-selling) by reducing processing factory's throughput. Farmers' can divert inputs, and this can result in low quality, low yields and low productivity. Opportunism is a kind of self-interest seeking. It extends from simple self-interest seeking to include self-interest seeking with guile (Williamson, 1979). Trust is a very important issue in any viable value chain development, without it, the chain cannot work (Pye-Smith, 2013). Sartorius and Kirsten (2007) say that trust helps reduce opportunistic behaviour of farmers and this reduces the need to control and monitor the other party and the need to take precautionary measures. Trust reduces transaction cost. In high trust societies, people spend less to protect themselves.

The contract parties should trust each other for the success of their business. Sartorius and Kirsten (2007) demonstrate that explicit incentives can signal distrust because trust relationships are delicate. Will (2013) recognizes the importance of both trust and incentive profit in contract arrangement. He says: 'while in the end mutual trust is the

basic and most critical reason why contracts succeed or fail, a realistic and realizable cost-benefit (profit) is crucial for creating a viable business that can sustain itself.

Gneezy et al. (2011) show that incentive can break social norms. Social and cultural constraints can affect some farmers' quality product performance. So trying to reduce transaction cost only by trust is not enough, incentives have their roles to play. However, the question of trust and commitment are important to maintain the relationship among the processors and the smallholders. Trust plays an important role in the success of an organization; when the manager lacks trust, it affects the organization performance. There is a problem of trust between actors in Togo. For example, a report from ETD (2014) shows that farmers' violation of the contract by side-selling their crop. Farmers also report losses because the ESOP administrators did not share the cost of failed crops or did not buy the produce at the right time after harvest (Kluvi, 2013)

2.2.5 Impact of Contract Farming on Farmers

There are four areas of impact discussed in the literature. These are i) impact of contract farming on farm performance, ii) impact of contract on agriculture technology adoption, iii) impact of contract farming on household income, and iv) impact of contract on quality upgrading.

- i. Impact of contract farming on farm performance:** Velde and Maertens (2014) investigated the impact of contract-farming on selected rice farms' performance indicators in The Benin Republic. Their results indicate that contract-farming has a positive impact on rice productivity. The contract farming effect was channelled through a combination of pathways

including farm size expansion, yield increases, high prices and commercialization intensification (Velde & Maertens, 2014).

Through contract farming, farmers acquire skills, knowledge and techniques that help them improve the quality of the product. They learn improved methods of applying chemicals and fertilizers, efficient use of farm resources and production techniques (ridging, fertilizing, transplanting, pest control, etc.) that are adopted by the farmers. Private agribusiness more diligently offer technology that improve farmers production performance than the official (government) agricultural extension service (Eaton & Shepherd, 2001).

- ii. Impact of contract on agriculture technology adoption:** agriculture technology can be defined as a collection of tools, including machinery, modifications, arrangements and procedures used by humans. In the agriculture sector, technology is techniques, inputs or machinery that are used primarily or entirely in order to support agricultural activities or agricultural enterprise (Byerlee, 1989). These techniques are very important to increase productivity as well as to ensure quality and satisfying consumers' preferences. Agricultural commodities are upgraded for a market that is demanding high quality standards products that need the adoption of new technologies because these technologies play an important role in quality upgrading.

Empirical studies have showed that the existence of external resources for material and technological inputs motivate farmers' more to accept new technologies (Akudugu, Guo, & Dadzie, 2012). The adoption of such new technology (new varieties and new production techniques) helps small

farmers to meet the high quality standards that are required by the contractor in the lucrative market (Eaton & Shepherd, 2001) .

iii. Impact of contract farming on household income: Minot (1986) after reviewing contract farming in developing countries underlines the positive impact of contract farming on farmers' income. Contract farming impacts on farmers' income depend on farmers' characteristic and the benefits farmers receive from participating (Warning & Hoo, 2000). Empirical evidence from literature shows that contract farming can have either a positive or a negative impact on farmers' income. Simmons, Winters, and Patrick (2005) focussed their study on the impact of contract farming in poultry, on maize seed and on rice seed in Indonesia. Their results show the positive effect on farmers' welfare, but that the contract had no effect on returns of capital in the case of rice seed.

Cai, Ung, Setboonsarng, and Leung (2008) studied the empowerment of farmers to move beyond the contract toward independence, using simple means, a propensity score matching and a switching regression comparison. They assessed the impact of contract farming on rice farmers' performance in Cambodia. They found a positive impact of contract on farmers' income and provided evidence that contract farming of quality and safe food is as an effective strategy in the private sector can be used in poverty reduction. They underline that this is possible only if the public sector supports the contract scheme for transaction cost reduction.

Miyata et al. (2009) evaluated the impact of contract participation on household income in China and found evidence that contract farming enhances per capita income of contract smallholders. Meshesha (2011)

investigated contract farming impact on household income of smallholder farmers in the Sheka zone in Ethiopia. He found that contract farming improves small holders' income. Velde and Maertens (2014) showed that participating in ESOP contract farming enhanced rice farmers' income in the Benin Republic.

iv. Impact of contract on quality upgrading: By the means of contract, firms provided farmers with better technologies, better technical training, better inputs (seed, fertilizer etc.) or better consulting services which all assist farmers to upgrade their productivity and quality (Miyata et al., 2009; Wang et al., 2014). Empirical research has showed positive effects of contract farming on farmers' performance in terms of quality upgrading.

v.

Saenger, Qaim, Torero, and Viceisza (2013) in analysing the impact of two contract incentive instruments, a bonus for consistent high quality milk and a price penalty for low quality on farmers' investment in quality-improving inputs in Vietnam found that the bonus payment generates higher quality milk, while the penalty drives farmers into higher input use, resulting in better output quality. By upgrading their productivity, farmers earn more and increase their income.

Abougamos et al., (2012) conducted a study on contracts for grain bio security and grain quality in Australia. Their results show that the firm's adoption of new technology reduces monitoring cost. The contract farming had an overall profit for the firm and induced a higher level of bio-security and quality performance of farmers. When the firm offers a quality price premium, farmers increase their effort (entail labour and material cost related) to meet the quality requirement, and quality grains are

produced. In their study on quality and double sided moral hazards in share contracts, Olmos, Grazia, and Perito (2011) prove that an outcome-conditioned share reduces an agent's incentive to make an effort in quality improvement.

In a study on market channels, quality incentives and contract harvesting, Bottema and Altemeier (1990) used the case study of maize, soybean and groundnut to demonstrated that commercialization alone is not enough for quality improvement. The quality is improved when there is a demand by the end users and a reward for quality by the producer. The role of contract farming is found to be independently variable according to the degree of commercialization. They concluded that only introduction of specific varieties with market rewards from end-users will increased farmers' quality performance and income, which means quality performance development.

Zúñiga-Arias, Ruben, Verkerk, and van Boekel (2008) investigated identifying effective economic incentives to enhance mango producers' quality performance in Costa Rica. They analysed the relationship between intrinsic product qualities attributes and socio-economic characteristics of mango producers and they found that quality performance is subsequently related to farm-household characteristics and contractual delivery parameters. Preferences for certain contractual regimes and marketing arrangements give rise to differentiation in quality performance. The key factors for quality improvement were long-term delivery relationships and non-price attributes.

Controversial Studies on the Impact of Contract Farming on Farmers

Empirical studies as well as contract theory books show that contract farming has not only a positive impact on farmers but also a negative effect on them (Bijman, 2008;

D'Silva, Shaffril, Azril, Uli, & Abu Samah, 2009; da Silva, 2005; Little, 1994; Minot, 1986, 2007, 2011; Minot & Ronchi, 2014; Miyata et al., 2009; Watts, 1994; Will, 2013; Wu, 2014).

Controversial aspects of contract farming are pointed out by Watts (Watts, 1994). According to Watts (1994), there is a widespread manipulation of contract by large companies and contract farming qualifies as self-exploitation because farmers are forced to labour more intensively and more extensively through the use of the household labour force, such as child labour. Watts (1994) recognizes that farmer income may increase when they participate in contract farming in some case, but equity is reduced. Little (1994) points out that contract farming is a form of exploitation when it involves a highly unequal power relationship. Little and Watts (1994) underline the diverse nature of contract farming. In Taiwan, Chang, Chen, Chin, and Tseng, (2006), after recognising the positive impact of contract farming on smallholder profit, underline that this is not a sufficient condition for such improvement. In a similar vein, Saenger et al. (2013) underline the importance of a third party to avoid the conflict of interest. Minot and Ronchi (2014) recognise that some problems raised in contract farming and highly recommend the role of a third party to prevent conflict and also to resolve disputes that could arise in contract arrangement.

2.3. The Domestic Rice Sector in Togo

2.3.1 Overview of the Togolese domestic rice sector

Rice is the third cereal consumed in Togo. Its production is mostly (90%) done by smallholders with a farm size of less than one hectare (ITRA & DSID, 2010). The average area cultivated is 0.57 ha per farmer. Rice is produced in the lowland (55%),

rainfed (26%), and irrigated (19%) (ITRA & DSID, 2010). Despite Togo's own potential to produce rice, producers face some problems that hamper their ability to produce enough to cover the need of the population (MAEP, 2010). The productivity is hampered by lack of access to input, lack of extension services, inadequate credit system, and difficulties in access to technology and market as well as various risks (Kluvi, 2013) Domestic rice value chains face tremendous constraints in its development in Togo.

2.3.2 Constraints in domestic rice value chains

Local rice value chains in Togo, like in the rest of West African countries, are facing tremendous difficulties. For Demont and Neven (2013), domestic rice value chains in West Africa face systematic constraints including lack of supportive government policies, lack of sustainable business development services, and lack of vertical partnerships. For Asiedu (2008) the most important cross cutting constrains in local rice value chains include insufficient access to the output market, inadequate access to credit, weak producer capacity, poor group animation and a weak technology transfer system. Will (2013) relates that due to fragile vertical linkages along the value chains and fragmented production, actors face marketing and production risks.

Credit access: Lack of access to credit is one of the most important constraints faced by smallholders in Togo, especially rice farmers (Kluvi, 2013; MAEP, 2010). Credit access from banks to the agricultural sectors is limited because of lack of collateral. It is challenging for a farmer to obtain credit from microfinance for their farm activities (ITRA & DSID, 2010). Credit drives farmers to fall into indebtedness and be trapped in poverty because of the high interest rates that can reached 24% while the interest rate from the commercial banks is about 12% (Kluvi, 2013). Most of times, the farmer

moved into informal credit that also charged them high interest rate (up to 50%). Sometimes, the loan is paid in kind, using the crop (Kluvi, 2013; MAEP, 2010).

Input access: Seed requirements are often not clearly determined, seed points of sale are rarely situated in the proximity of the end users and are not well known (MAEP, 2010). Less than 5% of rice producers in Togo use improved seed (MAEP, 2010). Efforts were made to organize the seed sector by the creation of a Department of Seed in 2009 (Kluvi, 2013; MAEP, 2010).

Rice production and productivity is mostly conditioned by the amount of fertilizers used, especially nitrogen (FAO, 2000). To obtain high yields in rice cultivation, farmers need adequate amounts of fertilizer at the right time. In Togo, a State Company called Central d'Achat et de Gestion d'Intrants Agricoles (CAGIA) is in charge with the distribution of subsidized fertilizers to smallholders farmer. The government subsidizes the fertilizer price at 40% of its real cost from 2009 to 2016. At that time, the subsidized fertilizer price is 11,000FCFA per bag of 50kg (Kluvi, 2013). In 2017, the price was reviewed and fixed at 13.500 FCFA per bag of 50 kg. Farmers complain about access to such subsidized fertilizer. It is difficult for small farmers to buy sufficient quantity on time for application. Even when they have access, they are not able to afford the quantity required to be applied on rice because of lack of credit (Kluvi, 2013; MAEP, 2010). The quality of fertilizers for farmers could be assured if only the supply of fertilizers were to be decentralized to village markets.

Improve technology access: Most of the farmers use traditional rice seed and production technology (ITRA & DSID, 2010). They are reluctant to adopt new technology (improve seed and fertilizer) because of uncertainty about the possible advantage of the new technology (ITRA & DSID, 2010). The other reason is that

improved technologies are most of the time not available to farmers. Even when the technology is available, the ineffective nature of extension activities do not allow the correct transfer of the technology (MAEP, 2010). Lack of appropriate technology adoption is observed along the value chains, from production to collection, from processing to packaging and to storage.

Low quality: The low quality of local rice is the results of the lack of adequate rice production skills and postharvest handling at all levels. MAEP (2010) shows that 20% to 30% of the production is lost due to poor harvest handling. It is well known that good quality seed contributes up to 40% to the yield, but few farmers (5%) use certified rice seed in Togo (MAEP, 2010). Therefore, yields are very low and vary according to variety cultivated. For example, in 2010 the mean yield of IR 841 variety was 2.248 Mt/Ha, the Agona variety was 2.437 Mt/Ha, and the NERICA variety was 1.796 Mt/Ha. The average yield at national level was 1.906 Mt/Ha (ITRA & DSID, 2010).

2.3.3 Pattern to upgrade domestic rice quality

Rice farming needs to be transformed from a subsistence activity to one that is run as a business and takes into account quality. This is because the growing urban populations are demanding high-quality products. Rice growing should generate income for producers and enhance greater economic growth (IRRI, 1985; Pye-Smith, 2013). To develop a sustainable rice value chain, the problems encountered in the sector need to be tackled. Institutional arrangement and partnerships based on trust, mutual benefits, and transparency are the key factors for value chains upgrading (Bahlmann, Schulze, & Spiller, 2007; Fritz & Fischer, 2007).

When well structured, a value chain approach through contract farming is appropriate to move farmers from subsistence agriculture to commercial agriculture (Setboonsarng et al., 2008). This will contribute to economic growth and poverty reduction (Pye-Smith, 2013). There is a need to link smallholder to input, credit and market.

The domestic rice value chains face quality governance problem throughout the supply chains. According to Demont and Neven (2013), West Africa's rice quality should be tailored to the end-market. Consumer preferences and emerging rice value chain development should therefore be based on governance of quality and clear marketing strategies. Value chains are based on a market demand-driven strategy, said Demont and Neven (2013), and are built on cooperation, a win-win situation, where all benefit financially, and are part of decision-making and the information-sharing process. There is increasing demand for quality rice driven by the urban population. As this market grows, rice producers can seize this opportunity by improving the quality of their product.

The prosperity and welfare of rice producers in Togo will depend to a certain degree, on their ability to be part of a viable value chain (Yovo, 2010). Farmers should see themselves as business doers. For IRRI (1985), improved quality starts with better paddy. Paddy potential may be reduced by the misuse of the mills but processing itself cannot produce quality milled rice better than the paddy is. In other word, the quality of the milled rice is determined by the quality of the paddy. The processor cannot change the product quality itself (Deng & Hendrikse, 2013). A paddy grade with high-quality, and paid at appropriate prices, motivate farmers to perform in quality improvement. The only way for farmers, dealers, millers and wholesalers is to react to

the market's high quality rice demands, and this is through quality governance and cooperation (IRRI, 1985).

The most important steps that are needed for rice quality upgrading are: i) use of improved seed, (the provision of improved seed through contract farming); ii) timing harvest (because the late harvesting decreased head-rice ratio by 7.9% compared to the harvesting on time); iii) mode of harvesting (appropriate mode of harvest mode is important to reduced foreign matter in the paddy and increase grain quality); iv) mode of threshing (threshing is most of time manual, farmers flay harvested plants against a log or a metal barrel, but sometimes manually threshing is done directly on the ground by hitting harvest with stick on ground, this last practices can induce low head-rice ratio upon milling and introduce impurities; v) drying and storage (the recommendation is to dry paddy on tarpaulins or plastic sheets to avoid contamination with soil or other foreign materials, dry paddy under the shade, in an area with the lowest available relative humidity, not under direct sunshine; vi) milling should be done with the appropriate milling machine, the professional millers grade milled rice before it is sold on the market, this increases rice quality and add value to the rice.

2.4 Reviews of Methodological Approaches in Contract Farming

This section describes methodological approaches used to assess farmers' motivation and constraints in contract farming. The section also reviews various impact evaluation approaches used in empirical studies on impact of contract farming.

2.4.1 Motivation and constraints in contract farming identification approaches

Empirical studies provide various approaches that can be used to assess farmers' motivation to engage in contract farming. Principal Component Analysis (PCA), Factors analysis (FA) and Cluster Analysis (CA) are mostly used in empirical studies

to assess farmer motivation for contract farming (Masakure & Henson, 2005; Puspitawati, 2013).

Puspitawati (2013) focussed on an ex-ante perspective of farmers' motivation to engage in contract. To analyse the 16 motivation factors that came out from the survey, Puspitawati (2013) combined the Principal Component Analysis (PCA), Factors analysis (FA) and the Cluster Analysis (CA). This combination helped him to distinguish four latent factors that influence farmers' motivations to engage in contract farming: (1) economic motive; (2) direct benefits; (3) market uncertainty; and (4) intangible benefits.

Masakure and Henson (2005) analysed farmers' motivation for contract farming using factor analysis. Cluster analysis was used to identify systematic differences in the relative importance of the identified motivation subsets. The socio-demographic characteristics of the cluster members were compared among the derived clusters groups. This helped the authors to group the 11 factors that were identified during the survey into four important motivation factors.

Simmons et al. (2005) identified factors that contribute to smallholder participation in contract farming. They used the Probit model to show that farm size and other factors such as participation in farm groups, farmer's age and education influence farmers participation in contract farming.

Abebe et al. (2013) explored farmer motivation for particular contract design attributes. They combined discrete choice experiments and analytical hierarchy process to investigate the motivation of potato farmers in Ethiopia according to contract terms attributes.

According to Decoster (1998), in the case where a researcher does not want to include all of the original measures in analyses but still wants to work with the information that they contain, the Principal Component Analysis (PCA) can be very useful. The use of PCA is however limited. Decoster (1998) recommended the use of PCA when the question is to perform data reduction, and Factors Analysis is performed when the question is to make statements about the factors that are responsible for a set of observations.

Decoster (1998) describes Factor Analysis as a collection of methods used to examine how underlying constructs influence the responses on a number of measured variables. Factor Analysis and Principal Components Analysis (PCA) are related, but there are differences in function. Factor analysis is used to test hypotheses producing error terms while the Principal Component Analysis (PCA) is mainly utilized to describe statistical technique (Decoster, 1998; Puspitawati, 2013). Regression modelling techniques are applied in Factor analysis and this helps to describe variability among observed and correlated variables.

There are basically two types of Factor Analyses: confirmatory and exploratory. Confirmatory Factor Analysis (CFA) tests whether a specified set of constructs is influencing responses in a predicted way, while Exploratory Factor Analysis (EFA) attempts to discover the nature of the constructs influencing a set of responses (Decoster, 1998). The Common Factor Model is the base of the two kinds of factor analyses (exploratory and confirmatory).

Cluster analysis is a classification technique that help to identify objects or groups of individuals that are similar to each other but different from individuals in other groups (Borgen & Barnett, 1987; Puspitawati, 2013). Variables used in a factor analysis are

clustered based on their variance. On the other hand, there are cases of people are grouped in a cluster analysis based on the similarity of responses to several variables. In conclusion, a factor analysis is used to form groups of variables based on several people's responses to those variables, while cluster analysis grouped people based on their responses to several variables.

Cluster analysis provides a means for explicitly classifying objects and empirically based methods (Scott & Knott, 1974; Puspitawati, 2013). Cluster analysis is an appropriate method to identify a set of farmers that have similar motivation to work under contract farming (Puspitawati, 2013).

Clusters commonly can be formed in two ways: Hierarchical clustering and k-means clustering. The hierarchical clustering can be divisive or agglomerative. The divisive clustering starts with one single cluster containing all records and ends up with separating the cluster into smaller ones. On the other hand, agglomerative hierarchical clustering starts with every case being a cluster itself, and successive steps are followed and similar clusters thus merge.

A k-means clustering is another way to form clusters. A k-means clustering method does not require computation of all possible distances. In the clustering process, the numbers of clusters that will be added should be known. The following steps should be followed to produce exact k clusters: (1) if k is the number of clusters needed, k randomly points are then chosen to define the centres of the k clusters; (2) each item is assigned to the closest point; (3) the mean is calculated for each cluster; (4) the K means is used to define the centres of K new clusters and reassign each item to the cluster with the closest centre; and (5) the previous two steps are repeated until there is no change in the nature of the clusters between steps (Everitt & Dunn 2001). Since

they will usually be selected as initial cluster centers, K-means clustering is very sensitive to outliers. Clusters with small numbers of cases form the results in outliers.

2.4.2 Impact Evaluation approaches

Impact evaluation is important to assess the effect of an intervention. Effective impact evaluation helps to analyse not only the effect but also to identify the factors that contribute to outcome (Khandker, Koolwal, & Samad, 2010; Meshesha, 2011). Impact analysis helps to assess how individuals would have performed without the intervention (Khandker et al., 2010).

Selection bias is the main challenge in impact evaluation because only the realized outcome is observed for each individual (Meshesha, 2011). The problem of missing data held can be observed because the outcome from nonparticipant are not observed. This problem of missing data is called a counterfactual problem (Khandker et al., 2010). Comparing outcome from treated individuals with an untreated group is the best way to overcome the counterfactual problem (Khandker et al., 2010). The important thing to do is to find a comparison group with similar characteristics as a treated group. Two solutions are possible. One is by modifying the target strategy of the programme to clean out differences that would have existed between treated and nontreated groups and the other one is by creating a comparison group through statistical design (Khandker et al., 2010).

Different methods are used in the literature to address the fundamental question of the missing counterfactual in impact evaluation. Each method has its own assumptions about participation and the nature of a potential selection bias in programme targeting. The assumptions are crucial to developing the appropriate model to determine programme impacts (Khandker et al., 2010)

Miyata et al. (2009) used three econometric components analysis to assess the impact of contract farming on income in China.

First, Miyata et al. (2009) estimated the probability of participation in the contract farming scheme using a Probit model. The regressors include household size and composition, ownership of land and other assets, the age and the education of the head of household. This analysis helped to address the question of whether contract farmers tend to be better endowed than non-contract farmers.

Second, an ordinary least squares (OLS) model was used to estimate per capita income as a function of farm and household characteristics. A dummy variable was used to represent participation in the contract scheme. To control for observable differences between contract and non-contract farmers, such as differences in farm size, education, and the availability of family labour, these authors included household characteristics in the model. The model did not take into account possible selection bias in contract participation, that is where a third component was included in the analysis.

The third component of their analysis is the so called the Heckman selection–correction model or the treatment effects model. This model used the Probit model to calculate the inverse Mills ratio and includes this ratio as a regressor in the income model. The inverse Mills ratio helped to correct the possible selection bias and it yields unbiased and consistent estimates in the income model.

In most of the empirical studies in which cross sectional data are used, Propensity Score Matching was repeatedly used in contract impact evaluation (Bellemare, 2012; Cai et al., 2008; Honfoga et al., 2016; Mesheshas, 2011; Velde & Maertens, 2014)

Cai, et al., (2008) in their study on empowering farmers to move beyond the contract toward independence, combine simple mean and propensity score matching comparisons to assess the impact of contract farming on rice farmers' performance in Cambodia. Mesheshas (2011) used Propensity Score Matching to estimate the effect of contract farming on household income from honey production based on cross section data collected using a multi-stage random sampling technique. In assessing the impact of contract farming on farmers welfare, Bellemare (2012), used the Propensity Score matching Model to overcome selection bias and estimate the treatment effect of wheat in Madagascar. With a cross-sectional household data, Velde and Maertens (2014) also used propensity score matching methods to analyse the impact of contract-farming on selected farm performance indicators. This technique helped them to overcome selection bias.

The PSM model can help to overcome selection bias, but cannot explain which factors affect the outcome variable, that is why some authors also use endogenous switching regression. In Taiwan, Chang et al., (2006) used endogenous switching regression to estimate the impact of contract farming on profitability and assessed factors affecting such profitability. To assess factors that contribute to increased revenue in Cambodia, Cai, et al. (2008) used the endogenous switching regression model in addition to PSM.

Simmons et al. (2005) used a two stage estimation process to measure the effects of farm contracts on gross margins, farmer employment and labour use. The results indicate that participation in contract farming increased returns to the capital for the broiler and seed corn contracts, but not for the seed rice contract. The three contracts influenced types of labour used; however, none of the three contract influenced total farm employment.

2.5 Reviews of Theoretical Approaches

2.5.1 Modern contract theory

The modern contract theory encompasses the principal-agent theory and the transaction cost theory (Bogetoft & Olesen, 2002). The main function of contract farming includes minimizing transaction costs of the coordination and providing incentives (including penalties), and risk sharing. To achieve such function, a contract design incorporates in contract menus, several instruments such as incentive, a risk sharing mechanism, and a renegotiation option and repeated contracting and simplified and transparent contract terms.

Principal agent theory

The principal agent theory is based on the incentive theory. In this theory the '*principal*' hires an '*agent*' with specialised skills to perform the task when the task is too difficult or costly for him to do himself (Sappington, 1991). The principal concern in this theory is how to best motivate the agent to do the task as the principal would prefer it.

The agency theory tries to determine the most effective contract given the different goals of the different parties. The processor's (principal) motivation to contract with a producer is to assure a continuous supply of quality raw material and reduce the transaction cost. On its side the producer (agent) wants stability in his income, market access and security, and access to technology and capital (Abougamos et al., 2012). The ability of processors to contract with farmers that produce paddy free from foreign matter face the problem of asymmetric information (Abougamos et al., 2012).

This information asymmetry can occur before the contract (adverse selection), or after the contract (moral hazard). Adverse selection implies that the producers hide their poor performance before the processors selected them for contract arrangement. Farmers know how the paddy has been managed in storage and at the farm, but the processor cannot observe this directly. The moral hazard problem here is that the producer does not have an incentive to manage the harvested paddy according to agricultural best practice listed in the contract terms (Abougamos et al., 2012).

In a contract-farming scheme, the principal is a firm or a processor and the agent is a grower or a farmer. The principal (processor) chooses farmers with whom he would like to contract and proposes the contract terms (Warning & Hoo, 2000). The agents (farmers), in turn, decide whether to participate or not. When the agent refuses the contract, the relationship terminates, but when the agent accepts the contract, he decides how much effort to put forth in order to respect the contract terms (Sappington, 1991). The extent of participants' profits will depend on the terms of the contract, farmers own characteristics and environment in which the contract is concluded (Warning & Hoo, 2000). The more the benefits from a contract-farming scheme increases, the more the farmers' performance is observed (Sappington, 1991).

It is not easy for the principal to observe the level of effort exerted by the agent. According to Sappington (1991), the principal can align the agent's decision with his own by the terms of the contract.

The agent's motivation problem is solved when the principal makes the agent residual claimant in the relationship (franchise fee that must be paid by agent for example). When the agent buys the franchise, his goal is perfectly aligned with the principal's initial goals. In this situation, the agent always acts as the principal exactly would

want if he shared the agent's superior information and expertise. In study conducted by Olmos et al., (2011), the agent theory was used to assess agent quality performance under double sided moral hazards in a share contract.

The relationship between the principal (processor) and the agent (farmers) within contract farming is rarely governed by explicit performance and risk-sharing incentives. This relationship is frequently a combination of informal and formal incentives that helped to achieve the desired results (Gow & Swinnen, 2001). For some contractors and firms, informal incentives could be the most cost-effective means of managing performance. For others, input control combined with performance premium is more efficient (Goodhue, 1999; Hueth & Ligon, 1999; Hueth, Ligon, Wolf, & Wu, 1999; Hueth & Ligon, 2002). Indirectly, the processor must also engage in training farmers and control for quality paddy production. This will induce farmers to increase their efforts to respect the contract terms.

The Principal Agency theory only is not enough to explain the contract design because this theory ignores the cost of making and administrating the contract scheme. The transaction cost theory comes as a complement to the agency theory and includes the transaction cost which is missing in the agency theory (Bogetoft & Olesen, 2002; Bogetoft & Ballebye, 2004). The advantage of the transaction cost theory is that the different contracts existing are explained by means of a broad range of variable contingency.

Transaction cost theory

The transactions costs have been described as ‘the costs of running an economic system, friction in the economic system, information imperfections, moving from ignorance to omniscience, reducing uncertainty, and carrying out exchange’ (Karaan,

2002). The new transaction cost economic literature usually emphasises asset specificity, uncertainty and frequency of transaction as the main source of transaction.

- **Uncertainty** signals that contract parties have incomplete information on current situation and the probability that the other party will developed opportunistic behaviour (Williamson, 1979). It is costly to predict uncertainty. According to Bijman (2008), lack of information about market conditions for farmers and quality of product for buyers is a problem in carrying out profitable transactions.
- **Asset specificity** is the extent to which the firm's investments have a sole or limited range of practical and economically useful applications. Farmers and or processor investment in a specific asset in a particular contract arrangement have little or no value in alternative uses. For that reason the higher the degree of asset specificity the higher the incentive to enter into a contract to protect the assets.
- **The frequency of exchange** means the frequency of trade. The transaction cost is high when the transaction frequency is low, and vice versa.

When farm products are delivered to processing firms, the transaction costs are higher because of coordination, aligning production, harvesting, collection and processing (Williamson, 1979). Contract arrangements between farmers and processors, therefore, help to minimize cost so that contract the arrangement is attractive for the two parties.

In contract farming, two main forms of transaction cost are described by Williamson (1979). The first one is the Ex-ante transaction cost, such as the cost of finding a contract partner, negotiating terms, drafting, safeguarding and monitoring the agreement. The second one is the Ex-post transaction cost which encompasses the

costs incurred to settle a dispute, such as the spill-over costs, as well as legal fees into the firm's activities and pricing levels. It is important to look at where per-unit cost can be reduced along the production and contracting process (Colen et al., 2013). In rice contract farming, the transaction cost are related to cost linked to increased food quality and safety standards required in rice export destination countries, and more stringent quality monitoring by rice processors and exporting firms. Colen et al. (2013) identifies several approaches to reduce transaction costs: investment in physical market infrastructure, better coordination among value chain actors that will allow traders to contract larger volumes thereby reducing trading costs, investment in transport infrastructure reducing transport costs etc.

As economic institutions, contract farming practices can help to reduce uncertainty, ensure that firms specialize and invest in specific assets and increase the frequency of exchange (Williamson, 1979). Contract farming can be valuably used as a response for cost reduction. Contract farming reduces uncertainty by reducing the likelihood of deceit and deception, and provides a guaranteed marketing channel for the farmer (Prowse, 2012). Quality upgrading and vertical coordination imply transaction costs that need to be reduced. Contract farming, therefore, provides the firm with greater certainty regarding the quantity and quality of production it will receive. After knowing the major transaction cost that occur in rice contract farming, there is a need to assess the impact evaluation theory. The next section will describe the impact evaluation theory.

5.2.2 Impact evaluation theory

The impact evaluation theory compares outcomes (Y_i) across treated individual and non-treated individual (control). The impact evaluation theory is given by the basic impact evaluation formula (Caliendo & Kopeinig, 2008; Meshesha, 2011):

$$T_i = Y_i(1) - Y_i(0) \quad (2.1)$$

Where the treatment effect for an individual i is T_i and the potential outcomes for each individual can be defined as $Y_i(D_i)$.

The counterfactual problems appear in the equation (2.1) because only one of the potential outcomes is observed for each individual i . $Y_i(1)$ is not observed for non-participants, whereas $Y_i(0)$ is not observed for contract participants. Therefore, there is a need to focus on average treatment effects because the estimation of the individual treatment effect T_i is not possible. The average treatment effect on the treated (ATT) is an important parameter used in the estimation of treatment effects. It is calculated by

$$T_{ATT} = E(T_i | D_i=1) = E[Y_i(1) | D_i=1] - E[Y_i(0) | D_i=1] \quad (2.2)$$

The expected value of ATT is now the difference between expected outcome values with and without treatment for those who were actually treated.

In this expression, the counterfactual element for contract producers, $E[Y_i(0) | D_i=1]$, is not observed. In order to estimate ATT this has to be dealt with in a proper way. A solution seems to take the average outcome of non-contracted farmers $E[Y_i(0) | D_i=0]$

$$T_{ATT} = E(T_i | D_i=1) = E[Y_i(1) | D_i=1] - E[Y_i(0) | D_i=0] \quad (2.3)$$

The problem here is that, before introducing the contract, non-contract farmers and the contract may not be the same. The expected difference between those groups may not entirely be due to the contract. To overcome this problem, the expected outcome for non-contract farmers, had they participated in contract farming, $E[Y_i(0) | D_i=1]$ can be used in equation (2.3) by adding and subtracting.

$$T_{ATT} = E[Y_i(1) | D_i=1] - E[Y_i(0) | D_i=0] + E[Y_i(0) | D_i=1] - E[Y_i(0) | D_i=1] \quad (2.4)$$

If we rewrite this

$$T_{ATT} = ATT + E[Y_i(0) | D_i=1] - E[Y_i(0) | D_i=0] \quad (2.5)$$

$$T_{ATT} = ATT + \varepsilon \quad (2.6)$$

ATT is the average difference in outcome of contract participants and noncontract participants, as if non-contract participating farmers also participate in contract farming. It is similar to the case where a randomly chosen farmer from the population is assigned to participate in the contract farming. In such case, contract and non contract farmers have an equal probability of participating in the contract scheme. The term ε is the difference between the counterfactual mean output of contract farmer and the mean output of non-contract farmers; it is the selection bias. The true parameter of ATT is identified if only the outcome of control and treatment are the same. This is written as:

$$E[Y_i(0) | D_i=1] - E[Y_i(0) | D_i=0] = 0 \quad (2.7)$$

Therefore, the main goal of an impact assessment is to get rid of selection bias. Various approaches are used to overcome selection bias. The assumption associated with each of the impact evaluation methods, and the nature of potential selection bias in program targeting and participation are summarized in Table 2.2. The approaches include Randomized evaluations, Matching methods, Double-difference (DD)

methods, Instrumental Variable (IV) methods, and Regression discontinuity (RD) design and pipeline methods (Khandker et al., 2010).

Table 2. 2 : List of impact evaluation approaches and their assumptions

Impact evaluation approaches	Assumption	Nature of selection bias and how it is solved
Randomized Evaluations	A randomly allocated initiative across a sample of subjects (communities or individuals, for example); the progress of treatment and control subjects exhibiting similar pre- program characteristics are then tracked over time.	Randomized experiments have the advantage of avoiding selection bias at the level of randomization
Matching methods, specifically propensity score matching (PSM)	PSM methods assume that selection bias is based only on observed characteristics; they cannot account for unobserved factors affecting participation	In the absence of an experiment, PSM methods compare treatment effects across participant and matched nonparticipant units, with the matching conducted on a range of observed characteristics. PSM
Double-difference (DD) methods	DD methods assume that unobserved selection is present and that it is time Invariant DD methods can be used in both experimental and non experimental settings	The treatment effect is determined by taking the difference in outcomes across treatment and control units before and after the program intervention
Instrumental variable (IV) methods	IV models can be used with cross-section or panel data and in the latter case allow for selection bias on unobserved characteristics to vary with time.	In the IV approach, selection bias on unobserved characteristics is corrected by finding a variable (or instrument) that is correlated with participation but not correlated with unobserved characteristics affecting the outcome; this instrument is used to predict participation.
Regression discontinuity (RD) design and pipeline methods	RD and pipeline methods are extensions of IV and experimental methods; they exploit exogenous program rules (such as eligibility requirements) to compare participants and nonparticipants in a close neighborhood around the eligibility cutoff	Pipeline methods, in particular, construct a comparison group from subjects who are eligible for the program but have not yet received it

Source: Adapted from (Khandker et al., 2010)

A randomized evaluations approach is used when the sample is selected randomly across the subjects of study (communities or individual). The progress of control and treatment of subjects showing the similar pre- programmed characteristics are then

tracked over time. The advantage of this method is that the selection bias is avoided at the level of randomization.

When unobserved selection is assumed to be present, the DD approach is used. This approach can be used with experiment and nonexperiment data. To measure treatment effect, the differences in outcomes across control and treatment groups are calculated before and after the programme intervention.

The IV is used for panel data as well as cross sectional data. In the case of panel data, the IV, allow for selection bias on unobserved characteristics to vary with time. The basis of IV is that a variable correlated with participants but uncorrelated with unobserved characteristics is used to predict participation and to overcome selection bias.

The Matching approach is used in the absence of any experiment. The treatment effect is compared across participant and non participant using the matching method. This method is based on the assumption that the selection bias is based on observed characteristics only; the unobserved characteristics are not taking into account.

When estimating the effect of treatments, Propensity Score Matching (PSM) helps to reduce bias; it is a treatment effect correction (Rosenbaum & Rubin, 1983). In a single propensity score or index, the method tries to capture the effects of different observed covariates X on participation. The outcomes of contract and non-contract farmers with similar propensity scores are compared to obtain the programmed effect. Some farmers are dropped because no match is found for them and they cannot be compared. The propensity score can be obtained based on the probability of participation in contract farming (model) D conditional on observed characteristics X . This is given by:

$$P(X_i) = \Pr(D_i=1|X_i) \quad (2.8)$$

The matching method is validated, only if assumptions, such as presence of a common support and an Conditional Independence Assumption (CIA) are satisfied (Khandker et al., 2010). CIA states that potential outcomes Y are independent of treatment assignment D given a set of observable covariates X that are not affected by treatment, (Rosenbaum & Rubin, 1983; Khandker et al., 2010). In our case, it means that the counterfactual outcome is the same as the outcome level that would have existed if the farmer had not participated in the contract farming scheme. This is given by:

$$(Y_0, (Y_1) \perp D_i | X_i \quad (2.9)$$

The other assumption is the common overlap or support condition: $0 < P(D_i = 1|X_i) < 1$. This condition implies that treatment observations have comparison observations 'nearby' in the propensity score distribution D (Rosenbaum & Rubin, 1983; Khandker et al., 2010). When these assumptions hold, the Propensity Score Matching estimator for ATT can be written in general as follow:

$$T_{ATT}^{PSM} = E_{P(X_i) | D_i=1} \{ E[Y_i(1) | D_i=1, P(X_i)] - E[Y_i(0) | D_i=0, P(X_i)] \} \quad (2.10)$$

Within the common support and with cross-section data, the treatment effect can be written as follows (Heckman, Ichimura, & Todd 1997; Smith & Todd 2005):

$$ATT = \frac{1}{N_T} \left[\sum_{i=T} Y_i^T - \sum_{j=C} \omega(i; j) Y_j^C \right] \quad (2.11)$$

Where N_T is the number of participants i and $\omega(i, j)$ is the weight used to aggregate outcomes for the matched non participants j .

Due to limited resource, it is not easy to conduct randomised experiment in the study area, a cross sectional data will be collected. In the absence of a randomized experiment, PSM methods is appropriate to compare treatment effects across

participant and matched nonparticipant farmers. The Endogenous Switching Regression Model also will be used to assess the robustness of the results from PSM.



CHAPTER THREE

METHODOLOGY OF THE STUDY

3.1 Introduction

This Chapter describes the methodological approach used in the study. The emphasis is on the conceptual framework, the analytical framework and data collection. The objectives one and three were addressed by Factor analysis (FA) and Cluster Analysis (CA) following Masakure and Henson (2005), and Puspitawati, (2013). The objective two was addressed by using the Propensity Score Matching (PSM) approach and the Endogenous Switching Regression Model (ESRM) approach. The reason for the choice of these two approaches is for the purpose of comparison of the results.

3.3 Conceptual Framework of the Study

Enhancing rice farmers' performance in terms of productivity (yield), revenue, and degree of rice paddy purity is very important in the process of upgrading the domestically produced rice quality. Various tools can be used to improve farmers' performance and contribute to rural development. Contract farming is one of the tools that can help to improve farmers' performance and thus upgrade quality (Minot & Ronchi, 2014). Warehouse receipt system also can be used to improve farmers' performance and thus upgrade quality. Contract farming draws our attention in this study because it is the only tool that is on going in the country. In Togo, the necessity to promote contract farming to improve farmers' performance has been well recognized since 2004 when ETD with assistance of CIDR launched the first contract farming model called ESOP (*Entreprise de Service et Organisation des Producteurs*). At that time, the attention of the policy was mainly on production, the development of irrigation schemes with little interest in rice quality improvement. This was a problem in the development of rice sector. In 2010, a new rice policy was designed to take into

account such a gap. In 2013, the new agriculture investment programme *Programme National d'Investissement Agricole et de Sécurité Alimentaire* (PNIASA) expressed the necessity to develop a quality based rice value chain in the country. Enhancing farmers' performance for paddy rice quality upgrading has thus become an important issue in the rice value chain (MAEP, 2010). The government of Togo, through the Ministry of Agriculture, funded ETD to promote a new ESOP contract farming scheme throughout the country. The effect of contract farming in the process to upgrade rice quality is conceptualized in the Figure 3.1. The conceptual framework offers a clear and concise way to understand how contract farming contributes to enhance farmers' performance for agricultural product quality upgrading.

Based on the concept literature, participating in contract farming contributed to enhance farmers' performance by means of contract terms (Eaton & Shepherd, 2001; Will, 2013 Minot & Ronchi, 2014). Elements in contract terms (input supply, credit facility etc.) can be incentives which affect farmers' motivation to participate in the scheme and to demonstrate/exhibit their performance. When a contract scheme is not well designed, the same elements in contract terms (price option, payment mode, penalties etc.) can also constitute constraints for the farmers and this negatively affects their performance (Bogetoft & Ballebye, 2004; Bogetoft & Olesen, 2002). When that happens, appropriate contract monitoring or policy measures are needed to correct it before the contract scheme disrupts (Eaton & Shepherd, 2001).

Farmers' decision to engage in a contract arrangement is motivated by the incentives in the contract terms (input supply, credit facility, etc) but also by other latent factors or constraints that farmers face in their environment (input and output market uncertainty, infrastructure, direct benefit, and indirect benefit) and specific assets that quality rice cultivation need (Bottema & Altemeier, 1990; DeVuyst & Ipe, 1999; Gneezy et al.,

2011; Saenger et al., 2013; Son Nghiem & Coelli, 2002). All these factors explain why farmers choose to accept the contract proposed by the processor.

The overall goal of the processor in this contract arrangement is to guarantee a reliable quality supply of raw material from a secure source that the farmers constitute (Sartorius & Kirsten, 2007). The processor therefore has an impact on the farmers' performance by the contract term that is offered. The processor, in the contract terms, provide, many contract attribute incentives to motivate the farmers in paddy quality improvement.

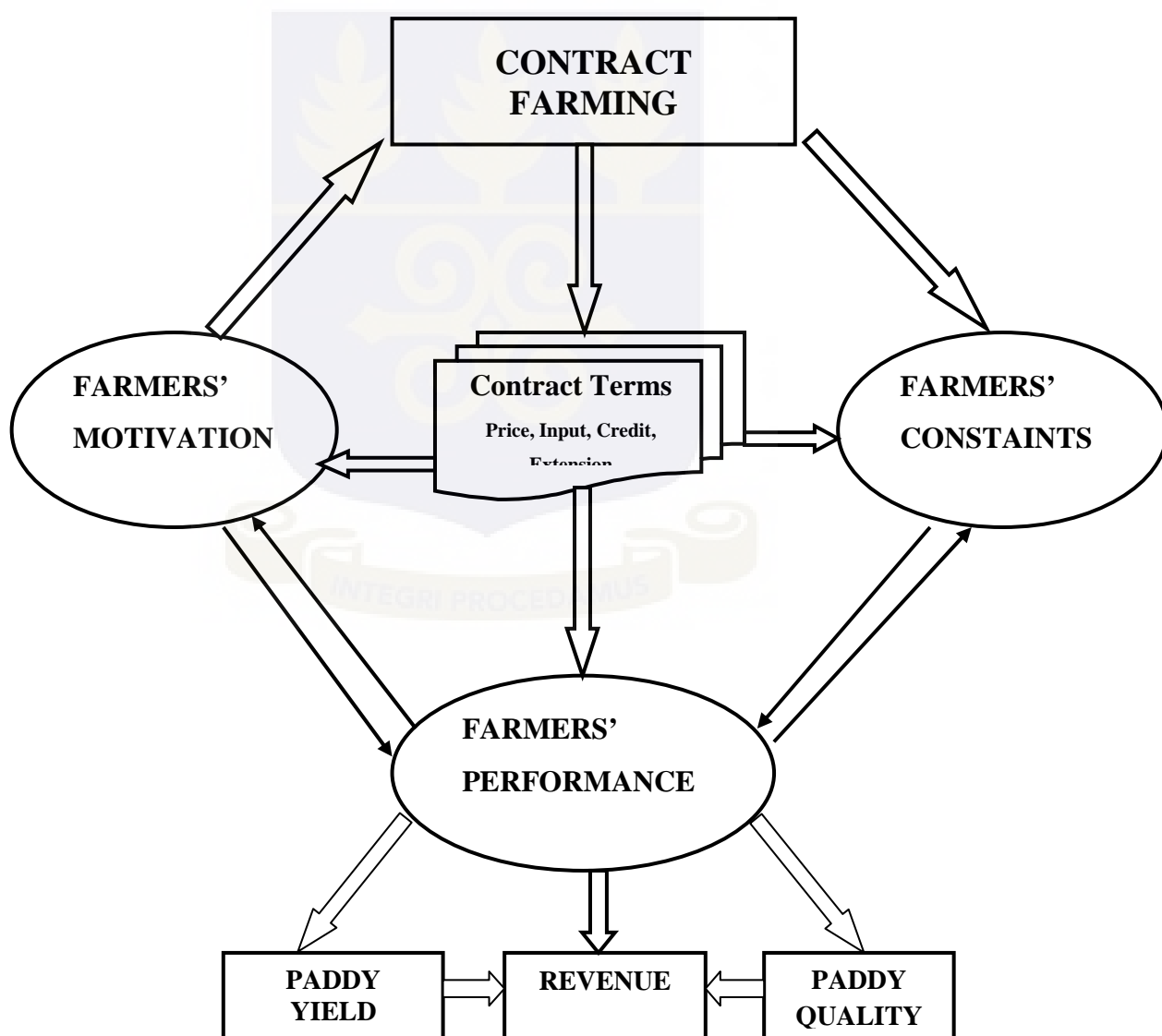


Figure 3. 1 : Conceptual Framework for contract farming and rice quality upgrading

Source: Designed by the author

Farmers' performance is affected by input (seed and fertilizer), and agricultural practices or operation training that the processor provides (especially threshing, winding, drying and storage technics). When farmers do not use quality certified seed, the paddy quality is affected by this mixed variety. When threshing and drying are done on the ground or the floor and the paddy is incorrectly winnowed, there will be foreign matter in the paddy, and the quality of the paddy is affected.

Contract farming itself cannot directly affect the quality of the paddy (Edusah & Sarfo-Mensah, 2014). Farmers, by using quality input received from the processors and following the advice for good agricultural practices (threshing, winding, drying, and storage) and the training from the processor, the quality requirement is met.

When farmers engage in a contract arrangement with a processor, some factors (constraints) hamper the realization of the positive impact of the scheme; when appropriate policy measures are not taken, the scheme is disrupted. These constraints negatively affect farmers' performance, which is reflected in yield, paddy quality and revenue. Contractors, by providing farmers with quality certified seed and fertilizer, providing extension service and bonus for quality, strengthen farmers' performance positively, impact paddy quality and then contribute to value chains upgrading. When faced with the multiple contract attributes, farmers base their motivation on contract attributes that provide the maximum and secure benefits.

When a contract farming scheme is not well monitored, it leads to problems such as problems with bargaining power, side selling, and corruption. The best fit contract is the one that sends feedback to farmers and contractors about price adjustments and contract amendments based on challenges faced in the contract scheme. The more

contracting parties benefit from the contract the more they are willing to contract, otherwise the process is stopped and the relationship ends.

3.2 Methods of Data Analysis

In this section, the analytical framework used is described. First, to assess farmers' motivation and constraint in ESOP contract farming, the following methods of analysis have been used. These are Factor Analysis and Cluster Analysis. Second, to assess the impact of contract farming on farmers' performance Propensity Score Matching and Endogenous Switching Regression methods were used.

3.2.1 Analysis of farmers' motivation and constraints: Factor Analysis and Cluster Analysis

A list of motivation factors for contracting with ESOP and constraints face by working under ESOP contract farming was developed during a pilot study. The study that was conducted from 15 ESOP contract scheme is outlined in (Table 3.1 and Table 3.2).

Table 3. 1 : List of motivation factors for contract farming

Variables(x)	Motivation factors
2C01	Payment is done in Bulk
2C02	Sale in Bulk is good
2C03	Unit of measure of the product is scaled
2C04	Acquire knowledge from technical assistance for quality improvement
2C05	Access to high quality seed for quality improvement
2C06	Having a guaranteed market
2C07	Access to credit
2C08	Ability to receive a higher quality premium price
2C09	Reliable supply of inputs
2C10	Ability to increase yields
2C11	Payment is more reliable
2C12	Saw other farmers were benefitting so I wanted to benefit too
2C13	Group members help each other
2C14	Guaranteed minimum price
2C15	No need to organize transportation to market
2C16	Ability to make new relationships with other farmers

These motivation and constraint factors were analysed using Factor Analysis and Cluster Analysis. In factor analysis, variables (listed in Table 3.1 and Table 3.2) were clustered into three groups/clusters based on how much variance these variables shared (59% cumulative variance for motivation factors and 83% cumulative variance for constraint factors) and on how many unique cluster variables shared the same variables. The cluster analysis focussed on grouping respondents into three clusters based on the similarity of responses to several variables (Scott & Knott, 1974; Puspitawati, 2013; Masakure & Henson, 2005).

Table 3. 2: List of constraints farmers face in contract farming

Variables(x)	Constraint factors
2E01	Price formula used by ESOP is not good; for example, I feel cheated when the price goes up
2C02	ESOP quality premium price is not high enough to cover investment made to satisfy their quality requirement
2E03	When other farmers fail to pay their credit we are asked to pay back
2E04	It takes too long to get paid for my rice sold to ESOP
2E05	ESOP doesn't have enough capital to cash and carry method of payment
2E06	ESOP agent manipulated product quality standard so that not all contracted production are purchased
2E07	ESOP contract is unreliable and exploit a monopoly position in price fixation (no price negotiation)
2E08	It is too risky to contract with ESOP because of the input that they offer as credit
2E09	Technical assistance from ESOP is not satisfactory
2E10	I face the risks of production problems because of poor quality of their seed variety
2E11	I have not benefited from selling my product to ESOP
2E12	I do not trust the Unit of measure (scales used)
2E13	Too many restrictions on how to cultivate the produce
2E14	ESOP does not buy the total production
2E15	Material, tarpaulin and plastics offered are not of good quality
2E16	I lose my freedom to sell my own production

a) Factor analysis

The Factors Analysis is related to the Principal Components Analysis (PCA), but, the factors Analysis is different in function. In this study, the factor analysis is utilized to test the hypotheses producing error terms. The factor analysis is like regression

modelling, but the fact that factors are not observable disqualifies the use of a regression model (Tryfos, 2001). A factor analysis is used to describe variability among observed and correlated variables. In order to measure the relational variables listed in Table 3.1 and Table 3.2, a five-point Likert scale specified as follows was used: *1=not important; 2=Somewhat important, 3=important; 4=Very important and 5=Extremely important.*

The variables presented as motivation factors have three unobserved variables which are named factors (perceived direct benefit, output measure and input market, and reliable source of income). In the case of the constraint variables, three factors were also found, these are: price formula constraint, payment mode, and lack of solidarity. With the factor analysis, joint variations in response to unobserved latent variables were detected. To identify these latent variable, two stages were followed, as used by Masakure & Henson (2005) and Puspitawati, (2013):

- 1) identification of underlying factors; this was done by clustering variables into three homogeneous sets, creating new variables, and allowing to gain insight into the three categories.
- 2) screening of variables includes identification of groups which allows the selection of three factors to represent the 10 most important motivation variables and the five (5) most important constraint variables

The study satisfied the three assumptions underlying the factor analysis:

- (1) only variables that are ordinal are used (e.g. scores assigned to Likert scales);

(2) the variables are moderately correlated to each other, otherwise carrying out a factor analysis would be pointless because the number of factors will be the same as the number of original variables,

(3) the variables used are linearly related to each other; scatter plots of pairs are used to measure whether the variables are linear to others.

In this study, p ($p=16$) variables X_1, X_2, \dots, X_p are measured on a sample of n subjects ($n=186$ contract farmers), then variable i can be written as a linear combination of m factors F_1, F_2, \dots, F_m where in this study, ($m=3$) $<$ ($p=16$), the theoretical factor model is written as follows:

$$X_i = b_{i1}F_1 + b_{i2}F_2 + \dots + b_{im}F_m + ei \quad (3.1)$$

where the b_{is} are the factor loadings (or scores) for variable i and ei is the part of variable X_i that cannot be explained by the factors (Table 3.1 and Table 3.2).

The analysis of results followed a three step process (Chen & Paulraj, 2004; Puspitawati, 2013):

- 1) First, calculating initial 'factor loadings' using the most common method that was the principal component method. The same method used to carry out a principal component analysis is used in Factor Analysis, but the factors that were obtained, were not the principal components. The loadings for the three factors were proportional to the coefficients of the three principal components. When the factors at the first stage of the analysis were uncorrelated, the second stage was started.
- 2) Second, once the initial factor loadings had been calculated, the factors were rotated. This factor rotation stage aimed to find factors being easier to interpret.

If there were groups (clusters) of variables that were strongly interrelated, the rotation was used to make variables within a subgroup score as high (positively or negatively) as possible on one particular factor. At the same time, the rotation ensured that the loadings for the variables on the remaining factors were as low as possible. In short, the object of the rotation was to try to ensure that all variables had high loadings only on one factor.

There are two types of rotation method, orthogonal and oblique rotation. The orthogonal rotation produced uncorrelated factors, but the oblique rotation produced correlation. In SPSS, the most common orthogonal method is called varimax rotation, which is most used and recommended because it attempts to make the loadings either large or small to facilitate interpretation and it is reasonable and available in virtually all factor analysis software programmes. In this study, the varimax rotation (orthogonal rotation) was used and the results are presented in a rotated component/factor matrix that presents the post-rotation loadings of the original variables on the extracted factors, and a transformation matrix that gives information about the angle of rotation.

3) Third, the calculation of factor scores was the next process in the factor analysis. A decision was made to use three (3) factors when calculating the final factor scores (the values of the 3 factors, F_1 , F_2 and F_3 , for each observation). This step was coming out by using the following methods:

a) the three (3) factors were chosen to account for the highest percentage (59% and 83% motivation and constraints respectively) of the total variability in the original variables;

b) The three (3) factors were chosen to be equal to the number of eigenvalues over one (1) (if using the correlation matrix). Different criteria must be used for the covariance matrix;

c) Developed the screen plot of the eigenvalues. The screen plot indicated that there is an obvious cutoff between large and small eigenvalues.

Tests of significance applied

The following tests were done for the factor analysis to analyse the measurement scale for all the 16 relational variables: i) the appropriateness of the factor analysis for the scales was tested using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO-MSA) test. When the KMO-MSA is greater than 0.5, all measurements were accepted (Nunnally, 1978); ii) Cronbach's Alpha is a reliability test used to analyse the measurement scale for all the 16 relational variables. Cronbach's Alpha reliability coefficient normally ranges between 0 and 1. When the Cronbach's Alpha coefficient closes to 1, the internal consistency of the items in the scale is greater. There is no lower limit to the coefficient. The value of alpha increased partially when the number of items in the scale increased. A high value for Cronbach's alpha shows good internal consistency of the items. Some rules of thumb are given by George & Mallery (2003) about Cronbach's alpha (α) value: $\alpha > 0.9$ – excellent, $\alpha > 0.8$ – good, $\alpha > 0.7$ – acceptable, $\alpha > 0.6$ – questionable, $\alpha > 0.5$ – poor, and $\alpha < 0.5$ – unacceptable. Nunnally (1978) suggest that an acceptable Cronbach Alpha should be above 0.6. The scores generated during the factor analysis were saved and used in cluster analysis.

b) Cluster analysis

There are three different procedures that can be used to cluster data: K-means cluster, hierarchical cluster analysis, and two-step cluster. In this study a K-means cluster was applied because the scores generated on the variables during the factor analysis were continuous. Cluster descriptors are based on factor scores that have a mean of zero and a standard deviation of one. A positive value indicates above average activity on a particular factor and a negative value indicates below-average activity on a particular factor. An algorithm followed to produce exactly K clusters in the K-means clustering are:

- (1) Started with K (where $K=3$) randomly chosen points to define the centres of the K clusters, where K is the number of clusters is needed;
- (2) I assigned to each item the closest point;
- (3) I calculated the mean (centroid) of each cluster;
- (4) I used the K means to define the centres of K ($K=3$) new clusters and reassign each item to the cluster with the closest centre; and
- (5) the previous two steps were repeated 10 times until there is no change in the nature of the clusters between steps (Everitt, Landau, Leese, & Stahl, 2011)

K-means clustering is very sensitive to outliers, because they are usually selected as initial cluster centres. This resulted in forming three (3) clusters with small numbers of cases.

3.2.2 Analysis of the impact of ESOP: Propensity Score Matching (PSM) and Endogenous Switching Regression Model (ESRM)

The Propensity Score Matching (PSM) approach and the Endogenous Switching Regression Model (ESRM) were applied to determine the impact of contract farming on farmers' performance. The reasons for the choice of these two approaches were to get rid of selection bias. PSM is one of the major approaches of causal treatment effects used in many studies with cross sectional data (Meshesha, 2011; Peikes, Moreno, & Orzol, 2008). It helps to correct treatment effect and reduce bias when estimating the effect of treatments (Rosenbaum & Rubin, 1983). The Endogenous Switching Regression Model was used to compare the results from PSM and assess factor affecting farmers' performance.

a. Propensity Score Matching

In the Propensity Score matching approach the following steps were undertaken: Estimate the Propensity Score with Discrete choice model Probit, using the Matching Algorithm Nearest (Neighbour Matching), Assess the Matching Quality by using Joint Significance, Pseudo-R² and Stratification Test, Calculating and comparing the Average Treatment Impact

To estimate the propensity score, the Probit model was used after variables to be integrated in the Probit model were chosen.

The variables included in the Probit model were selected from the literature review of similar empirical studies. Only variables that were fixed and unaffected by the participation in the ESOP contract scheme were included in the model (Table 3). Following Heckman, Ichimura, Smith, & Todd (1998), Heckman & Smith (1999) and

(Black & Smith (2004), the prediction rate method was used. In this method, variables are chosen to maximize the within-sample correct prediction rates. This method classified an observation such as ‘1’ if the estimated propensity score (P^*) is larger than the sample proportion of persons taking treatment (P), i.e. $P^*(X) > P$. If $P^*(X) \leq P$ observations were classified as ‘0’. The matching quality was checked and this helped to determine the propensity score specification.

Selection and definition of variables

The dependent variable for the Probit model was farmer status (FSTATUT). It took value 0 for noncontract farmer and 1 for contract farmer. The definition of independent variables selected and used in the estimation of the Probit model and their expected sign is presented in Table 3.3.

Table 3. 3: Independent variables description in Probit model

Variable (X)	Description	Code	Expected sign
AGEDUM	Age of the respondent	0 =35 years or younger 1=36 years or older	±
SEX	Sex of respondent	0=Male 1=Female	±
EDUCDM	Education	0= Not completed primary school 1=Completed primary school	+
REXPER	Rice experience	0=Less than 5years of rice production experience 1= at least five years of experience	+
TACTIVEH	Total number of household labourers	Number of persons (man equivalent)	+
DFWDM	Distance from homestead to fertilizer warehouse	0= less than 5 km 1=5 km and more	-
LANDACS	Lowland access	0= not easy 1= easy	+
FSIZE	Rice Farm size	Hectare	±
AGRO_ECO2	Agro-ecological zone	0=Forest Zone 1=Savannah Zone	±

Age: From the literature, the effect of the age of the farmer on their participation in contract scheme is ambiguous; it can be positive or negative depending on the source

(Honfoga et al., 2016). The argument is that older farmers may have more experience, authority or resources that may give them more possibilities to engage in contract farming. On the other hand, younger farmers have been found to be more interested in contracting and may be more willing to produce under contract because of their longer planning horizons (Chang et al., 2006).

Sex: Gender influences a farmer's decision to participate in the contract scheme. According to the socio-cultural situation, either women or men may participate more in the contract depending on who is in control of the productive resources (Barrett et al., 2012).

Education: the variable education is expected to have a positive effect on participation in contract farming because it increases knowledge, thereby enhancing the ability to understand and evaluate useful information in the contract term (Chang et al., 2006).

Experience: Rice farming experience may contribute to farmers' participation to the contract, because when farmers are more experienced, their risk vulnerability of crop failure is less (Honfoga et al., 2016),

Total household labourer: the total active members of the household have been identified to have positive influence on participating in contract scheme. Larger family sizes are generally associated with a greater labour force for the timely operation of farm activities. However, a negative relationship of household size participating in a contract can be linked to increased consumption pressure associated with a large family which does is not permitted to engage in the contract (Barrett et al., 2012).

Distance to fertilizer warehouse: Distance from homestead/house to fertilizer warehouse can affect farmers' participation in the contract because fertilizer is very

important in crop production; lack of fertilizer is a synonym for crop failure (Honfoga et al., 2016). A negative relationship is expected: the shorter the distance from homestead, the more likely the farmer will participate in rice contract farming.

Lowland access: Farmers participate more in rice contract farming when lowland access is easy in the area. Positive sign is expected. (Honfoga et al., 2016)

Farme size: From neoclassical production economics, farm size is a positive function of output and influences farmer participation in contract farming (Barrett et al., 2012)

Agro ecological zone: The agro ecological zone of the farmer also influences the farmers' decision to participate in the contract scheme.

Specification of the model

The Probit model took into consideration the farmers' socioeconomic characteristics listed above and measured their probability of participation in the contract arrangement. The Probit model assumed that an unobservable score, z , is a linear function of observable variables and of an unobservable disturbance term that has the standard normal distribution. The theoretical expression of the Probit model is $G(z)$

$$G(z) = \Phi(z) \equiv \int_{-\infty}^z \Phi(v)dv \quad (3.2)$$

Where $\Phi(v)$ represents the standard normal probability distribution $2\pi^{-1/2} \exp(-z^2/2)$.

This model is very important to measure the farmer's probability of participation in the contract farming taking into consideration the farmer's socioeconomic-characteristics:

$$P(Y_i=1/ X) = P(Y_i/ X_1, X_2, \dots, X_k), \quad (3.3)$$

where i is the farmer ($i=1, \dots, n$); y is farmers' participation or not in contract scheme, where $Y=0$ for the farmers who is not an ESOP contract participant, and $Y=1$ for the

farmers who is an ESOP contract participant; P is the probability that a farmer i will participate in contract; X is a vector of the socioeconomic-characteristics of the farmer such as age of the farmer, gender, education of the farmer, rice farming experience, total household labour, distance to warehouse, lowland access, farm size, and agro ecological zone (Table 3.3).

The empirical expression of the Probit model is as follows:

$$\begin{aligned} \text{FSTATUT} = & \beta_1 \text{AGEDM} + \beta_2 \text{SEX} + \beta_3 \text{EDUCDM} + \beta_4 \text{REXPER} + \beta_5 \text{DFWDM} \\ & + \beta_6 \text{LANDACS} + \beta_7 \text{TACTIVEH} + \text{AGRO}_{\text{ECO2}} + \varepsilon \end{aligned}$$

Nearest Neighbour Matching (NN): NN is chosen because it is the most straight forward matching estimator. The individual from the comparison group are chosen as a matching partner for a treated individual that is closest in terms of the propensity score. Matching with a replacement is allowed to increase the average quality of matching and to decrease the bias.

To assess the matching quality, the matching procedure's ability to balance the distribution of the relevant variables in both the control and the treatment group or not was checked (Table 3.4). For that purpose, standardized Bias was a suitable indicator used to assess the distance in marginal distributions of the independent variables (X_i), as suggested by Rosenbaum and Rubin (1985). A t-test approach was used to check if there were significant differences in covariate means for both groups (Rosenbaum & Rubin, 1985).

Table 3. 4: Standardised bias check of independent variables

Variable	Unmatched		Mean	%reduct		t-test	
	Matched	Treated	Control	%bias	bias	t	p>t
AGEDUM	Unmatched	0.805	0.640	37.4		3.75	0.000
	Matched	0.805	0.720	19.4	48.3	1.63	0.104
SEX	Unmatched	0.135	0.184	-13.4		-1.34	0.179
	Matched	0.135	0.092	11.8	12.2	-0.34	0.734
EDUCDUMY	Unmatched	0.648	0.627	4.5		0.45	0.653
	Matched	0.648	0.708	-12.3	-176.7	0.02	0.985
TACTIVEH	Unmatched	5.789	5.008	25.7		2.61	0.009
	Matched	5.789	5.258	17.5	31.9	0.92	0.360
AGRO_ECO2	Unmatched	0.621	0.618	0.7		0.07	0.947
	Matched	0.621	0.658	-7.6	-1055.8	0.06	0.955
FSIZE	Unmatched	0.618	0.548	13.1		1.32	0.187
	Matched	0.618	0.510	20.2	-54.5	1.94	0.054
DFWDM	Unmatched	0.637	0.662	-5.1		-0.52	0.605
	Matched	0.637	0.681	-9.0	-76.6	-0.11	0.914
REXPER	Unmatched	11.73	9.127	34.5		3.53	0.000
	Matched	11.73	9.529	29.1	15.5	1.16	0.248
LANDACS	Unmatched	0.567	0.539	5.6		0.57	0.569
	Matched	0.567	0.613	-9.1	-62.0	0.41	0.680

Joint Significance and Pseudo-R² are used to indicate how well the regressor (Xi) explains the participation probability. After matching, there were no systematic differences in the distribution of covariates between both groups and, therefore the pseudo-R² was fairly low as indicated in Table 3.5.

Table 3. 5: Joint significance test and Psoeud-R2 test

Sample	Pseudo R2	LR chi2	p>chi2
Unmatched	0.045	25.77	0.002
Matched	0.012	7.01	0.636

Source: Result of the study

Stratification Test: Finally, based on the estimated propensity score, observations were divided into strata so that there was no statistically significant difference between the mean of the estimated propensity score in both control and treatment group. Then a t-

tests was used within each strata to test if the distribution of the independent variables was the same between both groups (before and after matching) (Dehejia & Wahba, 1999). As the overall balancing was good for all independent variables (Table 3.4) and the matching performance was also good (Table 3.5) the ATE was therefore estimated.

The Average Treatment effect

When all assumption of conditional independence and a sizable overlap in propensity scores between participants and matched non participants was held, the average treatment effect (ATE) was calculated. The ATE was equal to the mean difference in outcomes weighting the comparison units by the propensity score distribution of participants.

More explicitly: the Average Treatment Effect was calculated following Heckman, Ichimura, and Todd (1997) and Smith and Todd (2005):

$$ATE = \frac{1}{N} \left[\sum_{i=T} Y_i^T - \sum_{j=C} \omega(i; j) Y_j^C \right] \quad (3.4)$$

Where N is the number of participants, i and $\omega(i, j)$ is the weight used to aggregate outcomes for the matched nonparticipants j , Y is the outcome and is described in Table 4. The `psmatch2` command was used in STATA to estimate ATT (Caliendo & Kopeinig, 2008). The outcome variables are presented in Table 3.6

Table 3. 6: Outcome variables description (Yi)

Variable (Y)	Description	
Quantity performance YIELD	Paddy Produced per hectare	Continue, (Mt/Ha)
Revenue performance REVENUE	Gross benefit	Continue, FCFA/Ha
NETBENEFIT	Net Benefit	Continue, FCFA/Ha
Quality performance PURITY	Degree of purity	Continue, (%)

Measurement of outcome variables

Paddy produced per hectare (Yield) is the total paddy produced according to farm size. Gross benefit (revenue) is yield multiplied by paddy price. Net Benefit is revenue per hectare minus total cost per hectare. The degree of purity of paddy referred to the cleanness of the paddy.

The degree of purity refers to the dockage (stones, soil, chaff, weed seeds, stalks, and rice straw) in the grain. These impurities increase the time taken to clean and process the paddy rice. In this study, the degree of purity of the paddy was used as a quality performance indicator because, in an open market, the degree of purity is the most important indicator of paddy price. It represents the cleanness of the paddy.

To assess the degree of purity, three samples of 100g of paddy were collected from different bags of paddy randomly chosen from respondents' stocked paddy following Suganthi and Nacchair (2015). The sample was sorted and dockages and was separated from the paddy. Sample and the dockage were weighted using Precision balance (MS12001L). Then the degree of purity was calculated using the formula used by Suganthi and Nacchair (2015) that is described as follows:

$$Dp = \frac{Tws - Wds}{Tws} * 100 \quad (3.5)$$

Where Dp is Degree of purity of paddy,

Tws Total weight of the sample size,

Wds is the Weight of dockage in the sample

Paddy Grade standards

In this study, Agriculture and Marketing grading standards were follow since ESOP does not have specific paddy quality standards (AGMARK, 2002). In order to assure quality of the milled rice, ESOP only advises its farmers to ensure that the paddy is free from dockage (0% of dockage in paddy is even specified in the contract terms)

According to AGMARK's (2002) paddy standards, the paddy grade is defined according to a certain maximum limit of percentage of dockage allowed in the paddy. These paddy grades are as follow: Grade I (Premium quality paddy with maximum 1% of Dockage), grade II (medium quality paddy with maximum 2% of dockage), grade III (low quality paddy with a maximum 4% of dockage) and grade IV (poor quality paddy with maximum of 7% of dockage). Note that % of Dockage is weight of dockage in the sample (Wds) over the total weight of the sample (Tws).

b. Endogenous switching regression

The endogenous switching regression is used for the purpose of comparing the results. Farmers' choice about joining ESOP contract farming and their performance with and without the contract is assessed by considering the following model:

Outcome equations:

$I_i = 0$ means that farmer i choose not to join ESOP contract, then Farmer i 's performance equation is as follows:

$$y_{0i} = \beta_0 X_{0i} + \varepsilon_{0i}; \quad (3.6)$$

$I_i = 1$ means farmer i choose to join ESOP contract, then Farmer i 's performance equation is as follows:

$$y_{1i} = \beta_1 X_{1i} + \varepsilon_{1i}; \quad (3.7)$$

Selection Equations:

$$I^* = \gamma Z_i + u_i$$

$$I_i = 1 \text{ if } \gamma Z_i + u_i > 0 \quad (3.8)$$

$$I_i = 0 \text{ if } \gamma Z_i + u_i \leq 0$$

In the equation 3.8, Z_1 is a vector of farmer characteristics that affect farmers' decisions to join ESOP contract;

in the equation 3.6 and 3.7 X_{1i} and X_{0i} are two vectors of farmer characteristics that affect farmers' performance under ESOP contract and without ESOP contract;

y_{1i} and y_{0i} are dependent variables measuring Farmers' performance;

γ , β_1 and β_0 are vectors of parameters subject to estimation;

u_i , ε_{1i} and ε_{0i} are three random error terms that follow a trivariate normal distribution, with zero mean and non-singular covariance matrix.

The Endogenous Switching Regression Model estimation

To estimate the endogenous switching regression model more efficiently and with no strict assumption, full information on the maximum likelihood method was used following Lokshin and Sajaia (2004). The 'movestay' command developed by Lokshin and Sajaia (2004) in the STATA programme was used to estimate the endogenous switching regression model. The factors that affect farmers' decision to join the contract and their performance with and without the contract are evaluated.

Indicators of switching regression consistency

The likelihood-ratio test for joint independence of the three equations was used. The significance of the chi2 means that the three equations are not jointly independent and should not be estimated separately.

Empirical Estimation of Switching Regression

To estimate the switching regression model, the following variables were included in the model:

- ✓ Socioeconomic variable: age, sex, education, experience in rice production, distance to fertilizer warehouse, lowland access, rice farm size, agro-ecological

zone, and total active in household are included exclusively in the selection equation of the four models.

- ✓ Additional variables that are related to technology used in rice production (Improved seed use, Fertilizer use,) Number of visits of extension officers, member of FBO, and credit access were included in the four selection equations as well as outcome equation.
- ✓ Modes of threshing and paddy price were included exclusively in the equations related to paddy Purity.
- ✓ The dependent variable in the selection model (equation 3.8) is a farmer contract status (FSTATUT). This variable takes a value of 1 if the respondent is an ESOP rice contract farmer and 0 otherwise.

The separate performance (Yield, revenue, net benefit and degree of paddy purity) function for rice farmers that are not in the contract and those who are in the contract similar to equation 3.6 and 3.7 (the same variables were included in equation 3.6 as well as equation 3.7) is as follows:

Yield performance:

$$\begin{aligned} \text{YIELD} = & \beta_1 \text{AGEDM} + \beta_2 \text{SEX} + \beta_3 \text{EDUCDM} + \beta_4 \text{TACTIVEH} + \beta_5 \text{FSIZE} + \\ & \beta_6 \text{AGRO}_{\text{ECO2}} + \beta_7 \text{MFBO} + \beta_8 \text{NEXTENS} + \beta_9 \text{IPSEED} + \beta_{10} \text{FERTZER} + \\ & \beta_{11} \text{LCREDIT} + \beta_{12} \text{LABOR} + \varepsilon_j \end{aligned} \quad (3.9)$$

Revenue and Net Benefit performance:

$$\begin{aligned} \text{REVENUE} = & \beta_1 \text{AGEDM} + \beta_2 \text{SEX} + \beta_3 \text{EDUCDM} + \beta_4 \text{TACTIVEH} + \beta_5 \text{FSIZE} + \\ & \beta_6 \text{AGRO}_{\text{ECO2}} + \beta_7 \text{MFBO} + \beta_8 \text{NEXTENS} + \beta_9 \text{IPSEED} + \beta_{10} \text{FERTZER} + \\ & \beta_{11} \text{LCREDIT} + \beta_{12} \text{LABOR} + \varepsilon \end{aligned} \quad (3.10)$$

$$\begin{aligned} \text{BENEFIT} = & \beta_1 \text{AGEDM} + \beta_2 \text{SEX} + \beta_3 \text{EDUCDM} + \beta_4 \text{TACTIVEH} + \beta_5 \text{FSIZE} + \\ & \beta_6 \text{AGRO}_{\text{ECO2}} + \beta_7 \text{MFBO} + \beta_8 \text{NEXTENS} + \beta_9 \text{IPSEED} + \beta_{10} \text{FERTZER} + \\ & \beta_{11} \text{LCREDIT} + \beta_{12} \text{LABOR} + \varepsilon \end{aligned} \quad (3.11)$$

Table 3. 7: Variables used in switching regression model

Variable (X)	Description	code
AGEDUM	Age of the respondent	0 =35 years and younger 1=36 years and older
SEX	Sex of respondent	0=Male 1=Female
EDUCDM	Education	0= Not completed primary school 1=Completed primary school
REXPER	Rice experience	0=Less than 5years of rice production experience 1= at least five years of experience
TACTIVEH	Total household labour	Number of people (man equivalent)
DFWDM	Distance from homestead to fertilizer warehouse	0= Less than 5 km 1=5 km and more
LANDACS	Lowland access	0= Not easy 1= Easy
FSIZE	Rice Farm size	Continue (Hectare)
AGRO_ECO2	Agro-ecological zone	0=Forest Zone 1=Savannah Zone
MFBO	Member of Farmer base organisation	0=No 1=Yes
NEXTENS	Number of visits of extension agents	Continue
IPSEED	Use of improve seed	0=No 1=Yes
FERTZER	Use of fertilizer	Quantity of fertilizer used (kg/ha)
CREDIT	Credit access	0=no credit access 1= received credit
LABOR	Log Cost of Labour FCFA/ha	Continue
TRHESHM	Mode of threshing	0=other wise 1= mechanic or flay panicle against barrel on tarpaulin
PRICE	Paddy price	Continue FCFA/Kg
Dependent variables		
FSTATUT	Farmers' status	0=Non-contract farmer 1=ESOP contract farmer
Quantity performance		
YIELD	Log Paddy Produced Kg/Ha	Continue,
Revenue performance		
REVENUE	Log Revenue FCFA/Ha	Continue
BENEFIT	Net Benefit	Continue FCFA/Ha
Quality performance		
DPURITY	Degree of paddy purity	Continue (%)

Degree of purity performance

$$DPURITY = \beta_1 AGEDM + \beta_2 SEX + \beta_3 EDUCDM + \beta_4 TACTIVEH + \beta_5 FSIZE + \beta_6 AGRO_{ECO2} + \beta_7 MFBO + \beta_8 NEXTENS + \beta_9 IPSEED + \beta_{10} FERTZER + \beta_{11} LCREDIT + \beta_{12} LABOR + \beta_{13} PRICE + \beta_{14} TRHESHM + \epsilon \quad (3.12)$$

The selection equation describes factor affecting participation in an ESOP contract model while outcome equation described factor affecting farmers’ performance.

The variables in these equations are presented in table 3.7 and the descriptive statistics are presented in table 3.8. The empirical selection model similar to equation 3.8 is presented implicitly below:

$$FSTATUT = \beta_1 AGEDM + \beta_2 SEX + \beta_3 EDUCDM + \beta_4 REXPER + \beta_5 DFWDM + \beta_6 LANDACS + \beta_7 TACTIVEH + \beta_8 FSIZE + \beta_9 AGRO_{ECO2} + \epsilon \quad (3.13)$$

Table 3. 8: Descriptive statistics of variables included in the Switching regression models

VARIABLES	Total		Non Contract Farmers		ESOP Contract Farmers	
	mean	sd	mean	sd	mean	sd
Observation (N)	414		228		186	
AGEDM	0.715	0.452	0.640	0.481	0.806	0.396
SEX	0.162	0.369	0.184	0.389	0.134	0.342
EDUCDUM	0.638	0.481	0.627	0.485	0.651	0.478
REXPER	10.35	7.640	9.127	6.591	11.85	8.539
TACTIVEH	5.367	3.046	5.009	2.908	5.806	3.160
DFWDM	0.651	0.477	0.662	0.474	0.638	0.482
LANDACS	0.551	0.498	0.539	0.500	0.565	0.497
FSIZE	0.579	0.537	0.549	0.530	0.617	0.545
AGRO_ECO2	0.621	0.486	0.618	0.487	0.624	0.486
MFBO	0.594	0.492	0.276	0.448	0.984	0.126
NEXTENSION	2.464	1.889	1.675	1.743	3.430	1.590
IPSEED	0.691	0.463	0.491	0.501	0.935	0.246
FERTZER	178.5	127.8	170.5	127.7	188.2	127.5
CREDIT	0.572	0.495	0.412	0.493	0.769	0.423
LABOR	11.67	0.501	11.67	0.541	11.68	0.451
TRHESHM	0.418	0.494	0.336	0.474	0.516	0.501
PRICE	4.920	0.136	4.837	0.133	5.022	0.027
FSTATUT	0.449	0.498				
YIELD	7.451	0.690	7.389	0.713	7.528	0.654
REVENUE	12.37	0.706	12.22	0.712	12.55	0.658
BENEFIT	0.269	1.965	-0.137	1.702	0.767	2.147
PURITY	97.68	3.587	96.15	4.197	99.55	0.846

After the parameters are estimated, the following performance indicators are calculated:

$$xb_{1i} = E(y_{1i}/x_{1i}) = x_{1i}\beta_1 \quad (3.15)$$

$$xb_{0i} = E(y_{0i}/x_{0i}) = x_{0i}\beta_0 \quad (3.15)$$

$$yc_{1_1i} = E(y_{1i}/I_i=1, x_{1i}) = x_{1i}\beta_1 + \sigma_1\rho_1f(\gamma Z_i)/F(\gamma Z_i) \quad (3.16)$$

$$yc_{0_1i} = E(y_{0i}/I_i=1, x_{1i}) = x_{1i}\beta_0 + \sigma_0\rho_0f(\gamma Z_i)/F(\gamma Z_i) \quad (3.17)$$

$$yc_{0_0i} = E(y_{0i}/I_i=0, x_{0i}) = x_{0i}\beta_0 - \sigma_0\rho_0f(\gamma Z_i)/[1-F(\gamma Z_i)] \quad (3.18)$$

$$yc_{1_0i} = E(y_{1i}/I_i=0, x_{0i}) = x_{0i}\beta_1 - \sigma_1\rho_1f(\gamma Z_i)/[1-F(\gamma Z_i)] \quad (3.19)$$

xb_{0i} represents the unconditional expectation of famers' performance without ESOP contract;

xb_{1i} represents the unconditional expectation of famers' performance under ESOP contract;

yc_{0_1i} represents the conditional expectation of contract famers' performance without ESOP contract;

yc_{1_1i} represents the conditional expectation of contract famers' performance under ESOP contract;

yc_{0_0i} represents the conditional expectation of non-contract famers' performance without ESOP contract; and

yc_{1_0i} represents the conditional expectation of non-contract famers' performance with ESOP contract.

Based on equations (3.14) and (3.15), the average treatment effect ATE of ESOP contract farming on farmer's performance is estimated as follows:

$$T_{ATE} = E(y_{1i}/x_{1i}) - E(y_{0i}/x_{0i}) \quad (3.20)$$

σ_0 and σ_1 are the standard errors of ε_{0i} and ε_{1i} ;

ρ_0 is the correlation coefficient between ε_{0i} and u_{1i}

ρ_1 is the correlation coefficient between ε_{1i} and u_{1i} ; and

.Indicators for selection bias

The estimated correlation coefficients ρ_0 and ρ_1 , are majors indicator for selection bias detection (Imbens & Wooldridge, 2009; Caliendo & Kopeinig, 2008). In fact, $\rho_1 > 0$ means a positive ρ_1 . This implies ‘positive selection’ in choosing the contract. In other words, this would indicate that farmers that actually choose to enter the contractual arrangement have above average performance under the contract. The average performance in this case is defined as $x_i b_i$, assuming all farmers in the samples were subjected to the contractual arrangement.

On the other hand, if non-contract farmers had in fact chosen to join the contract, their performance would be worse than farmers that actually chose to enter the contract.

When $\rho_1 < 0$, this means ‘negative selection’ in choosing the contract, or farmers actually chose to enter the contractual arrangement have below-average performance under the contract. In this kind of situation, when the non contract farmers had chosen to join the contract, their performance would have been above that of the contracted farmers.

Conversely, $\rho_0 > 0$, this means that a ‘negative selection’ into not choosing the contract for non-contract farmers. In other words, non-contract farmers have below-average

performance. In such case, if the contract farmers had chosen not to join the contract, their performance would have been better than that of the non-contract farmers.

If $\rho_0 < 0$, there is 'positive selection' into not choosing the contract for the non-contract farmers, or farmers that actually chose not to enter the contract have above average performance without the contract. In this case, if the contract farmers had in fact chosen to not join the contract, their performance would have been worse than that of the non-contract farmers.

3.2.3 Analysis of farmers' constraints: Factor Analysis and Cluster Analysis

3.4 Method of Data Collection

3.4.1 Description of the data collection process

Qualitative and quantitative data were collected for this study. Data collection was done in three phases:

First, a pilot study was conducted in 15 ESOP contract communities and interviews were undertaken with ETD/ESOP agents in order to fully understand the institutional context in which the ETD/ESOP contract scheme operate. These interviews also helped in the sampling process (selection of contract scheme communities).

Second, in-depth interviews were conducted with a purposeful group of contract farmers in each selected village (key informant) with the aim to get in-depth information on their village and communities.

In the third stage, a large survey was conducted using a structured questionnaire for in-depth personal interviews with sampled rice farmers.

3.4.2 Instrument for data collection

Two interview guides and one questionnaires were used in data collection.

- a. **One interview guide was used to collect information at village level.** This guide dealt with the institutional, physical and infrastructure environment in the village.
- b. **One interview guide was designed to collect information at processor level.** This interview guide had three sections: section A, general information (number of farmers in the contract scheme, the number of exit, number of farmer groups, etc.), section B (elements in the contract term, attribute and level); section C (problems encountered by the processor in contract scheme etc.)
- c. **A questionnaire was developed to collect information on rice farmers:** This questionnaire was divided into 4 parts.
 - ❖ **Part 0** contained general information on the survey (Information on Farmer, Enumerator, Supervisors and data Entry Operator ID)
 - ❖ **Part 1** contained 3 sections which are: Socio-demographics characteristics, Farmer base organisation (FBO), farmers' access to Credit and Extension services.
 - ❖ **Part 2** is about contract farming, farmers' motivations, constraints and contract preferences, this part contain 6 sections:
 - Section 2A contained general information on the contract
 - Section 2B contained elements in contractual arrangement in which farmer engaged

- Section 2C is about farmers' motivation for engaging in ESOP contract farming (only for ESOP farmers). A five point Likert scales from '1=Not important' to '5=extremely important' was designed to assess the importance of factors motivating the initial decision to contract with rice processing firms.
 - Section 2D is about Reason for not in CF. A five point Likert scales from '1=Not important' to '5=extremely important' was designed to assess the importance of constraint factors that farmers are facing in the contract arrangement.
 - Section 2E is about constraints of being in CF with ESOP. A five point Likert scales from '1=NOT important' to '5=extremely important' was designed to assess the importance of problems that farmers are facing contract arrangement with ESOP.
- ❖ **Part 3** of the questionnaire focusses on rice production and impact of contract on farming performance.
- Section 3A is about investment and assets.
 - Section 3B contains information on agricultural land and land tenure.
 - Section 3C is about input used in rice production.
 - Section 3D focusses on the cost of land preparation, seeding, fertilizer/chemical application, weeding, bird chase...
 - Section 3E also focusses on cost of rice harvest, threshing, winnowing, drying, storage, etc.
 - Section 3F is about quality and quantity performance indicators: quantity of certified seed, period of harvesting, where threshing is done, where drying is done, the storage form of rice sold and farm net revenue is calculated.

- Section 3G focusses on the share of the harvest and commercialization and proportion of dockage in the paddy.

3.5 Description of the Study Area

Primary data used in the study were collected from the six rice contract scheme communities in Togo. These communities are located in three regions in Togo (Plateaux region, Central region, Kara region) as indicated in the Figure 2. These regions cover two agro-ecological zones (forest agro-ecological zone and savannah agro-ecological zone)

3.6 Sampling Technique

A multistage sampling technique was used in selection of respondents. A list 15 of contract schemes communities was collected from Ministry of Agriculture (MAEP). A pilot study was conducted in these 15 ESOP contract scheme communities, and preliminary information about the scheme and the extent to which the scheme is performing was collected. During this pilot study, the tools for data collection (questionnaire and interview guide) were tested. Out of 15 ESOP contracts schemes visited, 6 ESOP were purposively sampled (Figure 3.2) based on years of experience (at least five years of experience) with the communities as indicated in Table 3.9 (ETD, 2013). The overall sample size was calculated using the Slovin formula and the theoretical sample size is $n = 364$, but in practice, data were collected from $n = 414$ farmers to avoid missing data. The repartition of sample size according to communities was determined at proportional as indicated in Table 3.10.

Slovin Formula: $n = N / (1 + N * e^2) = 364 \approx 400$, $N = 3976$, $e = 5\%$

Where

n = sample size,

N = the total population,

e = error term

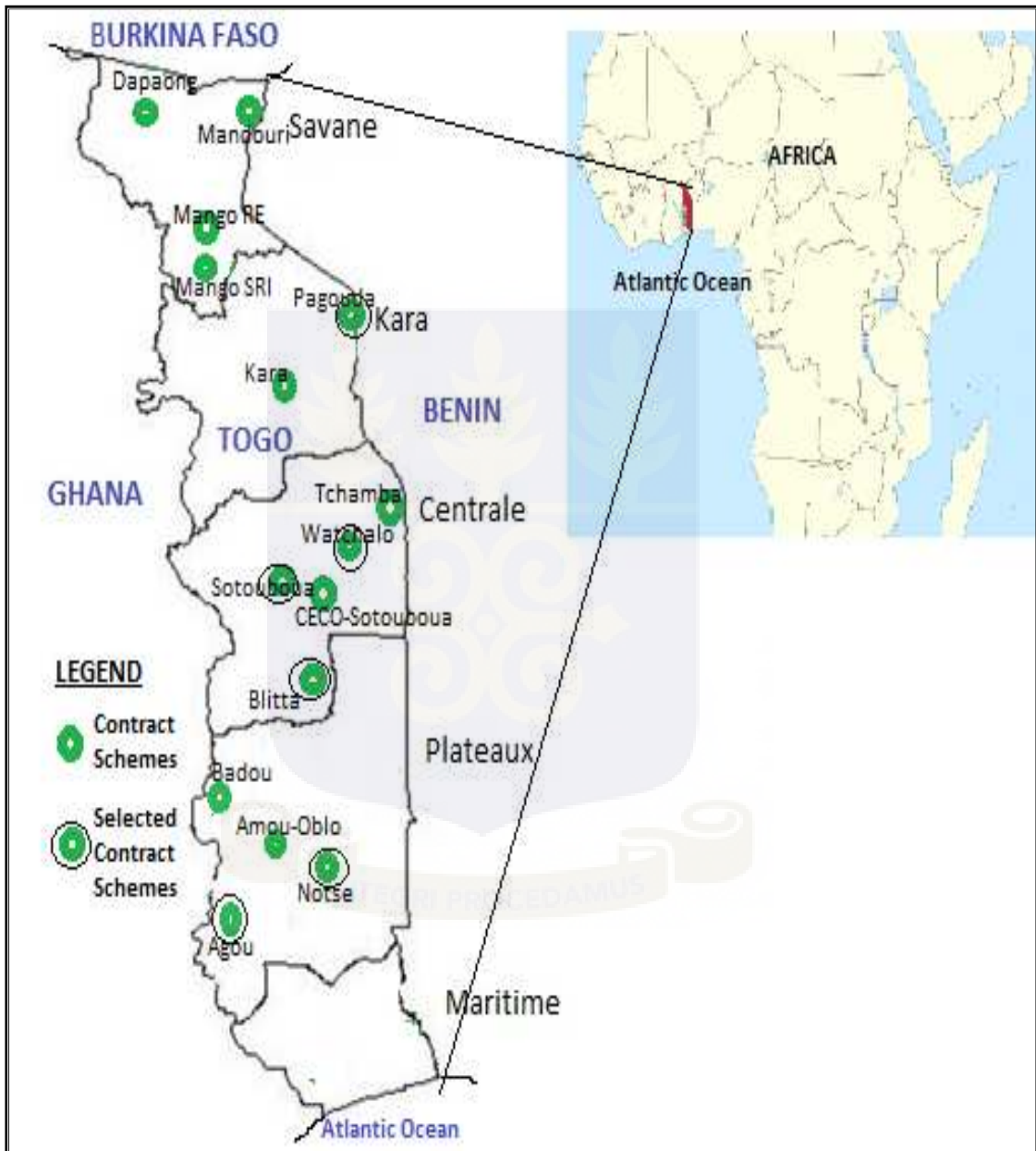


Figure 3. 2 : Map of Togo with ESOP Contract Scheme locations

Source: From google Map

Table 3. 9: List of contract scheme in Togo and year of creation

REGION	Name of Contract scheme	Name of community	Year starting processing	Leader of contract scheme	Sampled
PLATEAUX	ESOP-Notse*	Notse	2010	ESOP/ETD	yes
	ESOP-Badou	Badou	2015	ESOP/ETD	no
	ESOP-Amou-Oblo	Amou-oblo	2016	ESOP/ETD	no
	ESOP-Agou*	Agou	2008	ESOP/ETD	yes
CENTRALE	ESOP-Blitta*	Blitta	2004	ESOP/ETD	yes
	ESOP-Sotouboua 1*	Sotouboua	2004	ESOP/ETD	yes
	ESOP-Sotouboua 2*	Watchalo	2010	ESOP/ETD	yes
	CECO-AGRO Sotouboua	Sotouboua	2007	NGO CECO-AGRO	no
	ESOP-Tchamba	Tchamba	2009	ESOP/ETD	no
KARA	ESOP-Pagouda*	Pagouda	2010	ESOP/ETD	yes
	VAPE-RIZ Kara	Kara	2007	VAPE-RIZ	no
SAVANE	ESOP-Mango RE	Mango RE	2014	ESOP/ETD	no
	ESOP-Mango SRI	Mango SRI	2014	ESOP/ETD	no
	ESOP-Dapaong	Dapaong	2015	ESOP/ETD	no
	ESOP-Mandouri	Mandouri	2015	ESOP/ETD	no

Source: MAEP, 2016; * sampled contract schemes

Table 3. 10: Sample size and distribution

Name of Contract scheme	Name of community	Number of rice farmer per community			Proportion (%)	Sampled Rice farmers per community		
		Non Contract	Contract	Total		Non Contract	Contract	Total
ESOP-Notse	Notse	438	374	812	20,4	46	37	83
ESOP-Agou	Agou	394	314	708	17,8	41	33	74
ESOP-Blitta	Blitta	350	282	632	15,8	37	30	67
ESOP-Sotouboua 1	Sotouboua	349	287	636	15,8	36	30	66
ESOP-Sotouboua 2	Watchalo	329	269	598	15,4	34	28	62
ESOP-Pagouda	Pagouda	330	260	590	14,8	34	28	62
	Total	2190	1786	N=3976	100	228	186	n=414

NB : number of rice farmers per community obtained from MAEP 2016; Sampled farmers calculated using proportional and Slovin formula ($n = N / (1 + N e^2) = 364 \approx 400$, $N = 3976$, $e = 5\%$)

In each community, the name of the villages in which ESOP operate were written on pieces of paper and four were randomly picked.

In each village picked, a list of contract farmers was obtained from ESOP, while a list of noncontract farmers was obtained from the chief of the village. Contract farmers and non-contract farmers were randomly selected. The sample size was determined using proportional. The overall sample is indicated in Table 3.10 and a total of 414 farmers (186 (45%) contract farmers and 228 (55%) noncontract farmers are selected). The unit cost of input used in data analysis are summarised in table 3.11

Table 3.11. Unit cost of input.

Item	unit	Cost (FCFA)
Improved Rice seed	Kg	400
Herbicide	l	2500 -3000
Fertilizer, NPK	50Kg	11000
Fertilizer, urea	50Kg	11000
Land rent	ha	20000
Labour cost	Man Day	1200

Source: Compile by the author

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents the results of the study. It is structured into four sections. The first presents the profile of respondents; the second section presents farmers' motivation for working under ESOP contract farming; the third section focusses on the impact of ESOP contract farming on farmers' performance. The last section describes constraints that farmers face in ESOP contract farming.

4.1 Presentation of the Profile of Respondents

4.1.1 Socioeconomic characteristics

Farmers' socioeconomic characteristics are presented in this section and focus on demographic characteristics, social and infrastructure environment, and asset ownership and wealth.

Demographic characteristics

Farmers' demographic characteristics are presented in Table 4.1. The average age of the farmers' in the sample is 42 years old. This is close to the average age of rice farmers in the country (42 years, (ITRA and DSID, 2010)). The average age of ESOP contract farmers (44 years) is significantly higher than noncontract farmers (40 years) (Table 4.1). The proportion of youth (35 years old and less) working under ESOP rice contract (19%) is lower than the proportion of youth in rice production outside the ESOP contract scheme (38%). ESOP contract farmers have in average 12 years' experience in rice farming, which is significantly higher than non-contract (9 years).

Most of rice producers surveyed are male (84%) and there is no difference in the average percentage of men within the ESOP contract farmers and non-contract farmers. This result is not too much different from the results of ITRA and DSID, (2010) who showed that about 91% of rice farmer in the country are men. On the average, ESOP contract farmers have more a active labour force (7 persons per household) than non-contract farmers (5 persons per household). On the average, 64% of surveyed farmers completed primary school (62% of non-contract farmer against 65% of contract farmers). This result is different from the average level of education of rice farmers' in the country (42% completed primary school) indicated by ITRA and DSID, (2010).

Table 4.1: Respondent demographic characteristics

Variables	Total	NCF	CF	t or chi2
Average age of respondent (years)	41.85 (0.4951)	40.35(0.7090)	43.69 (0.6548)	-3.3918***
Young (% of 35years and younger)	28.50	38.00	19.35	13.8681***
Farming experience (years)	20.64 (0.4807)	18.90 (0.6412)	22.75 (0.6968)	-4.0599***
Rice farming experience, 'years)	10.35 (0.3754)	9.12 (0.4365)	11.84 (0.6260)	-3.6599***
Gender of respondent (% male)	83.82	81.58	86.56	1.8730
Average years of education of respondent	6.22 (0.1621)	6.34 (0.2271)	6.08 (0.2297)	0.7854
The proportion of respondents that completed primary school (%)	63.77	62.72	65.05	0.2416
Total active labour force in household (person)	5.36 (0.1497)	5.01 (0.1926)	5.80 (0.2316)	-2.6699***
Total household size of respondent (person)	6.66 (0.1561)	5.93 (0.1971)	7.56 (0.2340)	-5.3646***

Note: Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CF =Contract Farmer and NCF=Non Contract Farmers, Standard Error in parentheses

Source: Results from field survey 2016

Social and infrastructure environment

Nearly 98 % of ESOP contract farmers are members of the Farmer Based Organization (FBO) and 23% of them hold official positions in the FBO (Table 4.2). About 94% of ESOP contract farmers have contact with extension agents against 58% of non contract farmers. This is because, in addition to public extension officer advice, ESOP Offered

Extension advice to its farmers at least 3 times per growing season. About 77% of ESOP contract farmers got credit during the growing season 2015-2016 against 41% of non contract farmers because ESOP facilitates credit access to their farmers by linking them to Micro Finance Institutions (MFI). About 62% of respondent are from the savannah agro-ecological zone while the rest (38% are from the forest agro-ecological zone).

Table 4.2: Social and infrastructure environment

Variables	Total	NCF	CF	t or chi2
Member of Farmer Based association (% yes)	59.42	27.63	98.39	212.6789***
Respondent holds official position in FBO (% yes)	13.29	5.70	22.58	25.3325***
Contact with extension advice (% yes)	73.91	57.89	93.55	67.5322***
Number of visits of extension officers	2.44	1.67	3.38	-
	(0.0898)	(0.1152)	(0.1070)	10.6638***
Distance to main agricultural product market (km)	1.27	1.28	1.26	0.4746
	(0.0272)	(0.0395)	(0.0365)	
Distance to fertilize warehouse (km)	6.24	6.73	5.64	2.6866***
	(0.2027)	(0.2800)	(0.2881)	
Access to credit (% of yes)	57.25	41.23	76.88	53.2028***
Agro-ecological zone (% savannah zone)	62.08	61.84	62.37	0.0119

Note: Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CF =Contract Farmer and NCF=Non Contract Farmers, Standard Error in parentheses

Source: Results from field survey 2016

Asset and wealth indicators

According to 55% of respondent (54% of non-contract farmers and 56% of contract farmers), land access is easy in the area (Table 4.3). Non-contract farmers owned more farming land than ESOP contract farmers owned. About 68% of non contract farmers own lowland on which they cultivated rice against 47% of ESOP contract farmers. In terms of rice farm size, there was no significant difference between ESOP contract farmers (mean farm size = 0.62 ha) and non-contract farmers (mean farm size = 0.55ha). About 44% of respondents practised off- farm activities (45% of non-contract farmer and 45% of ESOP contract farmer). In terms of investment in children's education, ESOP contract farmers invested a higher amount (80,890 FCFA/year) than

non-contract Farmers (53,132 FCFA /year). On the average, 72% of respondent owned a radio, 19% TV, 81% mobile phone, 44% bicycle, and 32% motorcycle.

Table 4.3: Asset and wealth indicator of respondents

Variables	Total	NCF	CF	t or chi2
Land access is easy (% yes)	55.07	53.95	56.45	0.2596
Own rice plot cultivated (% yes)	58.70	68.42	46.77	19.7986***
Total rice farm size (ha)	0.57 (0.0263)	0.55 (0.0350)	0.62 (0.0399)	-1.2866
Off farm activities (1=yes)	44.20	43.42	45.16	0.1258
Own radio (1=yes)	72.95	73.68	72.04	0.1398
Own TV (1=yes)	19.08	18.86	19.35	0.0163
Own Mobil Phone (1=yes)	81.40	78.51	84.95	2.8039*
Own Motorcycle (1=yes)	32.61	29.82	36.02	1.7901
Own Bicycle (1=yes)	44.20	44.30	44.09	0.0019
Investment in Education (FCFA/year)	65602.66 (4659.85)	53131.58 (4968.80)	80889.78 (8274.58)	-2.9915***

Note: Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CF =Contract Farmer and NCF=Non Contract Farmers, Standard Error in parentheses

Source: Results from field survey 2016

4.1.2 Agriculture technologies used by farmers

In terms of agricultural technology adoption, ESOP contract farmers are doing better than non-contract farmers (Table 4.4). Almost 100% of ESOP contract farmers use a rice variety (IR841) and 94% of them purchase improved seed every year, while only 49% of non contract farmers purchase improved seed. About 85% of ESOP contract farmers use fertilizer against 79% of non-contract farmers. The quantity of fertilizer used is 188 kg/ha for ESOP contract farmers, while non-contract farmers used about 170 Kg/ha. Nursing before planting is practised by 36% of ESOP contract farmers against 17% of non-contract farmers. About 19% of non-contract farmers use likelihood seeding. To assure quality of paddy, about 52% of ESOP contract farmers thresh by flaying rice panicle against a barrel or a stick on the tarpaulin, while only 34% of non-contract farmers thresh by flaying rice panicle against a barrel or stick; the rest (66% of them) thresh by using a stick to hit rice on tarpaulin or on the

cement/concrete ground. About 48% of contract farmers also use a stick to hit rice panicle on tarpaulin or on cement/concrete. These results show that ESOP contract farmers use better agricultural practices than non-contract farmers. As described by (Futakuchi et al., 2013) these good agricultural practices contribute to increased rice quality. Farmers face losses due to climate change in the area and about 98% of respondent were willing to be covered by a weather index insurance (99% of non-contract farmers and 98% of ESOP contract farmers).

Table 4. 4: Agriculture technology used by respondents

Items	Total (N=414)	NCF (N=228)	CF (N=186)	t-test or chi 2
Purchase Improve seed used (% yes)	69.08	49.12	93.55	94.6539***
Use IR841 seed variety (% yes)	67.39	40.79	100.00	163.4211***
Nurse before planting (% yes)	25.74	17.33	36.07	18.5285***
Direct seeding (% yes)	54.66	63.56	62.37	0.0619
Likelihood mode of seeding (% yes)	10.95	19.11	1.08	33.9716***
Use fertilizer (% yes)	81.64	78.51	85.48	3.3252*
Average quantity of fertilizer (kg/ha)	178.50 (127.80)	170.50 (127.70)	188.20 (127.50)	0.1597
Mode of threshing, use panicle to flay barrel (% yes)	41.81	33.63	51.61	13.4765***
Threshing on tarpaulin (% yes)	93.89	92.83	95.16	0.9645
Willing to be covered by weather index insurance (% yes)	98.55	99.12	97.85	1.1629

Note: * Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CF =Contract Farmer and NCF=Non Contract Farmers , Standard Error in parentheses

Source: Results from field survey 2016

4.1.3 Presentation of the input, the cost and the performance in rice production

Input: The average quantity of input used in rice production is presented in Table 4.5. It appeared that the average quantity of rice seed used by ESOP Contract Farmers is 50Kg/Ha and that of non-contract farmers is 64Kg/Ha. The average quantity of herbicide use per hectare is 9 l/Ha. In terms of fertilizer, NPK and Urea are used in the

area. The average quantity of fertilizer (NPK-Urea) used is 178Kg/Ha (170Kg/Ha for non-contract farmers and 188Kg/Ha for ESOP contract farmers). The average quantity of NPK used by contract farmers (114Kg/Ha) is higher than the NPK used by non-contract farmers (98 Kg/Ha).

Table 4. 5: Quantity of input used in rice production

Items	Pooled Data			t-test
	(N=414)	NCF (N=228)	CF (N=186)	
Quantity of rice seed used Kg/Ha	57.80 (1.5820)	64.21 (2.3149)	49.95 (1.9417)	4.5921***
Quantity of herbicide l/Ha	9.17 (0.3402)	8.67 (0.4758)	9.78 (0.4850)	-1.6146
Quantity of fertilizer total Kg/Ha	178.46 (6.2791)	170.48 (8.4555)	188.24 (9.3509)	-1.4085
Quantity of NPK Kg/Ha	105.16 (4.0930)	98.11 (5.4184)	113.81 (6.1930)	-1.9133*
Quantity of urea Kg/Ha	73.29 (2.8254)	72.36 (3.8372)	74.43 (4.1843)	-0.3633

Note: Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CF =Contract Farmer and NCF=Non Contract Farmers , Standard Error in parentheses

Source: Results from field survey 2016

Production Cost: The rice production cost per hectare is presented in Table 4.6. Overall, there is no significant difference in their total rice seed cost per hectare. The average total production cost is 261,375 FCFA/Ha (266,947FCFA/Ha for ESOP Contract Farmers and 256,828FCFA/Ha for non-contract farmers (Table 4.6)). There is no significant difference in the average cost of the rice seed used per hectare between the two groups. ESOP contract farmers purchase small quantity of improved rice seed at a higher average cost (355.77 FCFA/Kg) while non-contract farmers purchase higher quantity of rice seed at lower average cost (265.26 FCFA/Kg). The other expenditure items are fertilizer, which represents 16% of total production cost, herbicide (10%), material (6%), land (4%) family labour (8%) and hired labour (50%) (Figure 4.1). The total hired labour cost is the most important item in rice production cost structure and it encompasses hired labour pay cash (44%) and hired cost pay with crop (6%)

Table 4.6: Rice production Cost structure of respondent

Items	Total (N=414)	NCF (N=228)	CF (N=186)	t-test
Seed cost FCFA/Ha	16876.04 (521.4407)	16605.6 (790.3439)	17207.54 (640.6712)	0.5737
Fertilizer cost FCFA/Ha	41046.11 (1444.215)	39210.96 (1944.784)	43295.65 (2150.721)	-1.4085
Cost of NPK	24188.89 (941.4105)	22567.24 (1246.254)	26176.72 (1424.391)	-1.9133*
Cost of urea	16857.22 (649.8606)	16643.73 (882.578)	17118.92 (962.3959)	-0.3633
Herbicide cost FCFA/Ha	25800.48 (939.0356)	24565.54 (1322.956)	27314.27 (1313.997)	-1.4580
Material cost FCFA/Ha	14512.93 (734.1287)	14854.95 (1130.338)	14093.68 (868.6434)	0.5154
Land rent FCFA/Ha	9619.273 (864.0792)	7065.57 (927.266)	12749.62 (1523.337)	-3.3113***
Hired labour cost pay cash FCFA/Ha	115433.9 (2751.066)	117223.1 (3879.607)	113240.6 (3862.77)	0.7197
Hired labour cost pay with paddy FCFA/Ha	15629.31 (1106.782)	14903.63 (1273.796)	16518.84 (1907.502)	-0.7255
Total Hired labour FCFA/Ha	131063.2 (3088.48)	132126.7 (4298.606)	129759.5 (4425.84)	0.3809
Total Family labour FCFA/Ha	21656.62 (1046.77)	20946.22 (1336.236)	22527.43 (1658.787)	-0.7510
TOTAL COST FCFA/Ha	261375 (5037.536)	256828.9 (6909.241)	266947.7 (7347.745)	-0.9992

Note: Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CF =Contract Farmer and NCF=Non Contract Farmers , Standard Error in parentheses

Source: Results from field survey 2016

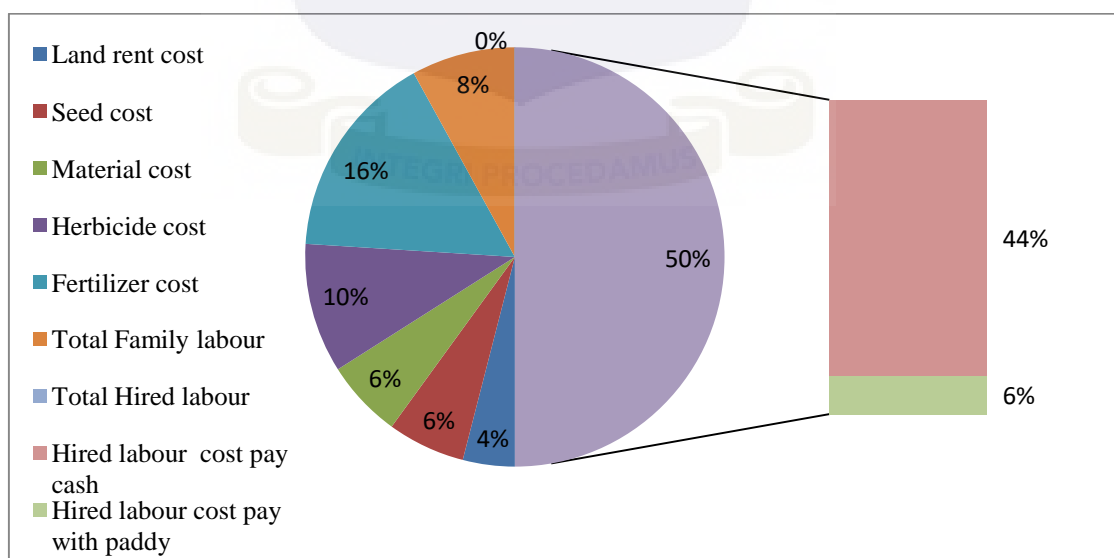


Figure 4. 1 : Rice production cost in percentage

Source: Results from field survey 2016

Performance indicators

Farmers' performance indicators are presented in Table 4.7. The ESOP contract farmers obtained significantly higher yield (2,263.93Kg/Ha) than non-contract farmers (2,021.59 Kg/Ha). Paddy price per Kg under ESOP contract (151.73 FCFA/Kg) is also higher than the paddy price in an open market (127.30FCFA/kg).

On average, the total net benefit (76,681.85 FCFA/ha) from rice production of ESOP contract farmers is significantly higher than non-contract farmers' average net benefit (-13,693.77 FCFA/ha). ESOP contract farmers' paddy purity (Table 4.7) is significantly higher (99.55%) than that of ESOP contract farmers (96.15%), this can be explained by the positive impact of ESOP contract farming on farmers' performance. ESOP trained their farmer to thresh on tarpaulin and to avoid any foreign matter that can reduce the paddy purity.

Table 4.7: Performance indicators

Items	Total (N=414)	NCF (N=228)	CF (N=186)	t-test
Revenue (FCFA/Ha)	293996.80 (9872.9540)	253202.30 (11353.5100)	344002.90 (16307.2300)	-4.6895***
Yield (KG/HA)	2130.47 (71.1828)	2021.59 (94.8932)	2263.93 (107.0461)	-1.6973*
Paddy value per KG (FCFA/KG)	138.27 (0.915)	127.30 (1.235)	151.73 (0.3040)	- 17.5124***
Net Benefit (FCFA/Ha)	26909.77 (9655.165)	-13693.77 (11270.21)	76681.85 (15743.45)	-4.7775***
Paddy purity (%)	97.68 (0.1762996)	96.15 (0.2779561)	99.55 (0.0620493)	-10.8631***

Note: Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CF =Contract Farmer and NCF=Non Contract Farmers , Standard Error in parentheses

Source: Results from field survey 2016

4.2 Rice Farmers' Motivation for Contracting with ESOP

4.2.1 Presentation of farmers' motivation factors

Rice farmers' ex-ante motivations for contracting with ESOP are presented in Table 4.8. A five point Likert Scale (1 not important to 5 very important) was used to determine the importance of these motivation factors for each respondent. The motivation factors are ranked using Wilcoxon sign-rank test (Wilcoxon, 1949). If the mean score of a motivation factor is significantly less than 3 (average score), it means that this factor is not important while a mean score significantly higher than 3, meaning that it is an important motivation factor. Based on this, farmers' motivation factors are grouped into three: and iii) not important.

i) **very important:** Twelve motivation factors can be classified as very important ex-ante motivation factors because they had a mean score significantly higher than the average score of 3. These factors are: payment is done in bulk, sale in bulk is good, unit of measure of the product is scaled, acquire knowledge from technical assistance for quality improvement, access to high quality seed for quality improvement, having a a guaranteed market, access to credit, ability to receive a higher price, reliable supply of inputs, ability to increase yields, payment is more reliable, saw other farmers were benefitting so I wanted to benefit too.

ii) **important:** The motivation factor such as group members help each other, guaranteed minimum price and no need to organize transportation to market have a mean score that is not significantly different from the average score of 3. These factors are classified as important ex-ante motivation factors for contracting with an ESOP.

iii) **not important:** The ability to make new relationships with other farmers has a mean score less than the average score of 3; it is therefore classified as not important ex-ante motivation to engage in ESOP contract farming.

Table 4. 8: Descriptive statistics of ESOP contract farmers’ ex-ante motivation factors

Motivation Factors	Mean scores	Z	Sig.
Payment is done in Bulk	4.36	-8.015a	0.0000
Sale in Bulk is good	4.03	-6.460a	0.0000
Unit of measure of the product is scale	3.91	-6.982a	0.0000
Acquire knowledge from technical assistance for quality improvement	3.87	-6.917a	0.0000
Access to high quality seed for quality improvement	3.75	-7.236a	0.0000
Having a guaranteed market	3.71	-6.090a	0.0000
Access to credit	3.52	-4.270a	0.0000
Ability to receive a higher quality premium price	3.43	-4.669a	0.0000
Reliable supply of inputs	3.43	-3.248a	0.0010
Ability to increase yields	3.34	-3.410a	0.001
Payment is more reliable	3.24	-1.677a	0.0940
Saw other farmers were benefitting so I wanted to benefit too	3.22	-1.913a	0.0560
Group members help each other	3.20	-1.277	0.2020
Guaranteed minimum price	3.08	Base of comparison	
No need to organize transportation to market	2.95	-.963	0.3350
Ability to make new relationships with other farmers	2.82	-2.767b	0.0060

Note: Mean scores were estimated using a Likert scale ranging from not important (1) to very important (5) a Mean scores indicated significant higher mean than 3 (average score) at the 10% level on the basis of positive sign
b Mean scores indicated significant lower mean than 3 (average score) at the 10% level on the basis negative sign

Source: Results from field survey 2016

4.2.2 Latent factors behind farmer’s motivations

In order to understand the latent factors behind contract farmers’ motivation for contracting with ESOP, the most important ex-ante motivation factors identified in Table 4 are subjected to Factor Analysis and the results are presented in Table 4.9. Sampling adequacy is measured by the Kaiser-Meyer-Olkin (KMO) statistic which is

0.76. The indicators of reliability in the Cronbach'Alpha is 0.72. Bartlett's Test of Sphericity is significant at 1% for the samples. All these indicators underline the consistency of factor analysis models. Factors loaded are subjected to varimax rotation. The underlying factors are presented in Table 4.9.

A total of three underlying factors had eigenvalues higher than one and are identified in each group, and these three factors account for about 60% of variation across the sample of the ESOP contract farmers and are: i) perceived direct benefit, ii) output measure and input market, and iii) reliable source of income

Table 4. 9: Rotated component matrix for ESOP contract farmers' ex-ante motivation

Motivation factors	(1) Perceived Direct Benefit	(2) Output measure and Input market	(3) Reliable source of income
Saw other farmers were benefitting so I wanted to benefit too	0.737	0.138	-0.088
Having a guaranteed market	0.719	-0.184	0.335
Ability to receive a higher quality premium price	0.649	0.443	-0.160
Acquire knowledge from technical assistance..	0.547	0.354	-0.272
Unit of measure of the product is scale	-0.104	0.751	0.252
Access to high quality seed..	0.370	0.643	-0.104
Reliable supply of inputs	0.094	0.598	-0.325
Access to credit	0.395	0.529	-0.130
Sale in Bulk is good	-0.059	-0.121	0.854
Payment is done in Bulk	-0.028	0.015	0.813
Eigen values	3.152	1.626	1.129
% of Variance	20.966	20.045	18.065

Extraction Method: Principal Component Analysis. Cronbach's Alpha=0.723; Kaiser-Meyer-Olkin Measure of Sampling Adequacy= 0.758 ; Bartlett's Test of Sphericity sign.1%

Number in bold are significantly higher than 0.5

Source: Results from field survey 2016

Factor1: This factor explains 21% of variation in the sample and highly loaded with issues such as 'saw other farmers were benefitting so I wanted to benefit too', 'having a guaranteed market', 'ability to receive a higher quality premium price' and 'acquire knowledge from technical assistance'. Overall, these motivation factors are associated

with *perceived direct benefit*. By seeing the direct benefit (such as higher quality premium price, guarantee market and knowledge) that other farmers draw from ESOP contract, farmers were motivated to work under ESOP contract farming too. Being in the ESOP contract farming scheme is very beneficial to farmers because outside the contract, it is difficult to have a guaranteed output market. This finding is in line with (Saenger et al., 2013a). Producing rice under ESOP contract is a good opportunity to overcome production and marketing problems associated with competitiveness of a staple crop like rice in the open market. Even when farmers find buyers, they are often paddy price takers. The paddy price offered in open market (harvest period) is less attractive than what is always agreed upon in the contract terms. Moreover, the ESOP Price is linked to quality. Contract farmers are motivated because they receive quality premium price in so far as they meet the quality requirement. This is in line with Miyata et al. (2009) who showed that quality premium price is an important farmers' motivation factor. Farmers also highly appreciate extension services from ESOP because it offers them training as well as technical assistance. The public extension services are scarce and ESOP extension officers come as a complement. Contract farmers therefore receive timely advice from the ESOP agents on how to improve their rice production and enhance their paddy quality. This is in line with other authors (Eaton & Shepherd, 2001; Will, 2013)

Factor2: This factor is highly loaded with issues such as 'access to credit', 'reliable supply of inputs', 'access to high quality seed' and 'unit of measure of the product is scale'. This factor accounts for about 20% of the variation in the sample and is associated with '*output measure and input market*'. In the open market, paddy rice is measured by the bowl and the volume is purposefully distorted by the buyer to contain more grain Figure (4.2). The distorted bowl contains 20% extra rice grain (10

Distorted bowls are 12 normal bowls). The use of a scale as a unit of measurement is therefore highly appreciated, and motivated farmers to be part of the contract.



Figure 4. 2 : Bowls used by traders (at the left a normal bowl, at the right a distorted bowl)

Source: Picture took by the author

In terms of input, rice production, as well as other staple crop productions, is severely constrained by limited availability of improved seed and fertilizer in the study area. Up to 2015, ESOP provided some of its farmers with improved seed as well as fertilizer and this has been a motivation factor for farmers to work under contract. Due to problems of repayment, ESOP stopped providing direct fertilizer to farmers; only improved seed is provided. ESOP, however, links contract farmers to Micro Finance Institutions (MFI) to ease their credit access and facilitate their fertilizer acquisition. Access to fertilizer is still a challenge to farmers because of the problem of availability. The fertilizer supply is unreliable and it is most of the time available after

optimal fertilizer application time. Being in the ESOP contract scheme was therefore a secure way for farmers to be guaranteed an input supply. Having access to credit facilitates the payment of fertilizer in the warehouse. It is important to state that up to the time of this study in March 2016, fertilizer was subsidized in Togo and the state company *Central d'Achat et de Gestion d'Intrants Agricoles* (CAGIA) was the only distributor of fertilizer throughout the country. The most prevailing problem advocated by farmers was the unavailability of the fertilizer. Input market liberalization has now started in Togo, but it is too early to make a judgment on this liberalization. This finding is in line with da Silva and Rankin (2013) who show that an input facility could motivate farmers to be part of a contract scheme

Factor3: This factor explained 18% of variation in the sample and is highly loaded with issues such as sale done in bulk is good and payment is done in bulk. This factor is associated with '*reliable source of income*'. Rice production under contract is a reliable source of income when it is purchased in cash and paid in bulk. Being in the ESOP contract scheme is a secure source of income for farmers because ESOP purchases the quantity of paddy under contract in bulk and also pays in bulk. These two operations are highly appreciated by farmers as motivation for working under the ESOP contract. This mode of payment allows them to take money in bulk and invest in housing construction and also in education for their children. Outside the contract scheme, it is difficult to sell in bulk. Occasionally, farmers sell in bulk, but the payment is not made in bulk. Contract production is therefore seen as a reliable source of cash income. This motivated their participation in the contract scheme. This finding is in line with Schipmann and Qaim (2011) who show that farmers preferred contract farming as a reliable source of income.

These results indicate that the decision of small rice contract farmers is motivated simultaneously by a range of factors related to incentive elements in the contract terms. These factors perfectly reflect the prevailing opportunity and constraints faced by these small scale rice farmers in Togo. Being in ESOP contract farming helped farmers to overcome weaknesses in the local input and output market. These results are in line with a study such as Masakure and Henson (2005) and Pusputami (2013) who underline the benefit farmers have by being in a contract scheme.

4.2.3 Variation in Farmers' motivation to contract with an ESOP

The linkage between rice farmers' motivations to contract with ESOP and the prevailing conditions in the input and output markets and extension services in the study area is highlighted in Table 4.10. The expectation is to assess variation in farmers' motivation to contract with ESOP, according to farmers' socioeconomic conditions and the infrastructure in the communities. Farmers' motivation to contract varied according to class of age, level of education, rice farming experience, input access, distribution system, roads nature in the village, and distance from the farmers' house/homestead to the nearest agriculture product market. Masakure and Henson (2005) also underline the close relationship between farmers' motivation and the prevailing market condition and their social and environmental conditions.

In order to analyse the way in which ESOP contract farmers' motivation differs between subsets of producers, a K-mean cluster analysis was used. Using a motivation factor loaded for each respondent, three cluster groups were produced with the greatest level of internal consistency (Table 4.10). Descriptors of clusters are based on motivation factor scores that have a standard deviation of one and mean of zero as indicated by Hair, Black, Babin, and Anderson (2009). When the cluster mean has a

positive value that indicates above average activity on a particular motivation factor and a negative value below-average activity on a particular motivation factor. Based on this, three distinct clusters of respondents were identified and the results are presented in table 4.10. Based on factors on which the subset group has positive score, three cluster groups were named ‘input/output market group (cluster 1)’, ‘reliable source of income group (cluster 2)’ and ‘overall incentive group (cluster 3)’.

Table 4. 10: Cluster mean scores for motivation factor scores derived from K-mean clustering for ESOP contract farmers

Motivation factors	(1) Input/output market group	(2) Reliable source of income group	(3) Overall incentive group
Perceived Direct Benefit	-1.13123	-0.17146	0.74853
Output measurement and Input market	0.48004	-1.58016	0.42708
Reliable source of cash income	-0.47801	0.16046	0.21135
Proportion of contract farmers (%)	29	22	49

Note: Positive scores are in bold

Source: Results from field survey 2016

Cluster1: About 29% of contract farmers can be described as ‘input/ output market drive’. These rice farmers are predominantly attracted to contract with ESOP because of the input and output market facility offered by ESOP (Factor2). The direct benefit (Factor1) and reliable source of cash income (Factor3) which have negative mean scores are of less importance to them than the sample as whole. Referring to Table 4.10 and Table 4.11, this input/output market group consisted of 85% of farmers that are more than 35 years old and who, most of them, are located at about 5-10 km from the output/input market. They have problems of transportation because of the bad road condition from their village to the market where agricultural products are sold and where input warehouses are located. About 76% of respondents from this group have criticized the input distribution system, and 61% complained about the state of the road (Table 4.11). The ESOP purchases the paddy at home and facilitates their improved

seed access. All these prevailing conditions explained farmers' motivation to contract with ESOP to overcome such constraints (Masakure & Henson, 2005).

Cluster 2: About 22% of contract farmers can be described as motivated by 'reliable source of income' in terms of cash income (Factor3). 'Perceived Direct Benefit' and 'Output and Input market' which have negative mean scores are of less importance than the sample as whole. These contract farmers are predominantly attracted to a contract with ESOP because ESOP purchase in bulk and pay cash in bulk. For them, selling in bulk and getting paid cash in bulk help them to make their investment in their children's education. As far as ESOP continues to buy and pay cash in bulk, this group of farmers is ready to continue the partnership, otherwise they could easily side sale or exit (Abebe et al., 2013). About 73% of respondents from this group are close to the market place (less than 5 km) and the road conditions in their village were classified as good by 66% of them (Table 4.11). Paddy transportation to market is no more a problem for them. They could easily sell in the open market, but they have no guarantee to sell in bulk. Contract farming is very much appreciated by them because they earn cash in bulk and this helps them to make investment such as purchase a motorcycle, build a house or invest in the education of their children.

Cluster 3: About 49% of respondents can be classified as 'overall incentive group'. They are positively motivated by all the three factors (direct benefit, output and input benefit and income benefit). This group of contract farmers viewed the benefit of ESOP contract farming in its entirety rather than focussing on a single benefit. This is in line with other authors such as Masakure and Henson (2005) who demonstrate that producers do not emphasize one particular incentive but consider their benefits as a whole. The majority of respondents (62%) in this cluster does not express any

complaint about the input distribution system, rather they complain about the state of the road (65%) from their village to the market (Table 4.11). About 85% of the respondents indicated that the distance from their house/homestead to the market is not too long (less than 5 km).

Table 4. 11: Motivation cluster membership by characteristics of contract farmers

Farmers Characteristics	Coding	Cluster groups			Chi-Square	Sig.
		1	2	3		
Age	35 years and less	14.80	14.60	24.20	2.6530	0.2600
	36 years and more	85.20	85.40	75.80		
Member of FBO	No	1.90	2.40	1.10	0.3470	0.8400
	Yes	98.10	97.60	98.90		
Position in FBO	Simple member	46.30	41.50	47.30	0.3930	0.8200
	Committee member	53.70	58.50	52.70		
Rice farming Experience	5 years and less	20.40	26.80	22.00	0.5930	0.7400
	6 years and more	79.60	73.20	78.00		
Land access	Very difficult	46.30	36.60	45.10	1.0580	0.5800
	Easy	53.70	63.40	54.90		
Year of Education	Less than 6 years education	38.90	29.30	35.20	0.9530	0.6200
	6 and more years of education	61.10	70.70	64.80		
Problem with Input distribution system	No	24.10	43.90	62.60	20.4630	0.0000
	Yes	75.90	56.10	37.40		
Harvest mostly steals	No	35.20	39.00	33.00	0.4580	0.7900
	Yes	64.80	61.00	67.00		
Roads nature in the village	Bad	38.90	34.10	64.80	14.7800	0.0000
	Good	61.10	65.90	35.20		
Distance to market	5 km and less	64.80	73.20	84.60	8.4070	0.0700
	6-10 km	31.50	22.00	14.30		
	11km and more	3.70	4.90	1.10		
Number of farmers in cluster group	Frequencies	54	41	91		
Proportion of respondents	Percentage (%)	29	22	49		

Source: Results from field survey 2016

Overall, elements in the ESOP contract terms positively motivate farmers' participation in the contract scheme, but the motivation varies in different degrees

according to farmers' socioeconomic conditions and infrastructure in the farmers' communities.

About 49% of the respondents were positively motivated by the overall incentive elements in the contract terms. On the other hand, about 29% of respondents are motivated by the unit of measurement and input supplied by ESOP. If one of these elements is absent in the contract terms, they will exit the contract scheme. About 22% of respondents are mostly motivated by the fact that ESOP purchases and pays in bulk, if ESOP should fail to do so, they will also exit the contract scheme. Serious care should be taken to maintain the three cluster groups identified in the contract scheme.

4.3 The Impact of ESOP Contract Farming on Rice Farmers' Performance

The results of the selection equations of the four endogenous switching regressions are presented in Table 4.12, the estimation of average treatment effects are presented in Table 4.13. The results of outcome equations of endogenous switching regression equations are presented in Table 4.14 for yield, Table 4.15 for revenue and net benefit and Table 4.16 for paddy purity. The Wald chi² test is significant at 1% for all the four switching regression models. This indicates that the Endogenous switching regression model is a good fit for the explanatory variables.

The Likelihood-Ratio test of independence between the selection equation and the outcome equations is significant for all the four switching regression models; this suggests that the three equations in each of these four switching regression models are related and should not be estimated separately.

The rho (ρ) value measuring coefficient of correlation (ρ_0 and ρ_1) between the error terms in the participation in the ESOP contract (selection) equation and contract farmers' yield, revenue and net benefit (outcome) equations is significantly different from zero for both ESOP contract farmers and non contract farmers. Unobserved factors increase the likelihood of participating in ESOP contract farming and are correlated with unobserved determinants of yield revenue and net benefit performance of ESOP contract farmers and non contract farmers. Not controlling for that will lead to bias estimates of the impact of ESOP contract farming on farmers' performance.

Since ρ_0 and ρ_1 are positive, it means that farmers who choose to enter the ESOP contract will have above-average yield, whether they are under the ESOP contract or outside the ESOP contract. In other words, ESOP contract farmers have an 'absolute advantage' in the sense that they have above-average yield, revenue, and net benefit with or without the ESOP contract. Conversely, non-contact farmers in general would have below-average yield revenue whether they are under ESOP contract or not. This suggests that a self-selection bias (in terms of yield, revenue, and net benefit) occurred in participation in the ESOP contract scheme. Not controlling for that will lead to biased estimates of the impact of contract farming on farmers' performance. In terms of paddy purity, selection bias did not occur, since ρ_0 and ρ_1 are not statistically significant for paddy purity.

The endogenous switching regression (joint estimation) is therefore more appropriate than separate regression, because it helps to overcome selection and unobserved bias. This is confirmed by the significance of the Likelihood Ratio test, rejecting the joint independence of the three equations and supporting the use the endogenous switching

regression model. The Propensity Score Matching estimation was also used to compare the results with that of the Endogenous Switching Regression.

4.3.1 Probability of participation in ESOP contract farming

The results of the selection equations from the four endogenous switching regressions and from the Probit Model (used in PSM estimation) are presented in Table 4.12. The results indicate that farmers' participation in ESOP contract farming is influenced by household labour force (man equivalent) and rice farming experience.

The four selection equation models as well as the Probit Model show that the first factor influencing the likelihood of participating in ESOP contract farming is Age. Youths (35 years old and less) have a lower likelihood to participate in the ESOP contract scheme. ESOP mostly contracts with the farmer based organizations (FBOs). Youth in the study area are not well organized in groups; that can explain why they participate less in the contract scheme. According to the descriptive statistics, 28% of the respondents are youth (35 years old and less). About 65% of youth are not members of any farmer based organization and this explains why youth participated less in the contract scheme.

The second factor that influenced farmers' participation in ESOP contract farming is household labour force. This variable is significant for the Probit model and two other selection equations of switching regression models. Households with higher labour force have a higher likelihood to participate in the ESOP contract scheme. This is expected because rice production needs more labourers to work on and off field. On the field, labourers support planting, pest and disease management, fertilizer application and harvesting. Post-harvest activities include manual drying of paddy,

threshing, bagging, milling, and packaging. Households with higher labour force can easily meet the ESOP quality criterion, which is labour consuming.

Table 4. 12: Factors affecting participation in ESOP rice contract farming, results from Probit model use in PSM and the selection equation from ESRM

Variables	Selection equation of endogenous switching regression results				PSM
	Selection eq (a)	Selection eq (b)	Selection eq (c)	Selection eq (d)	Probit result
Age	0.351** (0.148)	0.346** (0.148)	0.366*** (0.137)	0.397** (0.158)	0.246* (0.130)
Gender	-0.138 (0.174)	-0.137 (0.173)	-0.187 (0.163)	-0.181 (0.187)	-0.100 (0.181)
Level of Education	0.00896 (0.131)	0.00263 (0.131)	0.0529 (0.123)	0.0530 (0.137)	0.0302 (0.136)
Household Labour	0.0330 (0.0212)	0.0351* (0.0211)	0.0379* (0.0203)	0.0315 (0.0240)	0.0482** (0.0216)
Agro-ecological	0.0144 (0.131)	0.00798 (0.131)	-0.0286 (0.124)	-0.00238 (0.140)	-0.0445 (0.137)
Farm size	0.0102 (0.106)	0.00976 (0.105)	0.0868 (0.115)	0.0688 (0.119)	0.0969 (0.118)
Distance to warehouse	0.0671 (0.0971)	0.0969 (0.0949)	-0.0794 (0.0718)	-0.0554 (0.139)	-0.0450 (0.136)
Rice farming Experience	0.0126* (0.00648)	0.0119* (0.00630)	-0.000449 (0.00494)	0.0211** (0.00952)	0.0278*** (0.00885)
Land Access	0.113 (0.0893)	0.100 (0.0887)	-0.0555 (0.0711)	0.0275 (0.143)	0.0481 (0.133)
Constant	-0.791*** (0.232)	-0.796*** (0.230)	-0.537*** (0.198)	-0.816*** (0.260)	-0.804*** (0.246)
Observations	412	412	412	408	413
Log likelihood	-651.983	-653.36208	-1045.0319	-1110.652	-271.1442
Wald chi2(12)	37.40	34.57	80.85	25.06	25.77
Prob > chi2	0.0000	0.0005	0.0000	0.00340	0.0022
LR test of indep. eqns. :chi2(2)	13.97	15.68	82.24	17.01	-----
Prob > chi2	0.0009	0.0004	0.0000	0.0091	-----
Pseudo R2	-----	-----	-----	-----	0.0454

Note PSM=Propensity Score Matching;

ESRM=Endogenous Switching Regression Model

a=yield, b= revenue; c=Net Benefit, d=Paddy Purity; Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Results from field survey 2016

The last factor that influences farmer participation in ESOP contract farming is rice farming experience. This factor is significant for the Probit model and three other selection equations of switching regression models. Farmers with five (5) years or more experience in rice production have a higher likelihood to participate in ESOP contract farming.

This can be explained by the fact that the more farmers are experienced, the more they accept to take risks and grow rice under contract. The descriptive statistics show that only 13% of contract farmers have less than 5 years of rice farming experience against about 27% for non-contract farmers. These results are in line with Cai et al. (2008) who studied rice contract farming and factor affecting farmers participation in the contract scheme in Cambodia and came to conclusion that age, household labour force and experience, influence farmers' participation in the contract scheme.

4.3.2 Estimation of the average treatment effect of ESOP contract farming on farmers' performance

The estimated average treatment effect of ESOP contract farming on farmers performances (ATE) is presented in Table 4.13 and focusses on quantity performance (Yield), revenue performance (revenue and net benefit) and quality performance (degree of paddy purity).

Yield: The propensity score matching model (PSM) model showed that participating in ESOP contract farming contributes to increase the yield by 16%, and this is significant at 1%. This result is confirmed by the endogenous switching regression which showed that participating in ESOP contract farming contributes to increased yield by 14%. The endogenous switching regression result is significant at 1%. These

results are in line with (Velde & Maertens, 2014) who showed that ESOP contract farming increased farmers' rice yield in The Benin Republic.

Revenue: In terms of revenue, the results from the propensity score matching model (PSM) showed that participating in ESOP contract farming increases contract farmers' revenue by 35% and this is significant at 1%. In the same direction, the endogenous switching regression model showed that participating in ESOP contract farming contributes to increase farmers' revenue by 32%, and the results is significant at 1%. This result is in line with Honfoga et al. (2016) who showed that by participating in ESOP contract farming, farmers' revenue increased in The Benin Replublic.

Net Benefit: In terms of Net Benefit, the propensity score matching model (PSM) estimate that participating in ESOP contract farming increased farmers' net benefit by 93,300.00 Fcfa per hectare. Similarly, the endogenous switching regression showed that participating in ESOP contract farming contributes to increase farmers Net benefit by about 92,200.00 Fcfa/ha. This result is in line with Velde and Maertens (2014) who showed that contract farming contributes to increase the net benefit framers draw from rice production.

Paddy purity: In term of paddy purity (rice quality criteria), the propensity score matching model (PSM) showed that the paddy purity is increased from 96% to 99.55% as a result of participating in ESOP contract farming. This is confirmed by the endogenous switching regression which estimated that participating in ESOP contract farming contributes to a significantly increase in paddy rice purity from 96% to 99.55%. This result is in line with other authors who showed that contract farming contributed to upgrade product quality (Abougamos et al., 2012; Bottema & Altemeier, 1990; Miyata et al., 2009; Saenger et al., 2013).

From these results, it can be concluded that, whatever estimation method used (PSM or ESRM), participating in ESOP contract farming has a positive and significant effect on farmers' performance in term of on yield, revenue, net benefit and paddy purity.

Table 4. 13: Estimation of average treatment effects (ATE) of ESOP contract on farmers performance, results from PSM and ESRM

Performance indicators	Nearest Neighbour	Switching Regression
Yield (log)	0.164*** (0.0669)	0.138*** (0.0270)
Revenue (log)	0.350*** (0.067)	0.324*** (0.0264)
Net Benefit FCFA/ha 10,000	0.933*** (0.190)	0.922*** (0.0672)
Purity	3.422*** (0.289)	3.423*** (0.103)

Note PSM=Propensity Score Matching;
 ESRM=Endogenous Switching Regression Model
 *** p<0.01; Robust standard errors in parentheses
 Source: Results from field survey 2016

The results of the outcome equations from the ESRM estimating factors affecting farmers' performance are presented in Table 4.14 for yield, Table 4.15 for revenue and net benefit and Table 4.16 for paddy purity.

4.3.3 Factors affecting yield performance

The results of the outcome equations from the ESRM estimating factors affecting yield performance are presented in Table 4.14. The results show that the ESOP Contract Farmers' yield is significantly affected by age, gender, the number of extension visits, the use of fertilizer and labour, while non-contract farmers' yield is affected by farm size, number of extension visits, the use of fertilizer and the use of improved seed.

Table 4. 14: Factors affecting farmers paddy yield performance, results from switching regression

VARIABLES	Non contract	ESOP Contract	Select
Age	0.0802 (0.119)	-0.291** (0.142)	0.351** (0.148)
Gender	0.0332 (0.140)	0.378** (0.158)	-0.138 (0.174)
Level of Education	0.0240 (0.111)	0.156 (0.115)	0.00896 (0.131)
Total household labour	0.0269 (0.0194)	-0.00886 (0.0186)	0.0330 (0.0212)
Agro ecological zone	-0.0597 (0.111)	-0.0677 (0.121)	0.0144 (0.131)
Farm size	-0.233** (0.0998)	-0.0490 (0.0983)	0.0102 (0.106)
Member of FBO	0.0165 (0.107)	0.337 (0.347)	
Number extension visits	0.0787*** (0.0267)	0.0604** (0.0296)	
Credit access	-0.0928 (0.0981)	0.0173 (0.101)	
Quantity fertilizer per ha	0.00120*** (0.000356)	0.00114*** (0.000380)	
Use of improved seed	-0.186** (0.0866)	0.0744 (0.183)	
Labour cost (log)	0.135 (0.0856)	0.289*** (0.0975)	
Distance to fertilizer warehouse			0.0671 (0.0971)
Rice farming experience			0.0126* (0.00648)
Land access			0.113 (0.0893)
Constant	6.041*** (0.993)	4.170*** (1.219)	-0.791*** (0.232)
Sigma	0.839 (0.0725)	0.860 (0.0786)	
Rho (ρ)	0.8419 (.07448)	0.9059 (0.0446)	
Observations	412	412	412
Log pseudo-likelihood	-651.983		
Wald chi2(12)	37.40		
Prob > chi2	0.0000		
Wald test of indep. eqns. :	13.97		
chi2(2)			
Prob > chi2	0.0009		

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Results from field survey 2016

Age: The coefficient of Age is negative for the ESOP contract farmers, meaning that Youths (35 years old and younger) have higher yield than those who are older than 35 years old. This can be explained by the fact that youth more easily put into practice advice and training than older farmers who are most of time reluctant to change (Cai et al., 2008).

Youth, therefore, will benefit by participating in ESOP contract farming. Unfortunately, the number of youths is less in the ESOP contract farming compared to those who are older than 35 years old.

Gender: The coefficient of gender is positive, meaning that women have higher yields than men in ESOP contract farming. Outside the contract scheme, there is no significant difference between men and women in terms of revenue and net benefit. This can be explained by the ability of women to put into practice the advice received from the extension services, as explained by Akudugu et al. (2012).

Farm size: Farm size has a negative coefficient, meaning that higher yield is obtained when the farm size is small. This is because farmers take better care of their farm when the size is small.

Extension agent visits: For the ESOP contract farmers, as well as non-contract farmers, the number of extension agent visits, has a positive impact on yield. This means that advice from extension agents have more effect on yield when it is repeated. Contract farmers receive more visits (3.38 times per season) than non-contract farmers (1.67 times per season).

Use of Fertilizer: the fertilizer use contributes to increase the paddy yield of ESOP contract farmers as well as for the non- ESOP contract farmers; the average yield is

low on both sides. This can be attributed to the low use rate of fertilizer (188 kg/ha for contract farmers and 170Kg/Ha for noncontract farmers) compare to the rate recommended (300 kg/ha) (ITRA & DSID, 2010). To increase yield, there is a need to respect the dose of fertilizer recommended.

Improved seed: The sign of the coefficient of use of improved seed is negative and significant at 5% for the non-contract farmers. This is an unexpected result because improved seed normally contributes to increased yield. The plausible explanation is that the non-contract farmers may not respect all the good agricultural practices that are needed when an improved seed is used. Moreover, non-contract farmers purchase their seed from an unlicensed seed dealer who can easily sell them poor quality seed. ESOP provide contract farmers with quality seed which is positively related (albeit insignificant) to yield.

Labour cost: Labour has a positive and significant effect on the ESOP contract farmers' yield. The increase of labour cost by 1% contributes to increase yield by about 29%. By contrast, the effect of labour is not significant for non contract farmers' yield. This can be explained by lack of efficiency in the use of labour by the non contract farmers.

4.3.4 Factors affecting farmers' revenue and net benefit performance

The ESOP contract farmers' revenue and net revenue are affected by similar factors. Age, Gender, Number of Extension visits, use of Fertilizer and, Labour cost affect the ESOP contract farmers' revenue and net benefits. On the other hand, Age, Gender, Farm size, Number of the Extension visits, use of Improved seed, fertilizer and labour affect the Non contract farmers' revenue and the net benefit (Table 4.15).

Age: The coefficient of Age is negative in the two models for ESOP contract farmers, meaning that in ESOP contract farming, youth (35 years old and less) has higher revenue and net benefit than those who are more than 35 years old. This is explained by the higher yield that youths obtain by putting into practice advice received from ESOP's extension services. Age has no significant effect on revenue for non contract farmers. Youth, therefore, benefit more by participating in ESOP contract farming. Unfortunately, there are fewer youths are less in ESOP contract farming compared to those who are more than 35 years old.

Gender: The coefficient of gender is positive, meaning that, women have higher revenue and net benefit than men in ESOP contract farming. Without the contract scheme, there is no significant difference between men and women in terms of revenue and net Benefit. This also is the results from higher yield obtained by women in ESOP contract farming due to their ability to put into practice advice from ESOP's extension services.

Farm size: The farm size has a negative effect on the non contract farmers' revenue and net income per hectare. Out of ESOP contract farming, farmers with small farm size have more revenue per hectare than those who have larger farm size. There is no significant difference between the ESOP contract farmers' revenue per hectare, whether their farm size is big or small. This can be explained by the fact that non contract farmers only take seriously care of their farms if they are small and thus yielding in better revenue per hectare.

Extension agent visits: For ESOP contract farmers, as well as for non-contract farmers, the number of extension agent visits has a positive impact on revenue and net benefit. This is the result of the higher yields obtained when farmers have more extension visits and put their advice into practice.

Table 4. 15: Factors affecting farmers revenue and net benefit performance

VARIABLES	Revenue			Net Benefit		
	Non contract	Contract	Select	Non contract	Contract	Select
Age	0.0952 (0.119)	-0.291** (0.142)	0.346** (0.148)	-0.716** (0.282)	0.617 (0.465)	0.366*** (0.137)
Gender	0.0324 (0.141)	0.380** (0.159)	-0.137 (0.173)	0.610* (0.339)	0.111 (0.537)	-0.187 (0.163)
Level of Education	0.0687 (0.111)	0.163 (0.116)	0.00263 (0.131)	0.0595 (0.269)	0.524 (0.399)	0.0529 (0.123)
Total household labour	0.0292 (0.0193)	-0.0101 (0.0188)	0.0351* (0.0211)	-0.0624 (0.0464)	0.0499 (0.0651)	0.0379* (0.0203)
Agro ecological zone	-0.0815 (0.112)	-0.0704 (0.122)	0.00798 (0.131)	0.0832 (0.271)	0.182 (0.406)	-0.0286 (0.124)
Farm size	-0.210** (0.0996)	-0.0506 (0.0989)	0.00976 (0.105)	-0.176 (0.246)	0.161 (0.374)	0.0868 (0.115)
Member of FBO	-0.0433 (0.107)	0.316 (0.348)		-0.0549 (0.218)	0.188 (0.933)	
Number extension visits	0.0696*** (0.0264)	0.0624** (0.0298)		0.0376 (0.0587)	0.152** (0.0744)	
Credit access	-0.101 (0.0973)	0.0165 (0.101)		-0.102 (0.185)	0.0837 (0.282)	
Quantity fertilizer per ha	0.00121*** (0.000354)	0.0011*** (0.000382)		-0.000859 (0.000751)	-0.00168 (0.0012)	
Use of improved seed	-0.181** (0.0865)	0.0860 (0.184)		-0.523*** (0.184)	0.0498 (0.480)	
Labour cost (log)	0.133 (0.0845)	0.291*** (0.0981)		-0.927*** (0.154)	-0.916*** (0.285)	
Distance to fertilizer warehouse			0.0969 (0.0949)			-0.0794 (0.0718)
Rice farming experience			0.0119* (0.00630)			-0.000449 (0.00494)
Land access			0.100 (0.0887)			-0.0555 (0.0711)
Constant	10.89*** (0.978)	9.189*** (1.228)	-0.796*** (0.230)	10.34*** (1.794)	7.029* (3.650)	-0.537*** (0.198)
Sigma	0.8496 (0.0683)	0.8689 (0.0783)		2.1994 (0.134)	3.226 (0.227)	
Rho (ρ)	0.851 (0.0633)	-0.909 (0.0423)		-0.9607 (0.0156)	0.981 (0.010)	
Observations	412	412	412	412	412	412
Log likelihood	-653.362			-1045.031		
Wald chi2(12)	34.57			80.85		
Prob > chi2	0.0005			0.0000		
LR test of indep. eqns. :chi2(2)	15.68			82.24		
Prob > chi2	0.0004			0.0000		

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Source: Results from field survey 2016

Use of fertilizer: The use of fertilizer has a positive and significant effect on ESOP contract farmers and non contract farmers' revenue, but the effect of fertilizer is not significant on net benefit. This can be explained by the low contribution of fertilizer in the yields described above.

Use of improved seed: Use of improved seed has a negative effect on non-contract farmers' revenue and their net benefit. This is due to the decrease in yield that occurs in non-contract farmers' yield when they use improved seed. It can be due to poor maintenance of the farm and lack of complementary inputs. Conversely the use of improved seed has a positive effect on ESOP contract farmers' revenue and net benefit even if the effect is not significant.

Labour cost: Labour has a positive impact on ESOP contract farmers' revenue, but negative effect on net benefit. A 1% increase in labour cost contributes a 29% increase in revenue and 91% of increase in net benefit. These results are in line with Honfoga et al. (2016), and Velde and Maertens (2014).

4.3.5 Factors affecting the paddy purity performance

The results of the outcome equation of endogenous switching regression on paddy purity are presented in Table 4.16. It is shown that the ESOP contract farmers' paddy purity is significantly affected by agro-ecological zone, the number of extension visits, and the mode of threshing used, while non-contract farmers' paddy purity is only affected by the mode of threshing.

Agro-ecological zone: The coefficient of agro-ecological zone is negative, meaning that ESOP contract farmers in the forest zone have a higher paddy purity than ESOP contract farmers in the savannah zone. This can be explained by the threshing mode used in each agro-ecological zone. The descriptive statistics show that among ESOP contract farmers about 38% are from the forest zone and 62% from the savannah zone.

Table 4. 16: Factors Affecting Farmers' paddy Purity Performance, results from switching regression

VARIABLES	Non Contract f	Contract	Select
Age	-0.0393 (0.720)	0.277 (0.209)	0.397** (0.158)
Gender	0.234 (0.777)	-0.109 (0.203)	-0.181 (0.187)
Level of Education	0.415 (0.616)	-0.0125 (0.128)	0.0530 (0.137)
Total household labour	0.0751 (0.108)	-0.00619 (0.0193)	0.0315 (0.0240)
Agro ecological zone	-0.422 (0.858)	-0.423** (0.172)	-0.00238 (0.140)
Farm size	0.163 (0.556)	-0.0996 (0.113)	0.0688 (0.119)
Member of FBO	0.197 (0.682)	-0.336 (0.463)	
Number extension visits	0.147 (0.169)	0.0730* (0.0399)	
Credit access	-0.1421** (0.599)	0.127 (0.145)	
Quantity fertilizer per ha	0.000139 (0.00228)	-0.000323 (0.000533)	
Use of improved seed	0.897 (0.561)	-0.150 (0.244)	
Labour cost (log)	0.256 (0.557)	0.101 (0.139)	
Threshing mode	2.127*** (0.678)	0.410*** (0.137)	
Paddy price (log)	-1.560 (2.117)	0.328 (2.243)	
Distance to fertilizer warehouse			-0.0554 (0.139)
Rice farming experience			0.0211** (0.00952)
Land access			0.0275 (0.143)
Constant	98.60*** (12.45)	96.69*** (11.25)	-0.816*** (0.260)
Sigma	4.015 (.2249)	.7858 (0.0410)	
Rho (ρ)	-.1627 (0.3006)	-.0164 (0.494)	
Observations	408	408	408

Log likelihood = 1110.652, Wald chi2(14) = 25.06, Prob > chi2 = 0.00340

LR test of indep. eqns. : chi2(2) = 17.01, Prob > chi2 = 0.0091

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Results from field survey 2016

Among the 38% farmers that are from the forest agro-ecological zone, about 88% thresh rice by flaying rice panicle against a barrel. In contrast, among the 62% of contract farmers that are from the savannah agro-ecological zone, only 29% thresh by flaying rice panicle against the barrel, the rest thresh by flaying rice panicle on the ground by a stick. This kind of threshing contributes to increase the degree of foreign matter in the paddy.

Number of extension visits: The number of visits by extension agent positively and significantly contributed to increase the degree of purity of the paddy for ESOP contract farmers. On the other hand, for non-contract farmers, the effect of number of visits of extension agents on paddy purity was positive, but not significant. This again underlined the effectiveness and efficiency of advice provided by ESOP Extension agents.

Threshing mode: The paddy threshing mode, positively affected the degree of paddy purity for ESOP contract farmers as well as for non contract farmers.

When rice panicle is flayed against a barrel rather than by using a stick to hit the panicle on the ground, the paddy purity is increased. This mode of threshing highly contributes to increase the paddy purity because, the operation is done on tarpaulin and second, the paddy is not broken. After winnowing the paddy contain less foreign elements.

4.3.6 Participating in ESOP contract and paddy quality upgrading

The paddy purity results from the endogenous switching regression are compared with paddy grade threshold defined in methodology based on Agriculture and Marketing (AGMARK) paddy quality standard. The results are presented in Table 4.17.

Table 4.17: Paddy quality upgrading, results from endogenous switching regression and AGMARK Standards

Farmer statute	Degree of paddy purity (%) (Std. Err.)	AGMARK standards		Quality appreciation
		Dockage(%)	Paddy grade	
Sample non-contract farmers (N=219)				
In ESOP contract (estimate)	99.544 (0.0196)	[0-1]	Grade I	Premium
Out of ESOP contract (real)	96.131 (0.00918)	]2-4]	Grade III	Medium
Sample ESOP contract farmer (N=185)				
In ESOP contract (real)	99.555 (0.0228)	[0-1]	Grade I	Premium
Out of contract (estimate)	95.658 (0.1005)	]4-7]	Grade IV	Poor
Ordinary Farmer (N=404)				
In ESOP contract (estimate)	99.549 (0.0148)	[0-1]	Grade I	Premium
Out of ESOP contract (estimate)	95.915 (0.0679)	]4-7]	Grade IV	Poor

AGMARK: Agriculture and Marketing Standards; Standard Errors are in parenthesis
 Source: Results from field survey 2016

The results show that:

- i) if non contract farmers had participated in ESOP contract farming, the quality of their paddy would have been upgraded from grade III (low quality) to grade I (premium quality).
- ii) On the other hand, if the ESOP contract farmers had not participated in ESOP contract farming, the quality of their paddy would stay at grade IV (poor quality).
- iii) When a rice farmer participates in the ESOP contract farming programme, his paddy quality will upgrade from grade III (medium quality) to grade I (premium quality).

4.4 Constraints that Rice Farmers' Face with ESOP Contract Farming

4.4.1 Rank of constraints in ESOP rice contract farming

The ESOP contract farmers face a number of constraints which are listed in Table 4.18. These constraint factors are ranked using the Wilcoxon sign-rank test. Among the constraints, 5 have a mean score not significantly different from the average, (the required score of 3), meaning that they are important constraint factors. Conversely, the rest of the constraint factors have a mean score significantly lower than the average score 3, meaning that they are not important constraint factors.

The five important constraints that rice contract farmers faced are:

- i. Price Formula used by ESOP is not good, I feel cheated when the open market price goes up,
- ii. ESOP quality premium price is not high enough to cover investment made to satisfy their quality requirement,
- iii. When other farmers fail to pay their credit we are asked to pay back,
- iv. It takes too long to get paid for paddy rice sold to ESOP and
- v. ESOP doesn't have enough capital for cash and carry.

For contract farmers, the price formula used by the ESOP is not good because they feel cheated when the open market price goes up. In fact, the ESOP price is fixed at the beginning of the growing season. It encompassed a fixed price and a premium price when the quality requirement is met. ESOP undermines the price variation that can occur during the harvest time. These farmers see the price formula as a constraint and would like that the price formula took into account variation in output market. Contract farmers also feel that the ESOP quality premium price is not high enough to cover

investments made to satisfy the quality requirement. It is expected that contract farmers deliver quality paddy, and this needs a certain kind of threshing. The ESOP farmer has to purchase the tarpaulin on which threshing and drying are done.

Table 4.18: Farmers’ Constraints under ESOP rice contract farming

Constraint in ESOP rice contract	Descriptive Statistics	Wilcoxon Signed Ranks Test	
	Mean (N=152)	Z	Asymp. Sig.
Price formula used by ESOP is not good (for example, I feel cheated when the open market price goes up)	3.47	-1.544	0.123
ESOP quality premium price is not high enough to cover investment made to satisfy their quality requirement	3.28	-0.427	0.669
When other farmers fail to pay their credit we are asked to pay back	3.26	-0.823	0.411
It takes too long to get paid for my rice sold to ESOP	3.09	Base of comparison	
ESOP doesn’t have enough capital to cash and carry	2.93	-1.603	0.109
ESOP agent manipulated product quality standard so that not all contracted production are purchased	2.8	-2.737a	0.006
ESOP contract is unreliable and exploit a monopoly position in price fixation (no price negotiation)	2.77	-3.192a	0.001
It is too risky to contract with ESOP because of the input that they offer as credit	2.64	-4.055a	0.000
Technical assistance from ESOP is not satisfactory	2.54	-4.946a	0.000
I face the risk of production problems because of poor quality of their seed variety	2.53	-4.856a	0.000
I have not benefitted by selling to ESOP my product	2.51	-4.332a	0.000
I don’t trust the Unit of measure (scales used)	2.48	-4.809a	0.000
Too many restrictions on how to cultivate produce	2.41	-5.661a	0.000
ESOP doesn’t buy total production	2.38	-5.424a	0.000
Material . Tarpaulin and plastics on offers are not good quality	2.28	-5.989a	0.000
I lose my freedom to sell my own production	2.22	-6.693a	0.000

a. Based on negative ranks, significantly lower than the average at 1%.

Source: Results from field survey 2016

Contract farmers are expected to thresh in a way that guarantees the quality of milled rice and this needs more labour. Farmers therefore felt that quality premium price given by ESOP is not enough to cover efforts made to reach quality requirement.

One important issue farmers raised was about debt. In the ESOP model, farmers in the same group are in solidarity and when one farmer fails to pay back his loan, seed

credit, fertilizer or any other input credit, automatically ESOP withdraws money from the paddy value of the group before giving them their balance. This is seen as an offense by some farmers who have problems accepting such automatic contribution for repayment. One other constraint ruse mentioned by contract farmers is that ESOP delays payment and this is associated with the fact that ESOP does not have enough cash capital during the harvesting period. It is indicated that ESOP can delay payment by two to four months before payment; this delay in payment negatively affects farmers' activity in the next growing season. Farmers face similar problem in contract farming in Indonesia (Puspitawati, 2013).

4.4.2 Latent factors behind the constraint ESOP farmers faced

Using factor analysis, three latent factors behind farmers perceived constraints were identified. The results are presented in Table 4.19 and focussed on *Price Formula constraint*, *Payment Mode constraint*, *Lack of Solidarity in FBO*.

Factor1: The issues that loaded most heavily on this factor were 'the ESOP price premium is not high enough to cover investment made to satisfy their quality requirement' and 'Price Formula used by ESOP is not good' (I feel cheated when the open market price goes up). These constraints are associated with *Price Formula constraint* and explain about 36% of variation in the sample.

For farmers who sell their paddy just after harvest, ESOP price is good because this fixed price is higher than on open market price. On the other hand, for farmers who store and sell their paddy later after harvest, the price and price formulation used by ESOP is not good because the price offered is lower than price on open market (two month after harvest). Furthermore, farmers said that the quality premium price set by

ESOP (5 FCFA/Kg of paddy) is not enough to cover investment made for quality improvement.

Table 4.19: Rotated component matrix of constraint of being in ESOP contract farming

Constraint factors	Price Formula constraint	Payment Mode	Lack of Solidarity
ESOP quality premium price is not higher to cover investment made to satisfy their quality requirement	0.922	-0.04	-0.147
Price Formula used by ESOP is not good for example, I feel cheated when the price goes up	0.918	-0.082	0.147
ESOP doesn't have enough capital to cash and carry	-0.058	0.843	-0.029
It takes too long to get paid for my rice sold to ESOP	-0.05	0.84	0.062
When other farmers fail to pay their credit we are asked to pay back	0	0.027	0.993
Eigen values	1.809	1.323	1.026
% of Variance	36.174	26.467	20.529

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Cronbach's Alpha=0.68; Kaiser-Meyer-Olkin Measure of Sampling Adequacy=0.74, Bartlett's Test of Sphericity sig, at 1%

Source: Results from field survey 2016

Factor 2: The issues that loaded most heavily on this factor are 'ESOP doesn't have enough capital to cash and carry' and 'It takes too long to get paid for rice sold to ESOP'. These factors explained about 27% of variation observed in the sample and are associated with *Payment Mode constraint*. In the contract document, it is stated that ESOP will cash and carry the output, but sometimes, ESOP does not respect the contract terms because of lack of capital to purchase the product. In 28% of cases, the payment comes two to four months later. Farmers therefore are not happy with such delay. For them, it takes too long before getting paid. According to farmers, this delay in payment negatively affects their farming activities in the next growing season. It leads to late execution of activities.

Factor3: The only issue that loaded heavily on this factor is 'When other farmers fail to pay their credit, we are asked to pay back'. This factor explained 20.5% of variation

observed in the sample and was associated with *Lack of Solidarity*. When some farmers fail to pay back their credit, or seed cost or any other debt, ESOP automatically withdraws the debt from other farmers' revenue as indicated in the contract term. It appears that farmers do not really appreciate such automatic withdrawal. For these farmers, it would be better to change this contract term, so that each one should pay his own debt. Such perception hides a lack of training on solidarity within FBO. Some farmers side sale part of their paddy because of such automatic debt sharing system.

4.4.3 Variation in constraints according to ESOP farmers socioeconomic and environmental conditions

One might expect variation in constraints according to farmers' socioeconomic conditions and how well ESOP respects the contract engagement.

In order to analyse the way in which constraints faced by ESOP contract farmers differed among subsets of producers, the K-mean cluster analysis was run. Using scores from constraint factors generated from factor analysis, three cluster groups were produced with the greatest level of internal consistency (Table 4.20). Cluster descriptors are based on factor scores that have a standard deviation of one and a mean of zero. When the cluster mean score has a positive value, it indicates above average activity for a particular constrain factor and a negative value means below average activity for a particular constrain factor. Based on this, three distinct cluster groups were identified and the results presented in Table 4.20. These three cluster groups can be named as 'incentive constrains group' (cluster 1), 'cash and carry constraints group'(cluster 2) and 'FBO constraint group' (cluster 3).

Table 4. 20: Cluster mean for constraints factor scores derived from K-mean clustering for contract farmers

Constraints factors	1..Incentive Constraints Group	2. Cash Constraint Group.	3..FBO Constraint Group
Price Formula	0.90352	-0.52896	-0.98783
Mode of payment	-0.27772	1.23939	-0.82569
Lack of solidarity	-0.04491	-0.30150	0.39288
% of respondents	45	28	27

Note: Positive values are in bold

Source: Results from field survey 2016

Cluster 1: About 45% of ESOP rice contract farmers can be classified as affected by ‘incentive constraints’ because it is positively loaded with ‘Price Formula’ (Factor 1); constraints such as ‘payment mode’(factor 2) and ‘lack of solidarity’ (Factor 3) have negative mean score and are of less importance for this group of rice contract farmers. Their ex-ante motivation for contracting with ESOP is based on perceived direct benefit (higher price) but the price premium offered by ESOP is not high enough to cover their investments made to meet the quality requirement. As indicated in Table 4.21, this group of contract farmers is mainly composed of men (91%); most of them are educated and have completed at least primary school (72%). They have more than 2 children, meaning that they need more revenue to pay for children’s education.

Cluster 2 : About 28% of ESOP rice contract farmers can be classified as affected by ‘cash constraint’ because they are positively loaded with ‘payment mode’ (Factor 2); ‘price formula constraint’(factor 1) and ‘lack of solidarity constraint’ (Factor 3) which have negative signs and are far less important for this cluster. This cluster is made up of about 86% of respondents who have at least 5 years’ experience in rice production. These farmers complain about the payment mode. The delay in payment is the highest

among the three groups (2.2 month against about 0.5 months for the two other clusters.).

Table 4. 21: Constraints cluster membership by characteristics of contract farmers

Characteristics	Description	Constraints Cluster			Chi2 or F from Anova	Sign.
		1..Incentive Constraints Group	2. Cash Constraint Group	3..FBO Constraint Group		
Sex	Male (%)	91.40	88.30	75.60	5.6982	0.0580
	Female (%)	8.50	11.60	24.40		
Level of Education	Less than 6 years education(%)	27.20	37.30	53.60	7.7986	0.0200
	6 and more years of education (%)	72.80	62.70	46.40		
Rice farming Experience Dum	Less than 5 years (%)	25.70	13.90	21.50	2.1973	0.3330
	6 years and more (%)	74.20	86.10	78.50		
Children less than 15 years in household	Number of children	2.20	1.80	0.90	6.6611	0.0017
Payment mode	Cash and carry %	51.40	11.60	73.10	41.6744	0.0000
	Pay Total later %	48.50	88.30	26.80		
Duration before payment month	Month	0.50	2.20	0.50	1.2722	0.2880

Source: Results from field survey 2016

Cluster 3: About 27% of ESOP rice contract farmers can be classified as affected by ‘FBO constraint’ because they are positively loaded with ‘lack of solidarity’ (Factor 3); constraints such as ‘price formula’ (factor 1) and ‘payment mode’ (Factor 2) which have negative means scores and are far less important for this cluster. This group contains more women than the two other groups. Most of the farmers in this group (73.1%) were paid cash for their paddy sold under contract; about 54% of them did not complete primary school.

In sum , it was found that farmers face some constraints which needed to be tackled. These constraints can be grouped as ‘Price formula constraint’, ‘Payment mode constraint’ and ‘FBO constraint’. Though higher price premium was an important motivation that drives farmers to work under contract, they considered that ESOP’s quality premium price is not as high as expected. Moreover, farmers expected that ESOP should change the price formula and this should now vary according to the market price. The finding is in line with Miyata et al., (2005) who also underline the price problem in China. Schipman and Quaim (2011) also find similar results on importance of incentive price premium for quality improvement.

Furthermore, it was demonstrated that ESOP does not respect the contract terms because of lack of cash to purchase the paddy under contract. The payment is often delayed for about two to four months. This situation affect farmers’ activities during the next growing season. These results confirm what da Silva (2005) underlines as constraints in his documentation on irregular payment among farmers.

The last constraint highlighted by farmers is related to lack of solidarity among farmers themselves in their FBO. The fact that other farmers should share the payment of debt (if one of them is not able to pay the loan to ESOP) is not acceptable. For them each one should pay his own debt. These results show that there is a lack of social cohesion in the ESOP contract. Deng and Hendrikes (2013) explain that when the motivation is not high, it can produce reverse effect, and this can happen if suitable solutions are not found.

4.4.4 Constraints of non contract farmers

In this section, the reason why non farmers stayed out of the scheme are presented. Twelve constraints were identified (Table 4.22).

Table 4. 22: Reasons why farmers are not in ESOP contract

Constraint for not willing to be in contract	Descriptive Statistics	Wilcoxon Signed Ranks Test	
	Mean	Z	Sig.
General riskiness is too high	3.83	-4.717b	0.000
I do not have enough information to decide to engage in contracts	3.47	-3.445b	0.001
Contracting is not easy– this is not what I am familiar with doing	3.32	-2.278b	0.023
It takes too long to get paid for rice sold under contract	3.13	-1.772b	0.076
Do not want to be committed to a contract in case the price goes up	3.09	-1.628	0.104
Contract quality premium price is too small by selling under contract	2.97	Base of comparison	
Too many restrictions on how to produce	2.87	-1.320	0.187
I have not seen other farmers who contract with ESOP benefit I do not need credit	2.83	-1.905a	0.057
Do not trust the contractor trader/buyer to give me a fair price	2.79	-2.301a	0.021
Not sure if the yield will be as high as the seed I'm currently using	2.76	-2.889a	0.004
I am unsure of the quality of their seed	2.72	-3.069a	0.002
I do not need technical help Other (Please explain)	2.68	-2.884a	0.004

a. Based on positive ranks, significantly higher than the average score

b. Based on negative ranks, significantly lower than the average score

Source: Results from field survey 2016

The mean score of five constraints is significant and higher or equal to the average score of 3 based on Wilcoxon sign rank test. These five reasons are:

- i. General risk is too high,
- ii. I do not have enough information to decide to engage in contract,
- iii. Contracting is not easy, this is not what I am familiar with doing,
- iv. It takes too long to get paid for rice sold under contract, and
- v. Do not want to be committed to a contract in case the price goes up.

The five important constraints that hamper rice farmers' participation in ESOP are subject to factor analysis. Two latent factors were found behind these 5 constraints and presented in table 4.23) :

- i. lack of information on contract scheme, (factor1) and

- ii. risk aversion constraint, (factor 2)

Table 4. 23: Rotated Component Matrix of constraints for not being in ESOP contract farming

Reason for not being in ESOP contract	Information Constraint	Risk constraint
Do not want to be committed to a contract in case the price goes up	0.760	0.143
It takes too long to get paid for rice sold under contract	0.759	0.136
I do not have enough information, do decide to engage in contracts	0.667	-0.134
General riskiness is too high	-0.154	0.869
Contracting is Not easy– this is not what I am familiar with doing	0.258	0.700
Eigenvalues	1.753	1.239
% of Variance	35.062	24.789

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization.

Cronbach's Alpha=0.631, Cumulative %=59,85%; Kaiser-Meyer-Olkin Measure of Sampling Adequacy=0,524; Bartlett's Test of Sphericity sig at 1%

Source: Results from field survey 2016

Factor 1: The factor (lack of information on contract scheme) explained about 35% of the variation within non contract farmers and was loaded with issues such as ‘do not want to be committed to a contract in case the price goes up’, ‘I do not have enough information to decide to engage in the ESOP contract’ and ‘contracting is not easy, this is not what I am familiar with doing’.

This group of farmers is not growing under contract because they do not have enough information about how the scheme operates and what the is payoff. Some of the farmers said that they are not familiar with how to produce under contract. This group of farmers can easily change their minds and work under the ESOP contract when they have appropriate information on the ESOP contract scheme. This underlines the need to communicate and sensitize non contract farmers about the ESOP contract scheme.

Factor 2: The factor (risk aversion constraint) expresses about 25% of the variation within the non-contract farmers and is highly loaded with issues such as ‘General riskiness is too high’ and ‘It takes too long to get paid for rice sold under contract’. Farmers are afraid to grow under contract because of the risk of crop failure and debt. They are also afraid that when they work under contract, ESOP may not pay early. This group of noncontract farmer will not be easy to convince to participate in the ESOP contract scheme. This is line with Will (2013) who shows that it will be very difficult to convince risk aversion farmers to participate in the contract scheme.



CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

Several studies have shown the importance of contract farming in enhancing smallholder farmers' performance in agricultural product quality upgrading. These studies guided the design and implementation of contract schemes for small scale farmers' inclusion in viable value chains throughout the world. In Togo, ETD started implementation of the ESOP contract farming scheme with the assistance of CIDR in 2004 to enhance farmers' performance in quality improvement. This study contributes to answer the following research questions: 1) Why do rice farmers work under ESOP contract farming in Togo? 2) Does participating in ESOP contract farming enhance farmers' performance in Togo? What constraints do rice farmers face in their contractual relationship with ESOP? These research questions are addressed in the previous chapters. The current chapter summarizes the major finding that answers these specific research questions. This chapter suggests actions to be taken for improvement in the contract scheme and ends by providing suggestions for future research.

5.2 Farmers motivations for working under ESOP contract farming in Togo

Three groups of motivation factors for contracting with ESOP for rice production were identified. These are:

- i) **Direct benefit** which encompassed 'having a guarantee market', 'ability to receive a higher quality premium price', 'knowledge from technical

assistance for quality improvement’ and ‘seeing the benefit that other farmers have with contract scheme’.

- ii) **Output measurement and input facility** encompassed ‘use of scales as unit of measure of the product’, ‘access to credit”, ‘reliable supply of inputs, ‘access to high quality seed.’
- iii) **Reliable source of cash income** encompassed ‘sale is done in bulk and is good’ and ‘payment is done in bulk’.

From these three groups of motivation factors, three clusters of farmers were identified. These are:

- 1) **Overall incentive group:** About 49% of ESOP contract farmers are motivated by the overall incentive in the contract terms. The majority of farmers (62%) in this cluster do not express any complaint about the input distribution system, rather they complain about the state of the road (65%) from their village to the market. The house/homestead of about 85% of respondents from this group is not too far away (less than 5 km) from the market.
- 2) **Input/output market incentive group:** About 29% of the ESOP contract farmer respondents are motivated to contract because of the prevailing input / output market conditions in the country. About 85% of farmers in this group were more than 35 years old, and most of them were located at about 5-10 km from the output/input market. About 76% of respondents from this group have criticized the input distribution system and 61% complained about the state of the road..

- 3) **Reliable source of cash income group:** About 22% of ESOP contract farmers are motivated to contract with ESOP because they are in need of cash income. About 73% of farmers in this group are close to the market place (less than 5 km) and the state of the road in their village is also complained about by 66% of them.

5.3 The impact of ESOP contract farming on rice farmers 'performance

The results from the PSM model showed that ESOP contract farming contributes to increase contract farmers' yield by 16%, revenue by 35%, net benefit by 93,300 fcfa/ha and paddy purity upgrade from grade IV (low quality) to grade I (premium quality). To further evaluate the impact of ESOP contract farming on farmers' relative performance, given their participation decision and factors affecting their performance under ESOP contract farming, an Endogenous Switching Regression Model was run. The results from endogenous switching regression model showed that ESOP contract farming contributes to increase contract farmers' yield by 14%, revenue by 32%, net benefit by 92,200.00 F CFA/Ha and paddy upgrade from grade IV (low quality) to grade I (premium quality). The effect of ESOP contract farming on contract farmers' performance estimated by the Endogenous Switching Regression Model is similar to the effect estimated by PSM. This shows that selection biases are overcome by these two models. In fact, the endogenous switching regression model and the PSM model showed that farmers who chose to work under ESOP contract farming have the ability to increase their yield, revenue, and net benefit even out of the contract. Overall ESOP contract farming has a positive impact on farmers' performance in terms of yield, revenue, net benefit and paddy purity. When an ordinary rice farmer participated in the

ESOP contract farming, his paddy quality was upgraded from grade IV (poor quality) to grade I (premium quality).

- ✓ The ESOP Contract Farmers' yield is significantly affected by age, gender, the number of extension visits, the use of fertilizer and labour, while non-contract farmers' yield is affected by farm size, number of extension visits, use of fertilizer and use of improved seed in ESOP contract farming. The overall yield of contract and non contract farmers is low, suggesting that improvement is needed to increase yield.
- ✓ The ESOP contract farmers' Revenue and Net revenue are affected by factors such as Age, Gender, Number of Extension visits, use of Fertilizer, Labour cost. On the other hand, Age, Gender, Farm size, Number of the Extension visits, use of Improved seed, Fertilizer and Labour also affect non-contract farmers' revenue and the net benefit. In ESOP contract farming, youth (35 years old and less) has higher revenue and net benefit than those who are more than 35 years old. And women have higher revenue than men. The number of extension agent visits, has a positive impact on revenue and on net benefit. The use of fertilizer has a positive and significant effect on ESOP contract farmers and non contract farmers' revenue, but the effect of fertilizer is not significant on net benefit.
- ✓ The ESOP Contract Farmers' paddy purity is significantly affected by the agro-ecological zone, the number of extension visits, and the mode of threshing used, while non-contract farmers' paddy purity is affected by the mode of threshing. ESOP contract farmers in the forest agro-ecological zone have greater paddy purity than ESOP contract farmers in the savannah agro-ecological zone, as a result of threshing by flaying rice panicle against barrel (good post-harvest practices) that most of these are used in the forest zone.

5.4 Farmers constraints under ESOP contract farming in Togo

It was found that ESOP contract farmers face constraints which are directly linked to the contract terms and these constraints are grouped into three: Price Formula constraint, Payment Mode constraint, and Lack of Solidarity in FBO constraint.

- ✓ **Price Formula constraint:** Though higher price premium was an important motivation factor that drives farmers to work under contract, they considered that ESOP rice quality premium price is not well distributed. The quality premium price is attributed to the groups rather than individual. If this constraint is not addressed, about 45% farmers who are affected will reduce the investment made to upgrade the paddy quality. The Farmers expect that ESOP will design a new Price Formula in a way that individual effort in the group should be rewarded as well as the group. The quality premium price should be divided into two. One for the individual farmer that met the quality target and one for the group, if all the group members met the quality target.
- ✓ **Payment Mode constraint:** It was demonstrated that ESOP does not respect the contract term about cash and carry (in 28% of cases) because of lack of capital. The payment is therefore delayed about 2-4 months. This situation really affect about 28% of farmers' activity during the next growing season. If this situation is not addressed, about 28% of the farmers that are affected by such constraints will side sell part of their production or exit the contract scheme.
- ✓ **Lack of Solidarity in FBO constraint:** the last constraint highlighted by farmers is related to lack of solidarity among farmers themselves in their FBO. The fact that other farmers should share the payment of debt in case one of

them has a debt with ESOP is not acceptable. For these farmers, each one should pay his own debt. If this situation is not addressed, about 27% of farmers that are affected by such constraint will exit the contract scheme.

5.5 Conclusion

The ESOP contract farming is an appropriate tool to enhance rice farmers' performance for staple food production, such as rice quality upgrading. The smallholder rice farmers' are motivated to work under ESOP contract farming since it provides incentive elements in the contract terms. The prevailing input-output market condition in the country is favourable, and farmers' need for a reliable source of income can be met. Participating in ESOP contract farming effectively contributed to enhance rice farmers' performance in terms of yield, revenue, net benefit and paddy purity. It contributes to upgrade the paddy quality from grade IV, which is poor quality, to grade I which is premium quality. The farmers' performance is, however, affected by farmers' socio-economic characteristic and also elements in the contract terms. The factors affecting ESOP contract farmers' performance indicators are age, gender, number of extension visits, use of fertilizer, labour, and mode of threshing. These factors variously affect farmers' performance indicators also according to their agro-ecological zone. The contract contributes to upgrade the paddy quality from grade IV, which is poor quality to grade I which is premium quality. The Farmers' performance is, however, affected by farmers' socio-economic characteristic and also by elements in the contract terms. The factors affecting ESOP contract farmers' performance indicators are age, and gender.

5.6 Recommendations

The results from the study show that participating in ESOP contract farming contributes to enhance farmers' performance for quality upgrading. Scaling up the ESOP contract scheme throughout the country is a very good decision taken by the government:

- 1) To increase farmers' motivation to participate in the ESOP contract scheme, attention should focus on elements included in the contract terms, these contract terms should include incentive instruments such as quality premium price, input-out market facilities and payment mode.
- 2) To enhance farmers' performance for yield, revenue, net benefit and paddy quality improvement, special attention should focus on extension visits, as well as input provisions to farmers and mode of application.
- 3) To reduce contract exit by farmers and the risk of contract collapse, attention should focus on respect of elements included in the contract terms (commitment) by ESOP.
- 4) The ESOP contract farming contributes to significant increase in yield, but due to the fact that overall yield is low, suggesting that improvement is needed to increase yield. The improvement should focus on quantity of fertilizer, the mode of application of fertilizer, and visits by extension agents. The problem of availability of fertilizer is an important issue to be targeted. ESOP should find a way to provide farmer with fertilizer directly. The most important recommendation from farmers is that ESOP should use the credit obtained from Micro Finance Institutions (MFI) to directly

provide them with the required quantity of fertilizer, before giving them balance that they can use to cover labour cost.

- 5) Youth (35 years old or younger) in ESOP contract farming, have higher revenue and net benefit than those who have more than 35 years old. Unfortunately, youths are less in the ESOP contract farming. A strategy is needed to motivate youth participation in the ESOP contract scheme.
- 6) For ESOP contract farmers, as well as non contract farmers, the number of extension agent visits, has a positive impact on revenue and net benefit. These extension visits should be encouraged for revenue increment.
- 7) ESOP contract farmers in the forest agro-ecological zone have greater paddy purity than ESOP contract farmers in the savannah agro-ecological zone, as a results of threshing by flaying rice panicle against barrel (good post-harvest practices). To maintain such quality standards in the forest agro-ecological zone and to enhance savannah farmers' performance for quality improvement, attention should focus on the promotion of threshing by flaying rice panicle against the barrel and also promote mechanic threshing. It is also important to increase the number of visits of extension agents.
- 8) Setting-up modern post-harvest practices alone cannot solve the paddy quality problem completely, that is why special attention should focus on paddy price. Price should therefore be linked to the grade of the paddy. A high quality paddy should have a high price. There should be a quality premium price for individuals who meet the quality requirement in addition to the group quality premium price, when the group meet quality target.

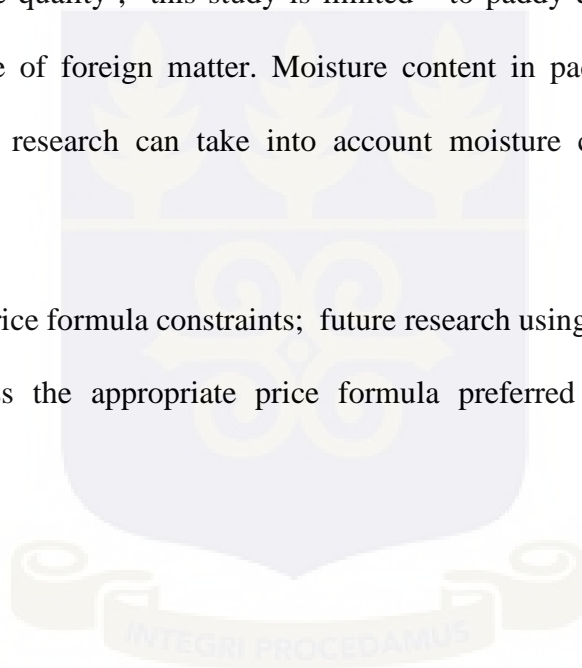
- 9) To ensure that the individual farmer's paddy quality is well appreciated, ESOP agents should proceed as usual for a first field grading during the procurement stage. At this stage, attention should focus on paddy purity, which should be the basis of payment. The paddy produce should be randomly sampled at the buying station and the gathered sample rapidly analysed by a (quality kit) for an accurate paddy grade assessment rather than through an ocular inspection as carried out by ESOP agents. The first premium payment price should be based on the paddy grade determined by ESOP agents for individual farmers. After being milled, a second quality premium should be given when the milled rice meets the quality standards; this will encourage farmers to individually and collectively invest in rice quality improvement.
- 10) To reduce contract exit, a new price formula needs to be designed, rewarding first individual farmers who meet the expected quality and second, the group who collectively meet the quality standards.
- 11) To reduce risk of side selling or contract exit due to delay in payment, ESOP should respect the contract terms and avoid delay in payment. To be able to pay cash to the farmers during the harvest season, the government should set a policy that facilitates loan reception for ESOP from Financial Institutions at preferential interest rates.
- 12) To enhance solidarity among contract farmers, a training on collective advantages should be conducted, explaining the importance of working together as a group.

5.5 Future Research

ESOP rice contract farming is a business model along the entire rice value chain (production, milling, packaging and marketing). The study does not focus on the whole ESOP business model designed and promoted by ETD. This study has only focussed on the contract farming arrangement between the farmer and the processor; the other actors are not taken into account in this study. A future research can take into account the other actors.

The term of 'rice quality', this study is limited to paddy quality only and then in terms of absence of foreign matter. Moisture content in paddy was not taken into account; future research can take into account moisture content for rice quality assessment.

Farmers raised price formula constraints; future research using experimental economic designs to assess the appropriate price formula preferred by farmers should be conducted.



REFERENCES

- Abebe, G. K., Bijman, J., Kemp, R., Omta, O., & Tsegaye, A. (2013). Contract farming configuration: Smallholders' preferences for contract design attributes. *Food Policy*, 40, 14–24.
- Abougamos, H., White, B., & Sadler, R. (2012). Contracts for Grain Biosecurity and Grain Quality. In *56th Australian Agricultural and Resource Economic Society (AARES) annual conference, Fremantle, Western Australia, February 7-10, 2012* (p. 13). Fremantle.
- AGMARK. (2002). Specification of paddy quality under Agmark.
- Akudugu, M. A., Guo, E., & Dadzie, S. K. (2012). Adoption of Modern Agricultural Production Technologies by Farm Households in Ghana : What Factors Influence their Decisions ? *Journal of Biology, Agriculture and Healthcare*, 2(3), 1–14.
- Asiedu, E. A. (2008). *Analyses of the Value-Chain of Priority Staple Crops for Research and Development Interventions in West and Central Africa*. Dakar Senegal.
- Bahlmann, J., Schulze, B., & Spiller, A. (2007). Trust as a supply chain management tool for slaughterhouses : Empirical evidence from north-western Germany. *17th Annual World Forum and Symposium "Agribusiness Food Culture: Tradition, Innovation and Trust – A Positive Force for Modern Agribusiness"*, IAMA Conference, (2007), 19.
- Barrett, C. B. (2008). Smallholder market participation: Concepts and evidence from eastern and southern Africa. *Food Policy*, 33, 299–317.
<http://doi.org/10.1016/j.foodpol.2007.10.005>
- Barrett, C. B., Bachke, M. E., Bellemare, M. F., Michelson, H. C., Narayanan, S., & Walker, T. F. (2012). Smallholder Participation in Contract Farming: Comparative Evidence from Five Countries. *World Development*, 40(4), 715–730.
<http://doi.org/10.1016/j.worlddev.2011.09.006>
- Baumann, P. (2000). *Equity and Efficiency in Contract Farming Schemes : The Experience of Agricultural tree Crops* *Pari Baumann Overseas Development Institute London* (working paper No. 139). London.
- Bellemare, M. F. (2012). As You Sow, So Shall You Reap: The Welfare Impacts of Contract Farming. *World Development*, 40(7), 1418–1434.
<http://doi.org/10.1016/j.worlddev.2011.12.008>
- Bijman, J. (2008). *Contract Farming in Developing Countries an overview. An overview of the literature, Wageningen University, ...* Wageningen. Retrieved from http://www.wageningenur.nl/upload_mm/5/c/b/79333121-6f4b-4f86-9e8e-0a1782e784d6_ReviewContractFarming.pdf
- Birthal, P. S., Jha, A. K., Tiongco, M. M., & Narrod, C. (2008). Improving Farm to Market Linkages through Contract Farming: A Case Study of Smallholder

- Dairying in India. *IFPRI Discussion Paper 00814*, (October).
- Black, D. a., & Smith, J. a. (2004). How robust is the evidence on the effects of college quality? Evidence from matching. *Journal of Econometrics*, *121*(1–2), 99–124. <http://doi.org/10.1016/j.jeconom.2003.10.006>
- Bogetoft, P., & Ballebye, H. (2004). *Design of production contract: Lesson from theory and agriculture* (1 edition). Danmark: Copenhad business school press.
- Bogetoft, P., & Olesen, H. (2002). Ten rules of thumb in contract design: lessons from Danish agriculture. *European Review of Agricultural ...*, *29*(2), 185–204. <http://doi.org/10.1093/eurrag/29.2.185>
- Borgen, F. H., & Barnett, D. C. (1987). Applying cluster analysis in counseling psychology research. *Journal of Counseling Psychology*, *34*(4), 456–468. <http://doi.org/10.1037/0022-0167.34.4.456>
- Bottema, T., & Altemeier, K. (1990). Market Channels, Quality Incentives and Contract Harvesting: The Case of Maize, Soybean and Groundnut. *Bulletin of Indonesian Economic Studies*, *26*(1), 91–115. <http://doi.org/10.1080/00074919012331335725>
- Byerlee, D. (1989). *The adoption of agricultural technology: A guide for survey design. Mexico DF: CIMMYT Economics Program*. Retrieved from <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Adoption+of+Agricultural+Technology:+A+Guide+for+Survey+Design#2>
- Cai, J., Ung, L., Setboonsarng, S., & Leung, P. (2008). *Rice Contract Farming in Cambodia: Empowering Farmers to Move Beyond the Contract Toward Independence. ADBI Discussion Paper 109*. Retrieved from <papers3://publication/uuid/4DB57FD9-D206-4157-A245-272A2E8442E6>
- Caliendo, M., & Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys*, *22*(1), 31–72. <http://doi.org/10.1111/j.1467-6419.2007.00527.x>
- Chang, C.-C., Chen, C.-C., Chin, M.-C., & Tseng, W.-C. (2006). Is Contract Farming More Profitable and Efficient Than Non-Contract Farming A Survey Study of Rice Farms In Taiwan by Ching-Cheng Chang. *Selected Paper Prepared for Presentation at the American Agricultural Economics Association Annual Meeting, Long Beach, California, July 23-26, 2006*.
- Chen, I. J., & Paulraj, A. (2004). Towards a theory of supply chain management: The constructs and measurements. *Journal of Operations Management*, *22*, 119–150. <http://doi.org/10.1016/j.jom.2003.12.007>
- Colen, L., Demont, M., & Swinnen, J. (2013). Smallholder participation in value chains: The case of domestic rice in Senegal. In A. Elbehri (Ed.), *Rebuilding West Africa's food potential: Policies and market incentives for smallholder-inclusive food value chains* (pp. 391–415). Rome: FAO/IFAD. Retrieved from <http://www.fao.org/docrep/018/i3222e/i3222e12.pdf>

- D'Silva, J. L., Shaffril, M., Azril, H., Uli, J., & Abu Samah, B. (2009). A Review of Contract Farming and Factors that Impinge Youths Acceptance to Contract Farming. *European Journal of Social Sciences*, 11(2), 328–338. Retrieved from <http://psasir.upm.edu.my/7431/>
- da Silva, C. A. B. (2005). *The growing role of contract farming in agri-food systems development: drivers, theory and practice*. Agricultural Management, Marketing and Finance Service. Rome: FAO.
- da Silva, C., & Rankin, M. (2013). *Contract farming for inclusive market access*. (C. A. da Silva & M. Rankin, Eds.). Rome: Fao.
- da Silva2, C. A. (2005). *The Growing Role of Contract Farming in Agri-Food Systems Development: Drivers, theory and Practice*. PPT. Rome: FAO.
- Decoster, J. (1998). *Overview of Factor Analysis*. University of Alabama. Alabama: Department of Psychology. <http://doi.org/10.2307/2685875>
- Dehejia, R. H., & Wahba, S. (1999). Causal effects in nonexperimental studies: Reevaluating the evaluation of training programs. *Journal of the American Statistical Association*. <http://doi.org/http://dx.doi.org/10.1080/01621459.1999.10473858>
- Demont, M. (2013). Reversing urban bias in African rice markets: A review of 19 national rice development strategies. *Global Food Security*, 2(3), 172–181. <http://doi.org/10.1016/j.gfs.2013.07.001>
- Demont, M., & Neven, D. (2013). Tailoring African Rice Value Chains to Consumers. In M. C. S. Wopereis, D. E. Johnson, A. Nourollah, E. Tollens, & J. Abdulai (Eds.), *Realizing Africa's Rice Promise* (I, pp. 302–309). London: CAB International, Africarice center.
- Deng, W., & Hendrikse, G. (2013). Social Capital and Incentives in the Provision of Product Quality by Cooperatives. In *140th EAAE Seminar, "Theories and Empirical Applications on Policy and Governance of Agri-food Value Chains," Perugia, Italy, December 13-15, 2013 1* (p. 27). Perugia, Italy: EAAE.
- DeVuyst, E. A. ., & Ipe, V. C. (1999). A Group Incentive Contract to Promote Adoption of Best Management Practices. *Journal of Agricultural and Resource Economics*, 24(2), 367–382.
- du Breuil, M., & de Romémont, A. (2007). *Togo: Promotion d'Entreprises de Services et Organisations de Producteurs (ESOP) Etude de cas de l'ESOP Soja Nyo au Togo*. (IIED, Ed.) *Regoverning Markets Innovative Practice series*. Londre, UK.
- Eaton, C., & Shepherd, A. W. (2001). *Contract Farming: Partnerships for Growth. A Guide*. FAO Agricultural Services Bulletin (Vol. 145). Rome: FAO.
- Edusah, M. A. S. E., & Sarfo-Mensah, P. (2014). Gender Constraints and Rice Varietal Characteristics Preferences in Lowland Rice Ecosystem in Ghana. *Developing Country Studies*, 4(15), 92–99.

- Elbehri, A. (2013). *Rebuilding West Africa's Food Potential: Policies and market incentives for smallholder-inclusive food value chains*. (A. Elbehri, Ed.). Rome: The Food and Agriculture Organization of the United Nations and The International Fund for Agriculture Development. Retrieved from <http://www.fao.org/docrep/018/i3222e/i3222e.pdf>
- ETD. (2013). *Rapport D“ Activité 2012 D”entreprise Territoir et Developement*. Lome Togo.
- ETD. (2014). *Rapport d'activité 2013 D'entreprise Territoir et Developement*. Lome Togo.
- ETD. (2015). *Rapport d'activité 2014 D'entreprise Territoir et Developement*. Lome Togo.
- ETD. (2017). Plan d ' Orientation Stratégique 2017 - 2021 Pour une croissance inclusive durable, 68.
- Everitt, B. S., Landau, S., Leese, M., & Stahl, D. (2011). *Cluster Analysis*. (D. J. Balding, N. A. C. Cressie, G. M. Fitzmaurice, H. Goldstein, G. Molenberghs, D. W. Scott, ... S. Weisberg, Eds.) (5th ed.). London UK: Wiley Series in Probability and Statistics.
- FAO. (2000). *Bridging the rice yield gap in the Asia-Pacific Region*. (M. K. Papademetriou, F. J. Dent, & E. M. Herath, Eds.). Bangkok, Thailand: Food and Agriculture Organization of the United Nations ; Regional Office for Asia and the Pacific. Retrieved from http://coin.fao.org/coin-static/cms/media/9/13171760277090/2000_16_high.pdf
- FAOSTAT. (2015). Food and Agriculture Organization of the United Nations: Statistics Division. Retrieved January 28, 2015, from <http://faostat3.fao.org/browse/Q/QC/E>
- Fiamohe, R., Seck, P. a, Nakelse, T., & Diagne, A. (2013). Assessing the effect of consumer purchasing criteria for types of rice in Togo: A choice modeling approach. In *The 4th International Conference of the African Association of Agricultural Economists, 22-25, 2013* (pp. 103–123). Hammamet. Retrieved from <http://doi.wiley.com/10.1002/agr.21406>
- Fritz, M., & Fischer, C. (2007). The role of trust in European food chains: Theory and empirical findings. *International Food and Agribusiness Management Review*, 10(2), 141–161.
- Futakuchi, K., Manful, J., & Sakurai, T. (2013). Improving Grain Quality of Locally Produced Rice in Africa. In M. C. S. Wopereis, D. E. Johnson, A. Nourollah, E. Tollens, & J. Abdulai (Eds.), *Realizing Africa's Rice Promise* (pp. 310–322). London: CAB International, Africarice center.
- George, D., & Mallery, P. (2003). *SPSS for Windows Step by Step: Answers to Selected Exercises. A Simple Guide and Reference* (Fourth (11)).
- Gneezy, U., Meier, S., & Rey-biel, P. (2011). When and Why Incentives (Don ' t)

- Work to Modify Behavior. *Journal of Economic Perspectives*, 25(4), 191–210. <http://doi.org/10.1257/jep.25.4.191>
- Goodhue, R. E. (1999). Input control in agricultural production contracts. *American Journal of Agricultural Economics*, 81(3), 616–620.
- Gow, H. R., & Swinnen, J. F. M. (2001). Private enforcement capital and contract enforcement in transition economies. *American Journal of Agricultural Economics*, 83(3), 686–690. <http://doi.org/10.1111/0002-9092.00191>
- GRISP. (2010). *Global Rice Science Partnership (GRiSP) Full proposal*. (IRRI, Africarice, & CIAT, Eds.). Global Rice Science Partnership.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2009). *Multivariate Data Analysis*. (Kindle, Ed.) (7th Editio). Pearson New Internation Edition. <http://doi.org/10.1016/j.ijpharm.2011.02.019>
- Heckman, J. J., Ichimura, H., Smith, J., & Todd, P. (1998). Characterizing Selection Bias Using Experimental Data. *Econometrica*, 66(5), 1017–1098. Retrieved from <http://econpapers.repec.org/RePEc:ecm:emetrp:v:66:y:1998:i:5:p:1017-1098>
- Heckman, J. J., Ichimura, H., & Todd, P. E. (1997). Matching Evidence Job As An Econometric Estimator: Evidence from Evaluating a Job Training Programme. *Review of Economic Studies*, 64(4), 605–654.
- Heckman, J. J., & Smith, J. a. (1999). The Pre-Program Earnings Dip and the Determinants of Participation in a Social Program: Implications for Simple Program Evaluation Strategies. *Economic Journal*, 109(july), 313–348. <http://doi.org/10.1111/1468-0297.00451>
- Henson, S., Jaffee, S., Cranfield, J., Blandon, J., & Siegel, P. (2008). Linking African smallholders to high-value markets : practitioner perspectives on benefits, constraints, and interventions. *The World Bank Agricultural and Rural Development Department Policy Research Working Paper 4573*, (March), 1–37. http://doi.org/http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2008/03/24/000158349_20080324130750/Rendered/PDF/wps4573.pdf
- Honfoga, B. G., Rodrigue, S. K., Anselme, A. A., & Anick, A. K. D. (2016). Impact of the business services for farmers organizations (ESOP) contract farming model on paddy producers well-being in Dangbo District of Benin. *African Journal of Marketing Management*, 8(4), 32–43. <http://doi.org/10.5897/AJMM2016.0506>
- Hueth, B., & Ligon, E. (1999). Agricultural Supply Response under Contract. *American Journal of Agricultural Economics*, 81(3), 610–615.
- Hueth, B., & Ligon, E. (2002). Estimation of an efficient tomato contract. *European Review of Agricultural Economics*, 29(2), 237. <http://doi.org/10.1093/eurrag/29.2.237>
- Hueth, B., Ligon, E., Wolf, S., & Wu, S. (1999). Incentive Instruments in Fruit and Vegetable Contracts: Input Control, Monitoring, Measuring, and Price Risk.

- Review of Agricultural Economics*, 21(2), 374–389.
<http://doi.org/10.2307/1349886>
- Imbens, G. W., & Wooldridge, J. M. (2009). Recent Developments in the Econometrics of Program Evaluation. *Journal of Economic Literature*, 47(1), 5–86.
- IRRI. (1985). Rice grain quality and marketing. In IRRI (Ed.), *International Rice Research Conference 1-5 jun 1985* (p. 74). Manila Philippine: IRRI. Retrieved from http://books.irri.org/9711041499_content.pdf
- ITRA, & DSID. (2010). *Renforcement de la disponibilité et de l'accès aux statistiques rizicoles : une contribution à l'initiative d'urgence pour le riz en Afrique subsaharienne. Rapport du Togo*. Lome.
- Karaan, M. (2002). Transaction costs in contract farming models for mussel and oyster farming in South Africa: Organisational and management implications. *Aquaculture Economics & Management*, 6(5/6), 397–409.
<http://doi.org/10.1080/13657300209380327>
- Key, N., & Runsten, D. (1999). Contract farming, smallholders, and rural development in Latin America: The organization of agroprocessing firms and the scale of outgrower production. *World Development*, 27(2), 381–401.
[http://doi.org/10.1016/S0305-750X\(98\)00144-2](http://doi.org/10.1016/S0305-750X(98)00144-2)
- Khandker, S. R., Koolwal, G. B., & Samad, H. A. (2010). *Handbook on Impact Evaluation: Quantitative Methods and Practices*. (T. W. Bank, Ed.). Washington DC: The International Bank for Reconstruction and Development / The World Bank. <http://doi.org/10.1596/978-0-8213-8028-4>
- Kherallah, M., & Kirsten, J. F. (2002). The New Institutional Economics: Applications for Agricultural Policy Research in Developing Countries. *Agrekon*, 41(2), 110–133. <http://doi.org/10.1080/03031853.2002.9523589>
- Kirsten, J., & Sartorius, K. (2002). Linking agribusiness and small-scale farmers in developing countries: Is there a new role for contract farming? *Development Southern Africa*, 19(July 2014), 503–529.
<http://doi.org/10.1080/0376835022000019428>
- Klivi, K. (2013). *Etude de la filiere riz au Togo. Rapport complet du PNIASA*. Lome Togo.
- Kumar, S., Chand, P., Dabas, J. P. S., & Singh, H. (2010). Characteristics and determinants of contract design of wheat seed farming in India: A basis of decision making. *Indian Journal of Agricultural Economics*.
- Little, P. D. (1994). Contract farming and the development question. In P. D. Little & M. J. Watts (Eds.), *Living Under Contract: Contract Farming and Agrarian Transformation in Sub-Saharan Africa* (Madison: U). Madison: University of Wisconsin Press.
- Little, P. D., & Watts, M. J. (1994). *Living Under Contract: Contract Farming and*

- Agrarian Transformation in Sub-Saharan Africa*. (P. D. Little & M. J. Watts, Eds.) (Madison: U). Madison: University of Wisconsin Press.
- Lokshin, M., & Sajaia, Z. (2004). Maximum-likelihood estimation of endogenous switching regression models. *The Stata Journal*, 4(3), 282–289.
- MAEP. (2010). *Togo National Rice Development Strategy (NRDS)*. Lome.
- Masakure, O., & Henson, S. (2005). Why do small-scale producers choose to produce under contract? Lessons from nontraditional vegetable exports from Zimbabwe. *World Development*, 33(10), 1721–1733.
<http://doi.org/10.1016/j.worlddev.2005.04.016>
- Meshesha, Zj. G. (2011). *Impact of contract farming on household income of smallholder farmers : The case of organic honey production in South West*. Wageningen University.
- Minot, N. (1986). *Contract farming and its effect on small farmers in less developed countries*. (C. K. Eicher, C. Liedholm, & M. T. Weber, Eds.) *International Development Paper*. Michigan: Department of Agricultural Economics.
<http://doi.org/48824-1039>
- Minot, N. (2007). Contract Farming in Developing Countries: patterns, Impact and Policy Implications. In F. Cheng, S. E. Frandsen, A. Kuyvenhoven, & J. Von Braun (Eds.), *The Program: “Food Policy For Developing Countries: The Role Of Government In The Global Food System”* (pp. 1–14). Ithaca New York: Cornell University.
- Minot, N. (2011). Contract Farming in sub-Saharan Africa : Opportunities and Challenges. In *Smallholder-led Agricultural Commercialization and Poverty Reduction: How to Achieve It? 18-22 April 2011, Kigali, Rwanda*. Kigali, Rwanda: ACTESA-MSU-IFPRI African Agricultural Markets Programme (AAMP).
- Minot, N., & Ronchi, L. (2014). Contract Farming : Risks and Benefits of Partnership between Farmers and Firms. *The World Bank Group, View Point*, (102736).
- Miyata, S., Minot, N., & Hu, D. (2009). Impact of Contract Farming on Income: Linking Small Farmers, Packers, and Supermarkets in China. *World Development*, 37(11), 1781–1790. <http://doi.org/10.1016/j.worlddev.2008.08.025>
- Nunnally, J. C. (1978). *Psychometric Theory* (2nd ed.). New York, N.Y.: McGraw-Hill.
- Olmos, M. F., Grazia, C., & Perito, M. A. (2011). Quality and double sided moral hazard in share contracts. *Agricultural Economics Review*, 12, 22–35.
- Oya, C. (2012). Contract farming in Sub-Saharan Africa: A survey of approaches, debates and issues. *Journal of Agrarian Change*, 12(1), 1–33.
<http://doi.org/10.1111/j.1471-0366.2011.00337.x>
- Peikes, D. N., Moreno, L., & Orzol, S. M. (2008). Propensity Score Matching: A Note of Caution for Evaluators of Social Programs. *The American Statistician*, 62(3),

222–231. <http://doi.org/10.1198/000313008X332016>

- Porter, G., & Phillips-Howard, K. (1997). Comparing contracts: An evaluation of contract farming schemes in Africa. *World Development*, 25(2), 227–238. [http://doi.org/10.1016/S0305-750X\(96\)00101-5](http://doi.org/10.1016/S0305-750X(96)00101-5)
- Prowse, M. (2012). Contract farming in developing countries: A review. *AFD*, (February), 99. Retrieved from <http://coqa.nl/wp-content/images/bijman-contract-farming-100508.pdf>
- Puspitawati, E. (2013). *Contracts and Marketing Decisions of Indonesian Potato Growers*. The University of Adelaide.
- Pye-Smith, C. (2013). *Making the Connection Value Chains For Transforming Smallholder Agriculture*. (V. Fautrel, L. Rutten, & A. Shepherd, Eds.) *Policy pointer* (Pure impre). CTA. <http://doi.org/ISBN 2212-6333>
- RNA, R. N. de l'Agriculture. (2013). *Profil de l'Agriculture Togolaise*. (FAO; MAEP, Ed.). Lome, Togo.
- Rosenbaum, P. R., & Rubin, D. B. (1983). The Central Role of the Propensity Score in Observational Studies for Causal Effects. *Biometrika*, 70(1), 41–55.
- Rosenbaum, P. R., & Rubin, D. B. (1985). Constructing a Control Group Using Multivariate Matched Sampling Methods that Incorporate the Propensity Score. *The American Statistical Association*. <http://doi.org/10.1080/00031305.1985.10479383>
- Saenger, C., Qaim, M., Torero, M., & Viceisza, A. (2013a). Contract farming and smallholder incentives to produce high quality: Experimental evidence from the Vietnamese dairy sector. *Agricultural Economics*, 44(April), 297–308. <http://doi.org/10.1111/agec.12012>
- Saenger, C., Qaim, M., Torero, M., & Viceisza, A. (2013b). Contract farming and smallholder incentives to produce high quality: Experimental evidence from the Vietnamese dairy sector. *Agricultural Economics (United Kingdom)*, 44(April), 297–308. <http://doi.org/10.1111/agec.12012>
- Sappington, D. E. M. (1991). Incentives in principal-agent Relationships. *The Journal of Economic Perspectives*, 5(2), 45–66.
- Sartorius, K., & Kirsten, J. (2007). A framework to facilitate institutional arrangements for smallholder supply in developing countries: An agribusiness perspective. *Food Policy*, 32, 640–655. <http://doi.org/10.1016/j.foodpol.2007.03.001>
- Schipmann, C., & Qaim, M. (2011). *Supply chain differentiation, contract agriculture, and farmers' marketing preferences: the case of sweet pepper in Thailand* (RTG 1666 No. 3). *Transformation of Global Agri-Food Systems: Trends, Driving Forces, and Implications for Developing Countries*. Goetingen.
- Scott, A. J., & Knott, M. (1974). A Cluster Analysis Method for Grouping Means in the Analysis of Variance. *International Biometric Society*, 30(3), 507–512.

- Seck, P. A., Touré, A. A., Coulibaly, J. Y., Diagne, A., & Wopereis, M. C. S. (2013). Africa ' s Rice Economy Before and After the 2008 Rice Crisis. In M. C. S. Wopereis, D. E. Johnson, A. Nourollah, E. Tollens, & J. Abdulai (Eds.), *Realizing Africa's Rice Promise* (pp. 24–34). London: CAB International, Africarice center.
- Setboonsarng, S., Leung, P., & Stefan, A. (2008). *Rice contract farming in Lao PDR: Moving from subsistence to commercial agriculture* (No. 90). ADB Institute. Tokyo. Retrieved from <http://www.econstor.eu/handle/10419/53488>
- Shepherd, A. W. (n.d.). An introduction to Contract Farming, 1–8.
- Simmons, P., Winters, P., & Patrick, I. (2005). An Analysis of Contract Farming in East Java, Bali and Lombok, Indonesia. *Agricultural Economics*, 33, 513–525.
- Singh, S. (2002). Contracting out solutions: Political economy of contract farming in the Indian Punjab. *World Development*, 30(9), 1621–1638. [http://doi.org/10.1016/S0305-750X\(02\)00059-1](http://doi.org/10.1016/S0305-750X(02)00059-1)
- Smith, J. a., & Todd, P. E. (2005). Does matching overcome LaLonde's critique of nonexperimental estimators? *Journal of Econometrics*, 125, 305–353. <http://doi.org/10.1016/j.jeconom.2004.04.011>
- Son Nghiem, H., & Coelli, T. (2002). The Effect of Incentive Reforms Upon Productivity: Evidence from the Vietnamese Rice Industry. *Journal of Development Studies*, 39(January 2003), 74–93. <http://doi.org/10.1080/00220380412331322671>
- Sopheak, K. (2014). *The Study on the Effect of Rice Contract Farming on Smallholder Farmers ' Incomes in Kampong Speu Province, Cambodia*. Royal University of Phnom Penh.
- Suganthi, A., & Nacchair, F. (2015). Quality Parameters of different Varieties of Paddy Rice grown in Vadakkanchery , Kerala. *International Journal of Advances in Pharmacy, Biology and Chemistry*, 4(2), 405–408.
- Swinnen, J. F. M., Vandeplass, A., & Maertens, M. (2010). Liberalization, endogenous institutions, and growth: A comparative analysis of agricultural reforms in Africa, Asia, and Europe. *World Bank Economic Review*, 24, 412–445. <http://doi.org/10.1093/wber/lhq017>
- Tabone, K., Koffi-Tessio, E. M., & Diagne, A. (2010). Compétitivité de la filière riz local au Togo : Une évaluation du taux de protection nominale, effective et du coût en ressource domestique. *Agricultural Economists Association of South Africa (AEASA) Conference*, 18. Retrieved from <http://ageconsearch.umn.edu/bitstream/95781/1/25>. Competitiveness in Togo filiers.pdf
- Technoserve and IFAD [International Fund for Agricultural Development] (2011): Outgrower Schemes – Enhancing Profitability; Technical Brief September 2011; available online at: <http://www.ifad.org/ruralfinance/pub/technoserve.pdf>
- Tollens, E., Demont, M., Sié, M., Diagne, A., Saito, K., & Wopereis, M. C. S. (2013).

- From WARDA to AfricaRice : an Overview of Rice Research for in Partnership in Africa. In M. C. S. Wopereis, D. E. Johnson, A. Nourollah, E. Tollens, & J. Abdulai (Eds.), *Realizing Africa's Rice Promise* (pp. 1–23). London UK: CAB International, Africarice center.
- Tonts, M. (2007). Development , Contract Farming and Ghana's Oil Palm Industry. *Geography*, 92(3), 266–278.
- Torero, M. (2011). *A Framework for Linking Small Farmers to Markets. Paper Presented at the IFAD Conference on New Directions for Smallholder Agriculture 24-25 January, 2011, Rome, Italy.*
- Tryfos, P. (2001). Chapter 14 Factor analysis. *Methods for Business Analysis and Forecasting*. Retrieved from <http://www.yorku.ca/ptryfos/methods.htm>
- USDA. (2015). Production, supply and distribution online. Retrieved January 28, 2015, from www.fas.usda.gov/psdonline/psdQuery.aspx
- Velde, K. Vande, & Maertens, M. (2014). Impact of contract-farming in staple food chains : the case of rice in Benin. In *The EAAE 2014 Congress "Agri-Food and Rural Innovations for Healthier Societies" August 26 to 29, 2014* (pp. 1–16). Ljubljana, Slovenia.
- Wang, H. H., Wang, Y., & Delgado, M. S. (2014). The Transition to Modern Agriculture: Contract Farming in Developing Economies. *American Journal of Agricultural Economics*. <http://doi.org/10.1093/ajae/aau036>
- Warning, M., & Hoo, W. S. (2000). The impact of contract farming on income distribution: theory and evidence. *Presentation at the Western Economics Association Annual Meeting*, (june 30). Retrieved from http://www2.ups.edu/econ/working_papers/00-6.pdf
- Watts, M. (1994). Living under contract: Contract farming, agrarian restructuring and flexible accumulation. In P. D. Little & M. J. Watts (Eds.), *Living Under Contract: Contract Farming and Agrarian Transformation in Sub-Saharan Africa* (Madison: U). Madison: University of Wisconsin Press.
- Wilcoxon, F. (1945). Individual Comparisons by Ranking Methods. *Biometrics Bulletin*. 6 (1), 80-83
- Will, M. (2013). *A Practical Guide for Linking Small-scale Producers and Buyers Through Business Model Innovation*. (GIZ, Ed.) *Contract Farming Handbook*. Bonn and Eschborn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.
- Williamson, O. E. (1979). Transaction-Cost Economics : The Governance of Contractual Relations. *Journal of Law and Economics*, 22(2), 233–261.
- Wu, S. Y. (2014). Adapting contract theory to fit contract farming. *American Journal of Agricultural Economics*, 96(5), 1241–1256. <http://doi.org/10.1093/ajae/aau065>
- Yovo, K. (2010). Incitation par les prix , rentabilité et compétitivité de la production

du riz au sud Togo. *Tropicultura*, 28(4), 226–231.

Zúñiga-Arias, G., Ruben, R., Verkerk, R., & van Boekel, M. (2008). Economic incentives for improving mango quality in Costa Rica. *International Journal of Quality & Reliability Management*, 4, 400–422.
<http://doi.org/10.1108/02656710810865276>



APPENDICE

Questionnaire

Objective de l'étude (Objective of the study): Le but de cette enquête est d'accroître notre compréhension de la motivation des riziculteurs à nouer une relation contractuelle avec les ESOP. Ceci permettra d'améliorer les termes du contrat actuel pour une production du riz de meilleure qualité. (The purpose of this survey is to improve our understanding of farmers' motivation to engage in contract arrangement with ESOP in order to design a best fit contract for rice quality improvement).

Utilisation des données: Les données collectées lors de cette étude sont uniquement pour des fins de recherche. Les données brutes et l'identité des répondants ne seront en aucune façon publiées. (The data collected as part of this survey are for research purposes ONLY. Farmer-level data will not be shared with non-research organizations. Only summary results will be included in published report).

Pour toute inquiétude, question ou suggestion veuillez contacter Mr Adabe Chercheur à ITRA-CRASS, Doctorant à l'Université du Ghana au tel :
+228 98268982 ou +228 90941385 ou +233 263718797, Email: iciadabe@yahoo.fr

PART O: INFORMATION GENERALE SUR ENQUETE Au niveau du producteur (GENERAL INFORMATION ON THE SURVEY, FARMER LEVEL)

Information sur l'ID du paysan, l'enquêteur, le superviseur, l'opérateur de saisie (Information on Farmer, Enumerator, Supervisors and data Entry Operator ID)

Code	Designation	ID du paysan (Farmer ID)	Designation	ID Enquêteur (Enumerator ID)	ID Superviseur (Field Supervisor ID)	ID Operateur de saisie (Data entry Operator ID)
Li/Co		OA		OB	OC	OD
1	Nom du paysan (1)		Nom (Name)			
2	Village	_____	Date			
2a	Canton	_____				
3	District/prefecture		Phone			
4	Region		Email			
5	Phone		Signature			
	Statut du paysan: Farmer statut 0=Non contract 1=Contract				Num du questionnaire	
	Heure du début	.....	Heure de la fin	.....	

PART 1: CARACTERISTIQUES SOCIOECONOMIQUE DU PAYSAN (FARMER SOCIOECONOMICS CHARACTERISTIC)

Section 1A: Caractéristiques sociodémographique du paysan (Socio demographic Characteristic of farmer):

Age	Gender 0=male 1=female	Ethnic Group	RELIGION	Statut matrimonial (Marital statut): 1= célibataire (Single) 2 =marié (Married) 3= séparé 4 =divorcé 5 =veuve/veuf	Education 0=aucune (none) 1=primaire (primary) 2=secondaire (secondary) 3=lycée 4=Université 6=coranique	Dernière Classe faite (Last class completed)	Expérience en agriculture (Farming Experience (year))	Expérience en riziculture (Rice farming Experience (year))	Profession?	Composition du ménage (Household composition)			Les membres actifs du ménage dans la production du riz (Total active in household member participating in rice production)			
										(Male)	(Female)	Total	Male	Female	Enfants -15 ans (Children - 15 that are active)	Total
1A1	1A2	1A3	1A3b	1A4	1A5	1A5b	1A6	1A7	1A7b	1A8	1A9	1A10	1A11	1A12	1A13	1A14

Section 1B: Membre de groupement de producteurs (OP/Tontine) (Famer base organisation (FBO))

Membre d'un groupement ? (Are you member of FBO?) 0=no, 1=yes	Si oui nom du groupement ? (if yes Name of FBO)	Depuis quand êtes vous membre? If yes since when?	Est-ce un groupement producteur du riz ? (Rice production FBO?) 0=no, 1=yes	Si tu es non membre de groupement pourquoi? (If No why?)	Un groupe pour la production du riz sous contract uniquement? (If yes is the group purposely constituted for contract rice production?) 0=no, 1=yes	Quel est votre position dans le groupement ? (Position in FBO) 1=President 2=secretary 3=treasurer 4=simple member 5=other committee member	Composition du groupement en cette année 2015/2016 (FBO composition 2015/2016)			Depuis sa création combien de membre ont quitté le groupement et combien sont des nouveaux adhérents ?(since its creation how many exit ? how many new memeber ?)			
							(Male)	(Female)	Total	Quitter (exit)Male	Quitter (exit)Female	nouveau (new) Male	Nouveau (New) Female
1B1	1B2	1B3	1B4	1B5...	1B6	1B7	1B8	1B9	1B10	1B11	1B12	1B13	1B14

Section 1C: Accès au Crédit et service de vulgarisation (Credit and Extension services access by farmer)

As-tu postuler pour crédit les 5 dernières années? (Have you apply for credit the last 5 years.) 0=no, 1=yes	Si non pourquoi, (If No why?)	Si oui as-tu reçu du crédit?, (if yes, have you received credit?) 0=no, 1=yes	Si non pourquoi ? (If no why,)	Si oui as-tu reçu le montant demandé et combien (if received what amount ?) 0=no, 1=yes	As-tu reçu l'argent en temps pour tes activités agricoles, (Have you received the money on time for your agric activities?) 0=no, 1=yes	As-tu reçu de l'aide pour pouvoir postuler au crédit ? Does someone assist you in credit application? 0=no, 1=yes	As-tu reçu de conseil pour la production du riz ? (Do you receive rice production advice from extension service)s 0=no, 1=yes	Si non pourquoi ? (If No why?)	Si oui, de qui? (If yes, from who?) 1=Government (ICAT) 2=NGO (ETD)Esop 3=Other NGO	Si oui combien de fois Durant la campagne agricole? (If yes, how many times do they visit you per season?)	Quelle appréciation donne tu à leur Transfer de technologie? (How do you appreciate the efficacy of their technology transfer?) 3=very effective 2=Effective 1= Not effective	Combien d' fois as tu formation en salle pour production riz (how many training on production you attend)
1C1	1C2	1C3	1C4	1C5	1C6	1C7	1C7b	1C8	1C9	1C10	1C11	1C12

1C5b) Combien? How much ?

1C7a) de qui ? From who ?.....

PART 2: CONTRAT AGRICOLE (CONTRACT FARMING)

Section 2A: Information Générale sur le contrat agricole (General information on contract)

2A01 /...../As-tu jamais été engagé dans le contrat agricole? (Have you ever been in contract farming?) 0=no 1=yes (si oui va question (if yes go to) **2A02**page3)

2A01b/...../si non engagé, alors veux-tu entré en contrat de production du riz (if no are you willing to engage in contract farming?) 0=no 1=yes , (si oui va à (if yes go to) **2C** page4) (si non va à **2D** page 5)

2A02 /...../ si engagé, quand êtes vous engagé dans le contrat? (Since when are you engaged in CF?) (year) (Nombre d'année)?.....

2A03 /...../ avec qui es-tu engagé dans le Contrat (With who are you engage in CF?) 1=ESOP, 2=ANSAT, 3=other NGO, 4= femme commerçante (women)

2A04 /...../ quelle sorte de relation avez vous avec qui tu conclus le contrat? (What kind of relationship do you have with contractor?) 0=pas de relation particulière (no relationship), 2= relation professionnelle (professional/business) 3= relation familiale (family relative), 4=nous sommes du même village (same village native); 5=autre (other).....

2A05 /...../ de quelle sorte de contrat s'agit-il? (what kind of contract is it?) 1= contrat individuel (individual contract); 2= contrat du groupe (group contract), 3=autre préciser (other)

2A06 /...../ Es-tu toujours dans le contrat? (Do you still in that CF?) 0=no; 1=yes

Section 2B: éléments dans le contrat auquel tu es engagé (Elements in contract arrangement in which you engaged)

Quels sont les éléments dans le terme de contrat ? (what are the elements in the CF terms?):

Coché les éléments dans le terme du contrat ci dessous et écrit le code (Tick the element in CF term to compose the code):

2B01 /...../ **Intrant** (Input supply): 0=pas de fourniture d'intrant (No input supply); 1= semence (seed); 2= Engrais (Fertilizer),3= herbicide (herbicide); 4= bâche (tarpaulin) 5=other

2B02 /...../ **Accès au credit** (Credit access): 0=pas de facilité au credit (No credit facility); 1=credit liquide (Cash credit); 2=lien avecIMF (link farmer to financial institute);3=autres (other)

2B03 /...../ **Mode de fixation du prix** (Price fixation): 0=Prix du marché (market price) 1=Prix fixé en début de campagne (fixed price) 2=formule Prix (formula price), 3=autre (other)

2B04 /...../ **Mode de paiement** (Payment mode): 0=payé comptent (cash and carry); 1=payé un peu et le reste plus tard (pay part and rest later) 3=pay le tout plus tard (pay the total later)

2B04b /...../Si 1 ou 3 quelle est la durée avant le paiement ? (if yes for 1 and 3 what is the duration ?)..... mois (month)

2B05 /...../ **Assistance technique ,conseil en production** (Technical assistance (advices and training for rice production techniques): 0=No ; 1=yes

2B06 /...../ **Service de vulgarisation** (extension revices) 1= ICAT; 2=autre (other) ONG, 3= ESOP/ETD

2B07 /...../ **Marché garantie (garantee market) 0= pas marché garantie (no market garantee) 1= part de production acheté (part of production is purchased)
2=achat de toute la production (the total production is purchased)3=Production utiliser pour rembourser crédit intrant seul (production to paid input credit),
4=part destiné à rembourser credit intrant et achat du reste de la production (part to pay input credit and rest for sale)**

2B08 /...../ Unité de mesure est: 1=bol (bowl) 2=balance (scale) (kg); 3=autres (other).....

2B09 /... .. / si autre specifier (specified if 2B08 is 3)

2B10 /...../ Obligation d’êtres membre d’un groupement? (Be a member of a FBO), 0=No, 1=Yes

2B11 /...../ La quantité à délivrer est précisée dans le contrat (Quantity to be delivered) 0=No, 1=Yes

2B12 /...../ La qualité à délivrer est précisée dans le contrat (quality to be delivered) 0=No, 1=Yes



Section 2C : Motivation à s'engager dans le contrat, pour Paysan motivé pour contrat seul (motivation to engage in contract, only for contract farmers)

Qu'est ce qui vous pousse s'engager dans le contrat avec ESOP? (what motivated you to engage in contract with ESOP ?)

Mettre à échelle tes motivations en répondant oui ou non puis écrivant v à la colonne correspondante (1=pas important, 2=peu important 3= important 4=tres important 5= extremement important) scale your response using five Liker scale 1=not important, 2=Somewhat important, 3=important, 4=Very important, 5=Extremely important then Rank

Code	Answer	Facteur de motivation (Motivation factors)	0=no 1=yes	Importance	Rank
Li/Co	C00				
2C01		Possibilité d'avoir un prix élevé (Ability to receive a higher price)			
2C02		Possibilité d'augmenter le rendement (Ability to increase yields)			
2C03		Possibilité de faire nouvelle relation avec d'autres paysan (Ability to make new relationships with other farmers)			
2C04		Avoir accès a des semences de haute qualité (Access to high quality seed)			
2C05		Avoir accès au credit (Access to credit)			
2C06		Avoir un marché garantie (Having a guaranteed market/buyer for crop)			
2C07		Acquérir de connaissance à travers assistance technique (Acquire knowledge/technical assistance from contractor)			
2C08		Ayant vu d'autres paysan beneficier, je veux aussi beneficier (Saw other farmers were benefitting so I wanted to benefit too)			
2C09		Garantir le prix minimum (Guaranteed minimum price)			
2C10		Mode de paiement est tres bien durable (Payment is more reliable)			
2C11		Pas besoin de transport au marché (Transportation is organized /No need to organize transportation to market)			
2C12		La fourniture d'intrant est assure (Reliable supply of inputs)			
2C13		Unité de mesure par la balance est très bon (Unit of measure of the product is scales)			
2C14		Vente groupé est interessant (Sale in bulk is good)			
2C15		Paiement en gros est interessant (Payment is done in bulk)			
2C16		Entraide au sein du groupe est très intéressant (Group members help each other)			
2C17		AUTRE (other)			

Va à (go to) 2E page 6

Section 2D: Raison de n’avoir pas être en contrat; Pour paysan non contractuel seul (reason for not being in ESOP contract for non contract farmers only)

2D01a /...../ Avez vous entendu parler de contrat pour la production du riz ? (have you ever heard about contract farming for rice production?) 0=no; 1=yes

(si non va à (if no go to) 2D01d)

2D01b /...../ si oui qui sont ceux qui le font ? if yes who are contractors ? 1=ESOP, 2= CECO-AGRO, 3=VAPE RIZ;4= ANSAT, 5=femme commerçante,(women traders) 6=autre (others)

2D01c /...../ Si oui avez vous eu opportunité de contracter avec eux pour riz avant de ne pas le faire? (If yes, Have you had the opportunity to contract your rice with ESOP and chose to not contract?) 0=no; 1=yes

2D01d/...../ Serais tu prêt à produire le riz sous contrat ? (Are you ready to grow rice under contract ?) 0=no; 1=yes

(Si non continuer avec le tableau suivant (if no go to next table) ; (si oui retourne au tableau de motivation (if yes return to motivation table at) page 4)

2D01-2D11: Expliquer les raisons de ne pas rentrer en contrat en remplissant le tableau suivant (give the reasons for not contracting with ESOP in next table)

Mettre à échelle tes raisons en répondant oui ou non puis écrivant v à la colonne correspondante (1=pas important, 2=peu important 3= important 4=tres important, 5 exptremement important)et mettre le rang Scale your reasons by filling with v in column and write your answer in column D00
1=not important, 2=Somewhat important, 3=important, 4=Very important, 5=Extremely important then Rank

Code	Answer	Reasons	0=no 1=yes	importance	rang
Li/Co	D00				
2D01		je n’ai pas confiance à la qualité de semence de des contacteurs (I am unsure of the quality of ESOP seed)			
2D02		Je ne crois pas que le rendement issu de leur semence sera aussi élevé que ce que j’utilise actuellement. (Not sure if the yield will be as high as seed I’m currently using)			
2D03		Je ne veux pas être lié par un contrat au cas où le prix augmente (Do not want to be committed to a contract in case the price goes up)			
2D04		Le risqué global en contrat est très élevé (General riskiness is too high)			
2D05		Le bonus pour qualité du riz sous contrat est trop peu (Contract quality premium price is too small by selling to ESOP)			
2D06		Il y a trop de restriction pour la production (Too many restrictions on how I produce)			
2D07		Il n’est pas facile de contracter, ce n’est pas quelque chose auquel je suis familier (Contracting is Not easy– this is not what I am familiar with doing)			

2D08		Je n'ai pas confiance au critère de qualité de ESOP pour obtenir un bon prix (Do not trust quality criteria of ESOP to give me a fair price)			
2D09		Il prend trop de temps avant d'être payer sous contrat (Would take too long to get paid for my rice sold to ESOP)			
2D10		Je n'ai jamais vu quelqu'un contracter et bénéficier (I have not seen other farmers who contract with ESOP benefit)			
2D11		Je n'ai pas besoin de leur assistance technique (I do not need technical assistance)			
2D12		Je n'ai pas suffisamment d'information pour m'engager dedans (I do not have enough information to engage in ESOP contract)			
2D13		Autre (other).....			
2D14		Autre (other).....			

Va à 2E16 à 2E20 2 page 6 dernières partie du tableau portant sur autre problèmes page 6 (go to 2E

To 2^E20 page 6 last sub section of the table on constraints)

Section 2E: Difficulté d'être en contrat (Pour paysan en contrat seul) Constraints of being in ESOP(for contract farmers only)

Mettre à échelle les problèmes que vous rencontrés dans le contrat avec esop (Scale up problems you face in ESOP contract arrangement): (*1=not important, 2=peu important, 3= important , 4=très important, 5 extrêmement important*) 1=not important, 2=Somewhat important, 3=important, 4=Very important, 5=Extremely important then Rank

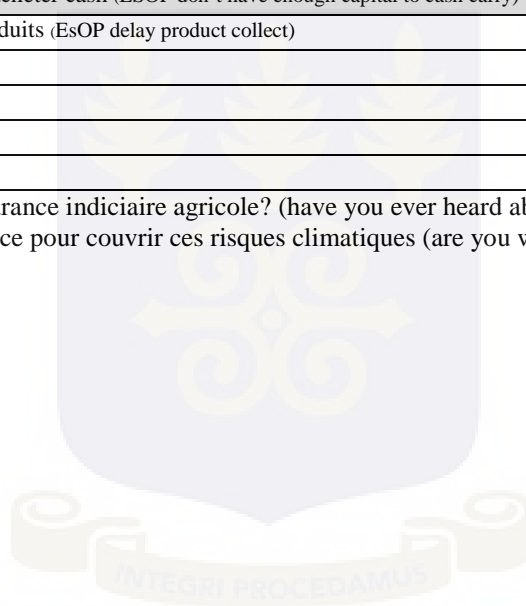
code	Answer	Problems	0=no 1=yes	importance	Combien de fois ce problème s'est passé depuis que vous êtes en contrat avec ESOP ?(how many time this problem hapend ?)
Li/Co	E00				
2E01		La formule du prix utiliser par esop n'est pas bon, par exemple le prix est toujours fixe quand le prix du marché augment (Price formula used by ESOP is not good (for example I feel cheated when the price goes up)			
2C02		Il est trop risqué de contracter avec ESOP à cause d'intrant qu'il donne comme credit (It is too risky to contract with ESOP because of input that they offer as credit)			
2E03		Le prix fixé par ESOP n'est pas aussi élevé pour couvrir l'investissement nécessaire pour leur critère de qualité (ESOP price is not higher to cover investment made to satisfy their quality requirement)			
2E04		Assistance technique de ESOP n'est pas satisfaisant (Technical assistance from ESOP is not satisfactory)			
2E05		Trop de restriction sur la production (Too many restrictions on how to cultivate produce)			
2E06		Ca prend trop de temps avant d'être payer par ESOP (It takes too long to get paid for my rice sold to ESOP)			
2E07		ESOP ne paye pas la totalité de la production (ESOP do not to buy total production)			
2E08		Nous sommes appelé à payé pour le credit d'autre membre du groupe (other farmers fail to pay their credit we are asked to pay back)			
2E09		Nous ne gagnons pas en vendant notre riz à ESOP (I have not benefit by selling my rice to ESOP)			

2E10	J'ai perdu ma liberté pour vendre ma propre production (I lose my freedom to sold my own production)				
2E11	Je fait face au problem de production à cause de la mauvaise qualité des semence ou variété non adapté à notre milieu				
2E12	Il y a manipulation de la qualité par les agents d'ESOP (ESOP agent manipulated product quality standard so that not all contracted production are purchased)				
2E13	ESOP exploite sa position de monopsony dans la fixation du prix, pas de négociation de prix (Sponsoring companies are unreliable and exploit a monopoly position in price fixation (no price negotiation))				
2E14	Le materiel (bâche et plastiques) donnée ou vendu ne sont pas de bonne qualité				
2E15	Je n'ai pas confiance dans leur unite de mesure qui est la balance (I don't trust the Unity of measure (scales used))				
2E16	Esop n'a pas assez de capital pour acheter cash (ESOP don't have enough capital to cash carry)				
2E17	Il y a retard dans la collecte des produits (EsOP delay product collect)				
2E18	Retard de pluie (rain comes late)				
2E19	Sécheresse (drought)				
2E20	Inondation (flood)				

2^E21//Avez-vous jamais entendu parler d'assurance indiciaire agricole? (have you ever heard about agriculture weather index insurance ?) 0=no, 1=yes

2^E22//Seriez vous prêt à souscrire une assurance pour couvrir ces risques climatiques (are you willing to subscribe?) 0=no, 1=yes

Continuer avec (continue to) 2F page 7



PART 3: PRODUCTION ET IMPACT DU CONTRAT SUR LA PERFORMANCE (PRODUCTION AND IMPACT OF CONTRACT ON PERFORMANCE)

Section 3A: Investissement (Investment and asset): **Quel investissement avez vous fait sur les éléments suivant (what investment have you made on assets?)**

Item ID	Nom de élément (Item name)	Année d'achat (year)	Avez vous cet element (Do you have this item) 0=No; 1=yes	Si oui quelle quantité? (If yes Quantity)	Prix unitaire (Price per unit)	Coût total (Total Amount) FCFA	Avez vous utilise cet element pour la production du riz (Do you use this item in your rice production?) 0=no 1=yes	Une partie de l'argent gagné dans la production du riz est-il rentré dans le coût de ce élément? Did you pay with earning from rice 0=no 1=yes	Si oui quelle proportion de l'argent issu de la production du riz ? (If yes proportion of rice earning)	quelles sont les autres sources l'investissement, (othero Source of money) 1=revenue agricole (Agric income) 2= revenue d'élevage (live stock income) 3= revenue non agric (Non agric income) 4= ONG (Welfare/NGO program) 6= credit 8= autres (other)
Li/Co			3AA	3AB	3AC	3AD	3AE	3AF	3AG	3AH
1	Tracteur/motoculteur (Tractor/Power Tiller)									
2	Motopump (Pump set)									
3	Pulverisateur (Spray machine)									
4	Houe (Hoe)									
5	Daba (daba)									
6	Coupe-coupe (Cutlass)									
7	faucile (harvest cutlass)									
8	Bache (tarpaulin)									
9	Aire de séchage (Drying area)									
10	Magasin de stockage (storehouse)									
11	Moto (Motorbike)									
12	Velo (bicycle)									
13	Voiture (car)									
14	Bateuse (Mist blower)									
15	Telephone (Mobile phone)									
16	Radio									
17	TV									
18	Investissement dans éducation des enfants (Education for children)									
19	Rénovation de maison (renovate house)									

20	Epergne (saving)								
21	Achat de terrain (Purchase land)								
22	Autre (other).....								
23	Autre (other)								

Section 3B. Terrain agricole et tenure (Agricultural land and land tenure)

3BA01// Combien de champs de riz possédez-vous ? (how many rice farm do you have?).....

3BA01 /...../ ha; Superficie total cultivée riz (2015/2016) ha (Total land farmed with rice in 2015/2016) (in square meters (ha))..... ha

ha3BA02 /..... ..ha; Superficie total cultivée riz (2014/2015) ha (Total land farmed with rice in 2014/2015) (in square meters (ha))..... ha

3BA03 /...../ Avez vous augmentez ou réduit la superficie du riz ces 5 dernière années ? (have you expanded or reduce rice farm size the last 5 year 0=pas de changement (no change) 1= réduit (reduced), 2= augmenter (expanded)?

3BA04 /...../ si augmenté à quelle pourcentage (By how much in percentage).....%?

Quelles sont les 2 autres cultures cultivées les saisons suivantes? (What are the other most important crop cultivated the following season?:

3BA05 /...../2015b ; 3BA06 /...../2015a

3BA07 /...../2014b. 3BA08 /...../2014a

Enquêteur : Dessine une carte des parcelles du riz possédé par le paysan en 2015/2016 derrière la page et complète le tableau suivant

(draw a map of rice plot of farmer which will help you to answer to the following question in the table)

Plot Num	Superficie (Size) (ha)	Tenure de terre (Land tenure system) 1= propriété et cultivé (owned and farmed) 2=Louer, payer en argent (rent with money) 3=louer, payer en nature (sharecropped) 4= louer du gouvernement (lease from the government) 5= louer de la famille (borrow/leased from family) 6= autre (other)	Si 1 comment la parcelle a été acquis (if 1 How was this plot acquired?) 1= Héritage (inherited from family) 2= don (Gift) 3= chat (Purchased) 4=don du gouvernement (allocated by government) 5=autres (other)	Quelle est la source de l'eau pour cette parcelle (What is the source of water for this plot?) 1=pluvial (rainfed) 2=bas fond (low land) 3= irrigué gavitaire eau du rivière (river gavitied) 4=irrigué pompe eau du rivière (river pumped) 5= pompe d'eau du sous sol pour irriguer) Groundwater irrigation 6=autres (other)	Quelle est la distance de la parcelle à ta maison (What is the distance from this rice plot to your house?) (km)	Coût de la parcelle (Cost of the plot)			Depuis combien d'année possédée vous cette parcelle (années) (Since when have you this plot)	Y-a-t-il un problème concernant cette parcelle? (Have you any problem about this land?) 0=no ; 1=yes Quel problème ? If yes what problem?
						Si acquis combien ? If purchased how much (CFA)	Si louer payer en argent, combien par saison? (if rent how much per season) (CFA)	Si louer payer en nature quelle quantité de riz usiner équivalente (Kg) (If share crop what quantity?)		
	3BB	3BC	3BD	3BE	3BF	3BG	3BH	3BI	3BJ	3BK
1er P Riz CF										
2ème P Riz										
3e P Riz (rice)										

4 Mais (maize)													
5 Sorgho (sorghum)													
6 Haricot(co wpea)													
7 Autre1 (other1)													
8 Autre2 (other2)													

Section 3C: Intrant pour la production de riz et autre culture (Rice and other crop Production inputs)

Enquêteur : Remplir pour chaque parcelle riz en respectant le numéro noté en part 3B (Fill in for each crop plot number from part 2B)

Se nso n	N	Culture (Crop cultivated)	Super ficie (ha) Total (TotalFar m size)	Variété (Variety cultivate)	Semence utilise et mode de semis (seed and mode of seeding)					Herbicide (heb/pesticide)			Quantité total engrais (kg) quantity of fertilizer		Coût Total engrais Fcfa Total cost of fertilizer		Total produ ction (Kg) (total produ ction)
					Qte Acheté Purchase d (kg)	Coût Cost (cfa)	Qté Reçu en don Received as gift (kg)	Qté Propre semence (Owned) (kg)	Mode de semis (mode of seeding) 5=direct en poquet;(direct) 2=à la volée (likelihood) 1= pépinière et repiquage (nursing and tranplanting) 3= ligne (line)	Hebic ide Total (qty) l (Syste mic weed cide)	Herb Selectif Qtty (l) (selectif weedcid e)	Coût Total (cfa) (Total cost)	Urea	NPK	Urea	NKP	
			3CA	3CD	3CE	3CF	3CG	3CH	3CI	3CJa	3CJ	3CK	3CL	3CM	3CN	3CO	3CP
201 5/2 016	1 CF	Riz (Rice)															
	2																
	3																
	4	Mais (Maize)															
	5	Sorgho (Sorghum)															
	6	Haricot															

		Cowpea																		
	7	Autre1																		
	8	Autre2																		

Section 3D: 2015/2016 Coût de préparation de terrain, semis, fertilisation/application des produits chimiques, d'herbicide, chassés'oiseaux. (Cost of land preparation, seeding, fertilizer/chemical application, weeding, bird chase)

Enquêteur : Remplir le tableau en respectant le numéro de départ 3B (Enumerator: Fill in for each crop plot number from part 3B)

N	Cult ure (Crop cultivated)	Super ficie (TotalFarm size)	Coût Préparation de sol (Land preparation) (CFA)				Coût Semis/repiquage (seeding/Nursey/planting) FCFA				Coût fertilizer/chemical application FCFA				Coût herbicide/sarclage (weeding cost) FCFA				Coût chasse oiseau (Bird chasing) FCFA			
			Faucha ge du sol (land mowin g cost)	Herbicide total Systemic weedcide applicatio n cost	1er labour (1 st Plough ing cost)	2ème labour (2 st Ploughin g cost)	Pepiniè re (Nursin g cost)	semis direct (direct seeding cost)	Repi quag e Tran splan ting cost)	Famille (fami ly labo ur value)	1er fertilisa tion (1 rd fertiliz er applica tion cost)	2eme fertilisa tion (2 rd fertiliz er applica tion cost)	3eme fertilisa tion (3 rd fertiliz er applica tion cost)	Famille (Famill y labour value)	1er Herbicide ge total (systemic weedicide applicatio n)	2eme Herbicide ge selectif (selectif weedicide applicatio n)	1er sarclage manuel (1 st weeding)	2eme sarclage (2 nd weeding)	Chasse oiseaux (Bird chassin g)			
			3DB	3DC	3DD	3DE	3DF	3DEa	3DG	3DH	3DI	3DJ	3DK	3DL	3DM	3DN	3DO	3DP	3DQ	3DR	3DS	3DT
1	Riz (Rice)																					
2																						
3																						
4																						

Section 3E: 2015/2016 Coût recolte battage, vanage, séchage, stockage etc (Cost of rice harvest, threshing, winnowing, drying, storage etc)

Enquêteur : Remplir le tableau en se référant au numéro 3B (Fill in for each crop plot number from part 3B)

N	Cultu re (Crop cultivated)	Super ficie (Total Farm size) ha	Coût de récolte (Coupe du riz) FCFA				Coût de battage (Threshing cost) fcfa				Coût de vanage (Winnowing cost) fcfa				Coût de séchage (Drying cost) fcfa				Coût de transport (Transport and storage cost) fcfa				
			payer en argent (cash cost) (fcfa)	Payer en riz kg Pay with crop	Famili al (valeur (fcfa) Family labour	Coût de nourriture (fcfa) (Food cost)	Payer en argen (fcfa) (cash cost)	Paye r en riz (kg) Pay with crop	Famille (valeur) fcfa Family labour	Nour riture (fcfa) (Fo od cost)	Payer en argent (fcfa)(c ash cost)	Paye r en riz (Kg) Pay with crop	Famille valeur en fcfa) Family labour	Nourrit ure (fcfa) (Food cost)	Payer en argent (fcfa)(cas h cost)	Payer en riz (Kg) Pay with crop	Famille valeur en fcfa) Family labour	Nourrit ure (fcfa) (Foo d cost)	Payer en argent (fcfa)(c ash cost)	Payer en riz (Kg) Pay with crop	Famille valeur en fcfa) Family labour	Nourrit ure (fcfa) (Food cost)	
			3EA	3EB	3EC	3ED	3EE	3EF	3EG	3EH	3EI	3EJ	3EK	3EL	3EM	3EN	3EO	3EP	3EQ	3ER	3ES	3ET	3EX
			3EA	3EB	3EC	3ED	3EE	3EF	3EG	3EH	3EI	3EJ	3EK	3EL	3EM	3EN	3EO	3EP	3EQ	3ER	3ES	3ET	3EX

paille, balle vide, etc..(using a scale, collect a three samples of 100 g from three different bags of respondent storage paddy, mixed the sample in a bowl then sort the grain and dockage foreign matter, then take the weight) Poids total de echantillon (Total weight of the sample).....g. Poids d'élément étrangers (weight of foreign matter)g

Section3G: partage de récolte et commercialisation (Harvested sharing and commercialization)

3GX01 /...../ qui sont les acheteurs? (Who are the buyers,) 1=ESOP, 2=ANSAT, 3= NGO, 4= femme acheteur (women buyers), 5=autres (other)

3GX02 /...../ où la vente a lieu? (Where did the sale take place?)1= au champ/maison (farm/house); 2=lieu de séchage (drying area/warehouse) 3=à usine(on ESOP firm), 4=au marché (on market place)

3GX03 /...../ qui est le principal acheteur? (Who is the main buyer?) In2015?; 1=ESOP, 2=ANSAT, 3=other NGO, 4= femme acheteur (women buyers), 5=autres

3GX04 /...../ quel est le mécanisme de fixation du prix avec le 1er acheteur principal (Price mechanism with your main buyer?) 0=prix du marché (Market price); 1=fixe prix (Fixed price); 2=formule de prix (Price formula base on quality), 3= prix discuté (price bargaining).

3GX05 /...../ quel est le prix de vente unitaire de votre paddy si sous contrat? What price do you received when selling paddy under contract?..... CFA/kg

3GX06 /...../ quel est le prix du paddy si vendu au marché? what price do you receive when selling paddy rice on open market?..... cfa/bol soitCFA/kg.

3GX07 /...../ quel est le prix du riz blanc si vendu sous contrat ? What price do you receive when selling milled rice under contract?..... cfa/bol soitCFA/kg.

3GX08 /...../ quel est le prix du riz blanc si vendu au marché? What price do you received when selling milled rice on open market?..... cfa/bol soitCFA/kg.

3GX09 /...../ distance de votre maison au marché le plus proche où les produit agricoles sont vendu) (Distance from house to nearest market you sale your product? (km)

3GA-3GS /...../Quelle quantité du riz est gardée ou vendue ? : remplir le tableau : How much ofthe harvest was kept or sold? Please fill the table

Enquêteur (Enumerators): repète les numéro de parcelle et remplis le tableau suivant (repeat rice plot numbers, seasons, and quantities harvested from mart 3D, then complete the remaining questions)

N	Culture (Crop cultivated)	Superficie (Total Farm size)	Quelle est la quantité de paddy non vendu? (How much paddy Harvested not sold?)(kg)					Quelle est la quantité de paddy vendu? How much paddy harvested is sold (kg)				Quantité de riz blanc non vendu (How much rice milled but not sold?) (kg)				Quantité de riz blanc vendu? (How much rice milled and was sold) (kg)				
			Garder pour payer les récoltes (pay harvesters) kg	Garder pour payer les locations terrain (land rent)	Garder pour donner aux voisins et amis (gift to neighbours)	Garder pour semence (save as seed)	Garder pour auto-consommation (own consumption)	TOTAL	Sous contrat (under contract)	Au marché (On pen market)	Vendu comme semence (sold as seed)	TOTAL	Garder pour payer location terrain (pay land rent)	Garder pour donner aux voisins et amis (gift to neighbours)	Garder pour auto-consommation (own consumption)	TOTAL	Sous contrat (under contract)	Au marché (on pen market)	A la maison (at the house)	TOTAL
		3GA	3GB	3GC	3GD	3GE	3GF	3GG	3GH	3GI	3GJ	3GK	3GL	3GM	3GN	3GO	3GP	3GQ	3GR	3GS
1	Riz																			
2																				
3																				

Section3H: Production et performance du groupement (production and performance of FBO)

code	Nombre total des membre du groupement en 2015/2016 ? Groupe members in 2015/2016	Combien ont signé engagement de production ? How many are engaged in contract	Combien ont effectivement livré 2015/2016 ? (how many effectively sell to ESOP)	Votre group a-t-il respecté engagement vis-à-vis du contrat cette année? (have your group Effectively respect contract agreement this year ?		Combien de fois Avez-vous respecté engagement depuis en contrat avec ESOP ? (how many time have you respect contract term since in contract with ESOP?)		Combien de fois Avez-vous reçu prime qualité depuis en contrat avec ESOP ? (how many time have you receive quality premium)	Si jamais eu de prime donne des raisons (if never received quality premium, guive reasons)
				Quantité ? (quantity)0=no 1=yes	Qualité (quality) 0=no 1=yes	quantité(quantity)	Qualité (quality)		
	3HA	3HB	3HC	3HD	3HE	3HF	3HG	3HH	3HI

Section3I : Peux-tu nous indiquer un producteur du riz qui n'est pas sous contrat ? 0=non, 1=oui, Son nom..... et numéro de tél ;.....

Observation



PART4 Au niveau du village (VILLAGE LEVEL) :

Nom du village (Name of Village)..... Canton.....code GPS.....

Section 4A: Environnement institutionnel (Institutional environment)

Le Système de distribution d'intrant :est-il facile d'acheter d'intrant (engrais et semence) en dehors du contrat (is it easy to have access to input out of contract ?)0=no, 1=yes	Si non pourquoi? (If No why?)	Distance du magasin d'intrant au village (Distance from nearest input warehouse to village?) (km)	Y a t-il confiance entre paysan et commerçante du milieu? (Culture and trust (does trust is among farmers and other traders?); 0=no, 1=yes	Y a-t-il de vols fréquente de récolte? (security situation in the area (harvest mostly steal?) 0=no, 1=yes	Le système de règlement des désaccords fonctionnel t-il bien ? Disagreement resolution system (Is it working well?) 0=no, 1=yes	Les routes du village pour le marché sont-ils en bon état ? (roads nature (road to market place are they good?) 0=no, 1=yes	Distance du village au marché de vente du riz ? Distance to place where you sale your rice? (market place if any) (Km)	Distance du village au lieu d'achat d'outil agricole? Distance to place where you buy agric tools (km)	Moyen de transport le plus utiliser (mean of transport used) 1= tête head 2= animaux (animals) 3= Vélo (bicycle) 4= moto (moto) 5= voiture (cars/bus/truck)	Les réseaux de communication sont-ils disponible ? est-il facile à faire téléphone? Communication s (mobile phone network is it available? Easy to make call? 0=no, 1=yes	Votre appreciation de vulgarisation agric et tranfert detechnology agricole ? (How do you appreciate the efficacy of their technology transfer?) 3=très efficace (very effective) 2 =efficace (effective) 1=non efficace (not effective)	Accès à la terre 1=facile 1=difficile, 3= très difficile
4A1	4A2	4A3	4A4	4A5	4A6	4A7	4A8	4A9	4A10	4A11	4A11	4A12

Section 4B: environnement d'infrastructure et matériel physique (Physical/infrastructural environment):

Les magasins de stockage de récolte est-il disponible dans le marché ? (Market infrastructure (warehouse are the available?) 0=no, 1=yes	Systems d'irrigation est-il disponible dans le village, ? (Irrigation system (is it available) 0=no, 1=yes	Si oui sont-ils en bon états? If yes Is it in good condition? 0=no, 1=yes	Y a-t-il de tracteurs ou motoculteurs dans le village (Is there tractor/power tiller machine for tilling?) 0=no, 1=yes	Combien de tracteurs (How many tractors?)	Combien de motoculteurs? (How many power tiller?).	Est-il facile de d'avoir accès à aux tracteurs et au motoculteurs hors du village ? (Is it easy to get tractor/power tiller machine for tilling?) 0=no, 1=yes	Combien de tracteur hor village ? (How many tractors)	Combien de motoculteurs hor village ? How many power tiller out of the village	Y a –t-il des batteuse dans le village ? (Is threshing machine in village?) 0=no, 1=yes	Est-il facile d'avoir des batteuse s? Is it easy to get threshing machine for threshing ? 0=no, 1=yes	Aire de séchage de paddy est –il disponible (Paddy Drying area Available ?) 0=no, 1=yes	Aire de séchage est-il cimenté? (Paddy Drying area cemented area?) 0=no, 1=yes	Les facilités d'égrenage ou décorticage du riz sont – il disponible a dans le village ? (Are rice milling facilities available in the village?) 0=no, 1=yes	Les machines d'égrenage sont-elle en bon état? donne Riz blanc sans matière étrangère? (rice mills are working?)0 =no, 1=yes	Facilité de décorticage du riz hors village ? (facility to mill out of the village? 0=no, 1=yes	Combien de décortiqueuse hors village
4B1	4B2	4B3	4B4	4B5	4B6	4B7	4B8	4B9	4B10	4B11	4B11b	4B12	4B13	4B14	4B15	4B16

PART5: AU NIVEAU DU TRANSFORMATEUR (From processor)

Section 5A: Information générale (general information)

5A1/ Nom de usine' (Name of firm)..... 5A2/ Année de création (Year of creation).....5A3/Année début de transformation (year of started processing).....

5A4/Nom du gérant (name of managerç.....5A5/Tel : gérant (Phone number of manager)..... :Email esop.....

Section 5B : Information sur les groupements sous contrat (information about FBO under contract)

Code	Année (year)	Nombre de groupement Ayant signé contrat (Number of FBO that sign contract)	Nombre total de paysan ayant signé engagement ? (Number of farmer under contract) 5B2			Nombre de paysan ayant effectivement livré (Number of farmers that effectively deliverd) 5B5			Nbre de groupement ayant respecté engagement en terme de (Number of FBO that respect contract terms)		Nombre de groupement ayant reçu prime de qualité (Number og FBO that received quality premium price)	Nombre de groupement disloqué ou quitté le contrat après la champagne (Number of FBO disrup after the first year)	Paddy Total collecté sous contrat (Total paddy collected under contract) (tonne)	Paddy Total collecté non contrat (total paddy collected out of contract) (tonne)
			H	F	T	H	F	T	Quantité (quantity)	Qualité (quality)					5B8	5B9
Li/Co		5B1	H	F	T	H	F	T	5B8	5B9	5B10	5B11	5B12	5B13
1	2015/16													
2	2014/15													
3	2013/14													

Section 5C: Information sur la production et la performance au décortilage (Information on production and performance of processing of ESOP)

Code	Année	STOCK DE PADDY COLLECTE (Total paddy collected)			Taux de perte sur stock (rate of weight loss after storage)			Taux de perte sur vannage (rate of weight loss after winnowing)			Taux de perte sur trie (Rate of weight loss after sort)			Taux usinage (rate of processing)			Taux long grain (Rate of long grain)			Taux brisure (Rate of broken grain)		
		Contra ct (t)	Non Contra ct (t)	TOTAL (t)	Contra ct (t)	Non Contra ct (t)	TOTAL (t)	Contract (t)	Non Contra ct (t)	TOTAL (t)	Contra ct (t)	Non Contra ct (t)	TOTAL (t)	Contra ct (t)	Non Contra ct (t)	TOTAL (t)	Contra ct (t)	Non Contra ct (t)	TOTAL (t)	Contract (t)	Non Contra ct (t)	TOTAL (t)
Li/Co		5CA	5CB	5CC	5CD	5CE	5CF	5CG	5CH	5CI	5CJ	5CK	5CL	5CM	5CN	5CO	5CP	5CQ	5CR	5CS	5CT	5CU
1	2015/16																					
2	2014/15																					
3	2013/14																					

Sil vous plaît remplir la liste joint des groupements sélectionnés avec l'aide du responsable qualité de l'usine : la performance des groupements en matière de la qualité de leur paddy en 2015/2016 ou à défaut, cette liste porte sur la production livrée par le groupement, le taux de perte sur stock, sur vannage, sur trie, le taux d'usinage, le taux de long grain, taux de brisure

(Please fill the attached list of selected FBO and with help of responsible of quality, indicate farmers groups in terms of paddy of their paddy in 2015/2016. This list focussed on quantity of paddy delivered and the different rate of performance after milled)

Section 5D: Quels sont les éléments les plus importants du contrat pour votre usine ? (what are the most important elements in the contract terms for you firm?)

code	Attribut (ATTRIBUTE)	Niveau (LEVEL)	Eléments offert par votre contrat ?(element in the contract)	Answer	Importance des elements (Importance of the attribute level for you)			
					0=oui 1=non	1=pas important (Not important)	2= important (Important)	3=très important (very important)	Classé suivant le rang (rank from important to less import)
			5B1	5B2				
1	Fourniture d'intrant (Input supply)	Fourniture de Semence (provide seed)						
2		Fourniture de Engrais (provide fertilizer)						
3		Fourniture de Herbicide (provide weedcide)						
4	Facilité au crédit (Credit facility)	Lier aux IMF pour faciliter accès au crédit (link to MFI to facilitate credit access)						
5		Pas de crédit (no credit access)						
7		Crédit Intrant (input as credit)						
8	Mode de fixation du prix (Price fixation)	Prix fixé avant production (fixed price at the beging of growing season)						
9		Prix discuté à la récolte (barging price at harvest)						
10		Prix du marché (Market price)						
11	Mode de paiement (payment mode)	Payer cash and carry la récolte (cash and carry)						
12		Collecter la récolte et Payer plus tard (collect the product and paid later)						
13		Remboursement de en nature du prêt intrant par la récolte (repaid input credit with crop)						
14	Assistance technique (Extension)	Assistance technique est donnée (extension advice)						
13		Pas d'assistance technique (No extension advice)						
14	Quantite et qualité (quality)	Quantité précisé dans le contrat (quantity to be delivered is preciesed in the contract)						
15		Qualité précisé dans le contrat (quality to be						

		delivered is preciesed in the contract)						
16	Autre (other)							

Section 5C: quels sont les principaux problèmes que vous rencontrés en contrat avec les producteurs ? (what are the most important problems are you facing in contract arrangement with producers)

Code	Answer	Lister les problems (Problems)	1=pas important (Not important)	2= important (Important)	3=très important (very important)	Quelles solutions proposez-vous pour résoudre ces problèmes? (what are proposed solution?)
Li/Co	E00	Vente de récolte à autres acheteurs (side selling)				.....
5C01		Nous n'avons pas assez de capital pour donner d'engrais à credit (lack of enough capital to paid fertilizer to be distributed to farmers)				
5C02		Détournement d'engrais à d'autres cultures (diversification of fertilizer for other crops)				.....
5C03		Nous n'avons pas assez d'argent pour acher toute la production (lack of enough capital to cash and carry total production at harvest)				
5C04		Les paysans ne respectent pas engagement quantité quand la sécheresse intervient, entraînant non remboursement crédit intrant (farmer are not able to meet quantity target when drought ocured, this lead to no repayment of seed credit)				Que pensez vous d'assurance agricole (WII) pour les paysans sous contrat ? serez vous prêt à recommander ça au paysans ? What do you thing about agriculture wheather index (WII)insurance? Are you ready to recommend it to farmersunder you contract scheme?
5C05		La culture et l'environnement social contraint les paysans à être moins performant en terme de qualité (culture and social environment is a constraint for quality improvement)				
5C06		Les paysans ne respectent pas les standards de qualité (Farmers do not respect the quality standards)				.....
5C07		Beaucoup de paysans quittent le contrat après la première année (A lot of farmers exit the contract scheme after just the first years)				
5C08		Autre.....				

Section 5D : Investissement et Dépenses (Invest and expenditures)

S'il vous plaît, Remplir le tableau suivant portant sur les postes d'investissement de votre Usine les 10 dernières années?

(Please fill this table for expenditure or investment you make the last 10 years)

Item ID	Nom de élément (Name of Item)	Année d'achat (Year)	Avez vous cet élément (Do you have this item) 0=No; 1=yes	Si oui quelle quantité? (If yes Quantity)	Prix unitaire (Price per unit)	Coût total (Total Amount) FCFA	Capacité ou débit du matériel (capacity of this material)	Avez vous utilisé cet élément pour le décorticage du riz ? (have you use this material in rice milling) 0=no 1=yes	Source d'investissement (source of investment) 1=auto invest (own) 2= actionnaire privé (private share holder) 3=partenaire et (ONG) (NGO partner) 4=Partenaire Gouvernement (Government) 5=Banque –don (Gift from Bank) 6=Banque crédit (loan from Bank) 7= autres (other)	Si 1,2 quelle proportion auto-invest et ou d'actionnaire (what proportion of own investment ?)	Quelle proportion pour les autres sources d'investissement ? (what proportion from other source ?) 3=partenaire et (ONG) (NGO partner) 4=Partenaire Gouvernement (Government) 5=Banque –don (Gift from Bank) 6=Banque crédit (loan from Bank) 7= autres (other)
Li/Co			5D	3AB	3AC	3AD		3AE	3AF	3AG	3AH
1	Balance (basculé) (scale)										
2	Autre balance (other scale)										
3	Vanneuse électrique (electric winnowing machin)										
4	Vanneuse manuel (manual winnowing machin)										
5	Autre vanneuse (winnowing machin)										
6	Trieuse optique (optic sort machin)										
7	Trieuse (Sort machin)										
8	Autre trieuse (other sort machin)										
9	Décortiqueuse électrique (electric milling machin)										
10	Autre décortiqueuse.(other milling machin)										
11	Calibreuse (
12	Autre calibreuse.....										
13	Machine à coudre les sacs (machin to sow bags)										
14	Machine à pour fermer sac plastic (thermosoudeuse)										
15	Autre machine (other machin)										
16	Hangar										
17	Magasin de stockage (warehouse)										
18	Bâche (tarpaulin)										
19	Aire de séchage (Drying area)										
20	Bureau (office)										
21	Moto (Motorbicycle)										

22	Voiture (car)										
23	Formation gérant et technicien (training of manager)										
24	Formation Personnel à usine (training of other agents)										
25	Formation femmes trieuses (training of women for sort rice)										
26	Autre (other)										
27	Autre (other)										



 Turnitin Originality Report

10444652:PHD_THESIS_FULL_DRAFT09_corr_6Adabe_final.docx
by ADABE EDOH

From Plagiarism Check (189bb929-0b62-4cce-a991-136a5c8252eb)

6Adabe_final.docx

Similarity Index

16%

Similarity by Source

Internet Sources:	14%
Publications:	7%
Student Papers:	5%

Processed on 20-Jul-2017 15:18 GMT

ID: 832035552

Word Count: 48847

sources:

- 1 2% match (Internet from 09-Jan-2017)
<https://digital.library.adelaide.edu.au/dspace/bitstream/2440/83608/8/02whole.pdf>

- 2 1% match (Internet from 16-Sep-2014)
<http://edepot.wur.nl/193737>

- 3 < 1% match (Internet from 26-May-2016)
<https://openaccess.adb.org/bitstream/handle/11540/5033/making-globalization-work-better.pdf?sequence=1>

- 4 < 1% match (Internet from 18-Oct-2011)
<http://www.adbi.org/files/dp109.rice.contract.farming.cambodia.pdf>

- 5 < 1% match (Internet from 25-Aug-2014)
<http://www.fao.org/uploads/media/zimbabwe.pdf>

- 6 < 1% match (Internet from 12-May-2010)
http://www.adbi.org/discussion-paper/2008/02/25/2492.rice.contract.farming.in.lao.pdr/switching_regression/

- 7 < 1% match (publications)
[Masakure, O., "Why do small-scale producers choose to produce under contract? Lessons from nontraditional vegetable exports from Zimbabwe", World Development, 200510](#)

- 8 < 1% match (publications)
[Abel, Kwaku K, Bruce, A, Donkoh Samuel, and Ayamga Michael, "Improved rice variety adoption and its effects on farmers output in Ghana", Journal of Development and Agricultural Economics, 2014.](#)

- 9 < 1% match (Internet from 24-May-2013)
http://www.cs.odu.edu/~cs472/fall07/assignments/a1/wahab/keysfile_alnum

- 10 < 1% match (Internet from 04-Jul-2014)
http://www.value-chains.org/dyn/bds/docs/830/12-VA-A-Savoir_ContractFarmingReview.pdf

- 11 < 1% match (Internet from 16-Jul-2017)
<http://repository.ubn.ru.nl/bitstream/handle/2066/159269/159269.pdf?sequence=1>

- 12 < 1% match (Internet from 09-Mar-2012)
<http://www.ippg.org.uk/papers/dp37.pdf>

- 13 < 1% match (Internet from 20-Nov-2013)
<http://www.adbi.org/files/dp90.rice.contract.farming.in.lao.pdr.pdf>

- 14 < 1% match (Internet from 12-May-2010)
<http://lad.nafri.org.la/fulltext/2019-0.pdf>

- 15 < 1% match (Internet from 24-Dec-2016)
<https://digital.library.adelaide.edu.au/dspace/bitstream/2440/81909/8/02whole.pdf>

- 16 < 1% match (Internet from 04-Oct-2012)
http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2009/12/10/000333037_20091210014322/Rendered/INDEX/520990PUB

- 17 < 1% match (Internet from 10-May-2010)
<http://faculty.smu.edu/millimet/classes/eco7377/papers/caliendo%20kopeinig.pdf>

< 1% match (publications)