ACTORS' INTERACTIONS AND FARMERS' PARTICIPATION IN AGRICULTURAL PROJECTS: A CASE OF RIPAT-SUA PROJECT IN MOROGORO TANZANIA

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EXTENDED ABSTRACT

Studies on farmers' interactions in agricultural projects have reported on the importance of the interaction of farmers with other actors on their participation in agricultural projects and subsequent adoption of agricultural technologies. However, there has been little interest on the influence of farmers' interactions, alternative income generating opportunities and biophysical conditions of the farmers' geographical locations, on farmers' participation in agricultural projects. Guided by Ostrom's Institutional Analysis and Development (IAD) framework and the social exchange theory, the study sought to describe the patterns of interactions between farmers and other actors, determine the influence of interactions on farmers' participation in agricultural projects and determine exogenous factors influencing farmers' interactions. The study adopted a cross-sectional research design whereby data were collected through a questionnaire survey, focus group discussion, and key informant interview. Quantitative data were analysed descriptively and inferentially while qualitative data were analysed using content analysis. The study findings showed that farmers' interactions with other actors in agricultural projects increased with decrease in distance from the crop market. Diversity of crops/livestock produced and number of resources shared by the actors showed a statistically significant influence on farmers' interactions. The findings showed further that participation of farmers in agricultural projects increased with increasing remoteness, and interactions influenced participation. With alternative income generating opportunities, the farmer may take up additional income generating activities limiting their participation in agricultural activities. Institutions, biophysical conditions and group leadership showed statistically significant influence on participation. The study findings corroborate the IAD framework that the action situation, that is, biophysical conditions (in this case proximity to the crop market), interactions and institutions, influence farmer’s decision to participate in agricultural projects. They also support the social exchange theory which postulates that cost and rewards (in this case resources shared) are important driving forces for farmers’ interactions. The study suggests that, rather than referring to it just as cost and rewards, it should be explicit in the social exchange theory that both material and social benefits are important when it comes to motivating factors for actors’ interactions. For increased farmers’ participation, it is recommended that government and non-governmental organizations embrace group approach and the RIPAT approach in designing and implementing agricultural development projects. Creation of avenues for agricultural stakeholders’ interactions, improvement of the feeder roads and construction of markets at strategic locations are also recommended. Lastly, agricultural interventions ought to be rewarding to farmers.

DECLARATION

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

....
....

Gasper Philemon Ringo

Date

(MAPME Candidate)

The above declaration is confirmed:

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....

Dr. Emmanuel T. Malisa

Date

(Supervisor)

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DEDICATION

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Agriculture is of great importance in the economy and poverty alleviation efforts in many countries. The agricultural sector is more important in development of the developing countries, including Tanzania, where most of the people depend on agriculture as a way of living (Aref, 2011). Farmer groups have been promoted as a means through which farmers are able to pool labour and other resources, access service providers together and therefore attain their production objectives better than they would if they operated individually. Farmer groups are groups of individuals with common interest in agriculture formed to help each in improving agricultural products as well as income generation (Farmers' Association, 2019). Roles played by farmer groups in agriculture such as poverty reduction, production increase and food security stimulate government, non-governmental organizations (NGOs), and extension agents to form farmer groups as one of the essential means of increasing performance and participation in agricultural projects and income generation on small scale-farmer (Abdul-rahaman and Abdulai, 2018).

Participation is the way in which stakeholders influence and share control over priorities setting, policy-making, resource allocation and access to public goods and services

(Omotesho *et al.*, 2016). Other scholars define farmers participation as farmers' involvement in farming activities in the rural areas (Ochieng *et al*., 2018 and Aref, 2011). A well-planned participation system in agricultural groups can be the best way for the adoption of new agricultural technology disseminated either by government, non-governmental organizations (NGOs), and extension system. According to Aref (2011), farmers' participation in agricultural projects, if not considered during planning and implementation of agricultural projects, development and sustainability will not be attained in agricultural projects. Therefore, participation of farmers, especially through farmer groups, during planning and implementation phases of the projects is seen as a possible way to reduce failure of agricultural projects, and increases farmers' interaction with different stakeholders involved in the project.

Farmers interact with fellow farmers, buyers, extension agents, scientists, government officials, and NGOs', and this leads to adoption of new agricultural technology and increase in agricultural production (Wood *et al.*, 2014). Farmers rely on actors' interaction for information pick up, resources sharing, and knowledge sharing (Warnet, 2015; Duinen *et al.*, 2012). Social interactions, which farmers have with different actors, are used as a source of information and resources to individual or group of farmers. According to Vishnu *et al.* (2018), farmers view information as agricultural production resources. Farmers do interact with different actors in the social network so as to acquire different information including market information, improved technology in agriculture, and type of crops to be produced. Access to agricultural information available in social interaction of the farmers is associated with an increase in agricultural production and transfer of agricultural knowledge through social interaction (Pratiwi and Suzuki, 2017). In this study, actors' interactions refer to relationships among actors, including farmers, buyers, service providers, and projects implementing organization through which the involved actors acquire agricultural information and/or resources.

RIPAT-SUA project uses RIPAT (Rural Initiatives for Participatory Agricultural Transformation) approach which, among other things, encourages the formation of farmer groups and participatory planning and management of agricultural projects. RIPAT approach uses farmer groups for training, transferring information, resources, and sharing market information (Vesterager *et al.*, 2017). RIPAT is a participatory extension approach that aims to close the agricultural technology gap as a means of improving livelihoods and self-support among rural small-scale famers (Vesterager *et al.*, 2017). Among others, the RIPAT approach embraces collaborations as one of the key elements of the approach. In this regard, organizations implementing projects applying the RIPAT approach collaborate with the local government authorities (Aben *et al.*, 2013), and links farmers with service providers including crop buyers, seed suppliers, and researchers. How this interaction enhances or constrains participation of farmers in agricultural projects is a relevant question that warrants a study. Also, literature, for example Omotesho *et al*. (2016) shows that, although farmer groups have proven to be instrumental in addressing smallholder farmers' problems, participation of farmers in groups' activities is one of the challenges encountered. Using RIPAT-SUA project as a case study, this study attempted to account for the determinants of participation of farmers in groups'/agricultural projects' activities.

1.2 Problem Statement

Farmer groups have been important for NGOs and extension agents to meet their targeted goals to the communities. Involving groups in implementing projects has been associated with greater achievements and farmer groups' participation in agricultural projects (Paul, 2009; Suvedi *et al.*, 2017; Ofuoku and Agbamu, 2013; Roth *et al.*, 2014; Ajayi and Otuya, 2005; Ogunlela and Mukhtar, 2009; Etwire *et al.*, 2013; Oerlemans, 2004).

Different studies have been conducted in the area of farmer groups and have addressed various issues, including farmer groups' participation in agricultural projects, their performance and role in improving economic conditions of farmers. The studies include Place *et al*. (2004), Kalr*a et al.* (2013), Orsi *et al*. (2017), Mkpado and Arene (2007), Ram *et al.* (2017), Swaminathan and Balan (2013), Tallam (2018), and Omotesho *et al*. (2016). However, there has been scanty interest in the role of the following variables on farmers' participation in agricultural projects activities: Farmer's interactions with the other actors, alternative income generating activities or employment opportunities, and physical characteristics of the farmer's geographical location. For example, in their study on determinants of level of participation of farmers in group activities, Omotesho *et al.* (2016) focused on age, gender, total annual income (farm income and non-farm income), education, farm size, number of extension contacts, membership of other farmer groups, access to farm credit, and access to training.

This study sees actors' interactions to be crucial in understanding farmers' participation in groups' or projects' activities. Farmers' decisions, whether to participate in project activities or not, and actions, are motivated by their interactions with other actors, coupled with institutions and incentives surrounding them. Therefore, the study pays particular attention to farmers' interactions with other actors, alternative income generating activities and biophysical conditions which, potentially, influence their participation in groups' or projects' activities, but have received little attention in the farmer groups' literature.

1.3 Study Justification

RIPAT-SUA project is an agricultural project operating in Morogoro Municipal and Mvomero Districts, covering villages/ wards representing the highland, midland and the lowland areas of the Uluguru Mountains. Eight farmer groups have been formed during the RIPAT start phase and, according to the RIPAT-SUA project quarterly report (2019), members had differential participation in the project. The question was whether or not the differences in participation has anything to do with the income generating opportunities available in the farmers' geographical locations, interactions with various actors, and the physical characteristics of the farmers' geographical locations. Therefore, this study provides an understanding of the reasons for differential participation of farmers in groups' or agricultural projects' activities. The information is useful in formulation of strategies for improving agriculture, especially those with bearing on promoting adoption of improved agricultural technologies and farmers' organizational development. Also, such information is useful for NGOs, policy makers, District Councils and farmer groups in designing and implementing agricultural projects.

In addition, the study is in line with the Sustainable Development Goals (SDGs), particularly goal number 2 which emphasizes on zero hunger through supporting smallholder farmers' ability to increase agricultural production, as well as Agricultural Sector Development Strategy (ASDS) 2015/15-2025/26, particularly strategic objective 2, sections G and I, which emphasize on research to improve extension services. As for academic relevance, the study tested the relevance and application of the IAD framework and the theory of social exchange under the study's circumstances.

1.4 Objectives of the Study

1.4.1 Overall objective

The overall objective of this study was to examine the role of actors' interactions on farmers' participation in agricultural projects.

1.4.2 Specific objectives

i) To describe the patterns of interaction of group members with other actors

ii) To determine the influence of interactions on farmers' participation in agricultural projects

iii) To analyse exogenous factors influencing farmers' interactions with other actors

1.5 Research Questions

i. What are the patterns of interaction between group members and other actors?

ii. How do farmers-other actors' interactions differ by altitude?

iii. How do interactions in the farmers' geographical locations with other actors enhance or constrain group members' participation in agricultural projects?

iv. How do alternative sources of income affect participation in farmer groups' activities?

v. How do biophysical conditions of the community affect farmers' participation in agricultural projects?

1.6 Theoretical Framework

The study is framed within Ostrom’s Institutional Analysis and Development (IAD) framework. The IAD framework has been used to identify the major variables to be used to analyse institutional arrangements around the study topic. Also, the framework has been used to help identify questions to be addressed. According to Mcginnis (2011), the IAD focuses on the action situation leading to interactions and outcomes. Action situations are the social spaces where individuals interact, exchange goods and services, solve problems, dominate one another, or fight (among the many things that individuals do in action situations). Action situation is used to refer to an analytic concept that enables an analyst to isolate the immediate structure affecting a process of interest to the analyst for the purpose of explaining regularities in human actions and results, and potentially reform them (Ostrom, 2011).

Based on the IAD framework, a common set of variables used to describe the structure of an action situation includes: (i) the set of actors, (ii) the specific positions to be filled by participants, (iii) the set of allowable actions and their linkage to outcomes, (iv) the potential outcomes that are linked to individual sequences of actions, (v) the level of control each participant has over choice, (vi) the information available to participants about the structure of the action situation, and (vii) the costs and benefits which serve as incentives and deterrents assigned to actions and outcomes (Ostrom, 2011).

The study used the social exchange theory to identify the elements of the IAD framework that are particularly relevant to the study's research questions. The social exchange theory proposes that actors possess different levels of information, power and motivation that influence their decision making and interaction (Thomas and Thigpen, 1993). Based on the theory, farmers and federal government are social actors engaged to fulfil a certain goal.

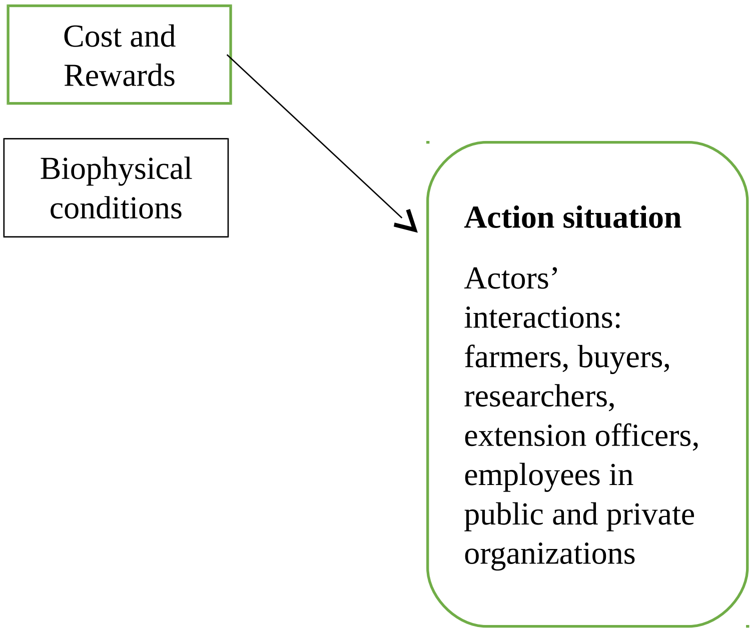
Federal government (institutions, NGOs, agro-companies, extension services, researchers) attempts on behalf of the famers, to regulate production, training, prices and access to credit through farmer groups. Social exchange theory views human interaction and exchange a kind of result-driven social behaviour related to cost and rewards (SWDG, 2019). Cost and rewards found in farmer groups will drive the behaviour of farmers to participate in agricultural projects through farmer groups. Individual farmer will make decision based on a certain benefits found in farmer group through interaction with different social actors (institution, researchers, buyers and agro-company) which have different benefits (training, access to credit, market and agricultural inputs) to the farmers.

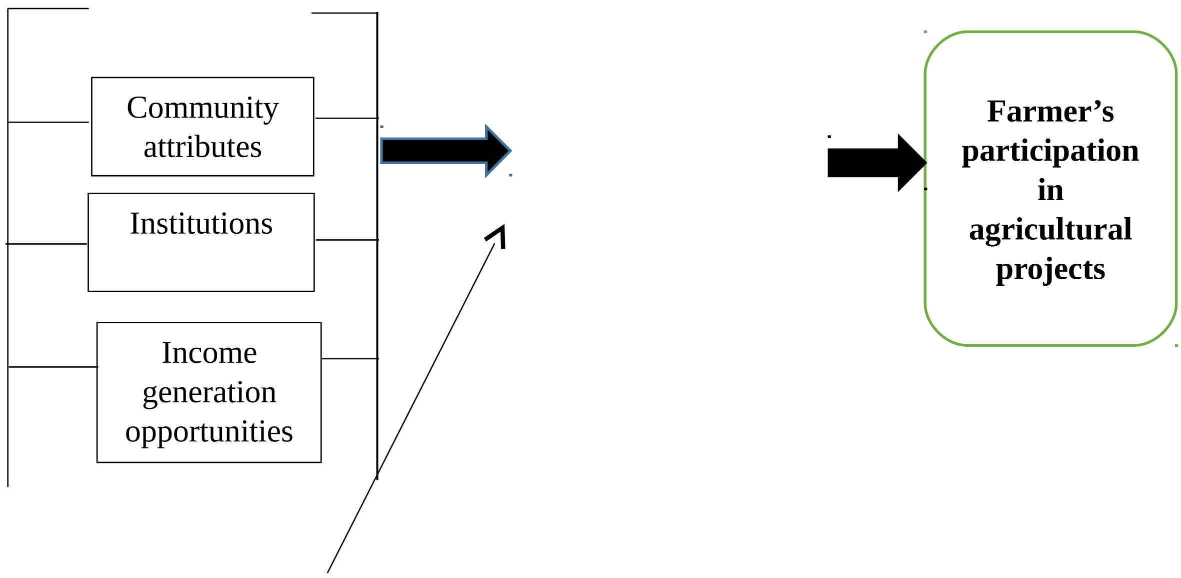
Thus, as implied in the IAD framework and the social exchange theory, the interactions of a farmer with various actors yields rewards or cost (incentives or deterrents) necessary for him/ her to participate in agricultural projects (to generate outcomes). Interactions on the other hand are influenced by factors such as institutions, information, market, credit, extension and accessibility of the area. Specifically, the study endeavoured to examine the influence of cost and rewards, information, biophysical conditions, institutions, community attributes and availability of income generation opportunities on interactions and farmer's decision to participate in agricultural projects. Also, the study evaluated the interactions to see how they affect farmer's participation in agricultural projects. According to Ostrom

(2011), the action situation involves a number of institutions which influence decision; the institutions interact and provide incentives for actors to generate outcomes.

1.7 Conceptual Framework

As shown in Figure 1, the action situation (space where individuals, groups, NGOs and institutions interact) influences farmer's decision to participate in agricultural projects. The action situation, as implied in Ostrom's IAD framework (2011), is influenced by external forces such as biophysical conditions (climatic condition, status of road infrastructure, soil property, slope, etc) surrounding the actors (individuals or groups), characteristics of the community, interaction with actors from outside the community and institutions (including religious and education institutions, policies, norms, beliefs, etc).




Community attributes
Institutions
Income generation opportunities
Farmer's participation in agricultural projects

Information

Figure 1: A conceptual framework for the study on the role of actors' interaction on farmers' participation in agricultural projects

Source: Adapted from Ostrom (2011) and informed by the social exchange theory

Other factors are income generation opportunities (employment opportunities), information and cost/rewards associated with interactions/participation in agricultural projects. According to SWDG (2019), cost and rewards found in farmer groups will drive the behaviour of farmers to participate in agricultural projects through farmer groups.

1.8 Organization of the Dissertation

The dissertation is organized in four chapters. Chapter one contains the background information, problem statement, justification of the study, objectives of the study and the research questions. Theoretical and conceptual frameworks, and organization of the dissertation are also presented in chapter one. Chapters two and three contain the publishable manuscripts emanating from the study. Manuscript one, which is on the influence of interactions on farmers' participation in agricultural projects, is presented in chapter two. Manuscript two, which is on the influence of exogenous variables on interaction of farmers with other actors in agricultural projects, is presented in chapter two.

Chapter four summarizes the major findings from the dissertation as well as the overall conclusions and recommendations emanating from the dissertation.

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CHAPTER TWO

2.0 Influence of Farmers and Other Actors' Interactions on Farmers' Participation in Agricultural Projects: Experience from RIPAT-SUA Project

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2.1 Abstract

Participation of group members in agricultural projects is among the subjects of the farmer groups' field which have been widely studied. However, little is known on the influence of the following variables on farmers' participation in agricultural projects: farmers'

interactions with other actors, availability of alternative income generation opportunities and biophysical conditions of the farmers' geographical locations. Guided by Ostrom's Institutional Analysis and Development (IAD) framework and the social exchange theory, the study sought to determine the influence of interactions on farmers' participation in agricultural projects. Quantitative data were collected through questionnaire survey while qualitative data were collected through Focus Group Discussion (FGD), and Key Informant Interview. Descriptive/ multiple regression and content analysis were used to analyse quantitative and qualitative data respectively. Participation of farmers in agricultural projects increased with increasing remoteness and, interactions influenced participation. Where alternative income generation opportunities exist, interaction is likely to influence the farmer to take up additional income generating activities limiting their participation in agricultural projects' activities. Institutions, biophysical conditions and group leadership showed statistically significant influence on participation. The study findings corroborate the IAD framework that the action situation (biophysical conditions, interaction and institutions) influences farmer's decision to participate in agricultural

activities. For increased farmers' participation in agricultural projects, it is recommended that government and non-governmental organizations embrace the group approach and the RIPAT approach in designing and implementing agricultural development projects.

Key words: Interaction, farmers, participation, agricultural projects

2.2 Introduction

The agriculture sector in Tanzania accounts for 20% which is about a quarter of the export value of agricultural products, and about 80% of the population living in the rural areas are farmers (JICA, 2020). The agriculture sector in Tanzania is highly contributing to poverty reduction in the country. According to JICA (2020), the poverty rate in Tanzania is 33.3% and 21.7% for rural and urban respectively. Since the 1980s there was a decrease in centralization of governments; extension services across developed and developing countries use bottom-up approaches to ensure that private sector and farmers are highly involved in agricultural project implementation for effective participation of the farmers

(Kalra *et al.*, 2013 and Sharaunga and Mudhara, 2018). Government, non-governmental organizations (NGOs), extension officers and inputs supply firms should ensure that farmers are involved in the agricultural projects to increase agricultural production by using farmer groups.

Participation is the way in which stakeholders influence and share control over priorities setting, policy-making, resource allocation and access to public goods and services (Omotesho *et al.*, 2016). This study adopted participation definition from Ochieng *et al*. (2018) and Aref (2011) who define farmers participation as farmers' involvement in farming activities in the rural areas. A well-planned participation system in agricultural groups can be the best way for the adoption of new agricultural technology disseminated either by government, NGOs, and extension system. Participation of farmers in agricultural projects is crucial in development and sustainability of such projects. According to Aref (2011), farmers' participation in agricultural projects if not considered during planning and implementation of agricultural projects, development and sustainability will not be attained in agricultural projects.

Interaction of farmers and other actors in agricultural projects has played an important role in information transfer and performance of farmers' production activities. Actors involved in agricultural projects comprise a different level of information which helps the farmer to adopt different technologies introduced in agriculture. Farmers' interactions help in acquisition of information on agriculture which in turn helps farmers to improve agricultural productivity. Duinen *et al*. (2012) argued that farmers, institutions, NGOs, buyers, inputs supply firms and extension officers involved in the agricultural sector have different information, production experience and knowledge, therefore farmers must interact with different actors to acquire this information in the agriculture sector. Interaction can influence farmers' participation in agricultural projects. Therefore, the study defines interaction as a way through which farmers share agricultural knowledge, acquire agricultural information, and obtain agricultural inputs from different actors available in the social system. According to Pratiwi and Suzuki (2017), social interaction which farmers have will help to disseminate agricultural information leading to more farmers' participation in the agricultural project or group activities.

Rural Initiatives for Participatory Agricultural Transformation (RIPAT) approach uses farmer groups to disseminate new agricultural technologies to farmers. According to Vesterager *et al*. (2017), farmer groups are individual farmers working together from different households with common interest in which agricultural technology and inputs are channelled through them. RIPAT approach uses farmer groups to lower tension on extension services to ensure more farmers get the required training, agriculture technology and inputs. Farmer groups, when they develop and grow together, tend to build social capital creating social interaction (Kilpatrick *et al.*, 2003). In order to ensure farmers participate in agricultural projects, farmers are trained, work together, and are facilitated to solve problems together and create solidarity among themselves. RIPAT-SUA project has been designed and implemented using the RIPAT approach. The project, whose objectives are enhancing adoption of agricultural technologies to small scale farmers, testing and demonstrating the RIPAT approach, and popularizing the RIPAT approach, is being implemented along the land catena of the Uluguru Mountains (RIPAT-SUA Project, 2018). The project villages/wards are located at lowland, midland and highland altitudes, which differ in terms of biophysical conditions and distance from the urban centre. In each of the project villages/ wards, the project has been promoting agricultural activities including crop and livestock production, along with micro-financing activities intended to support agricultural financing.

Studies have addressed various issues, including farmer groups' participation in agricultural projects, their performance and role in improving economic conditions of farmers. The studies include Place *et al*. (2004); Kalr*a et al.* (2013); Orsi *et al*. (2017); Mkpado and Arene (2007); Ram *et al.* (2017); Swaminathan and Balan (2013); Tallam (2018); and Omotesho *et al*. (2016). However, little is known on the influence of the following variables on farmers' participation in agricultural projects' activities: farmers' interaction with other actors, availability of alternative income generating activities or employment opportunities, and physical characteristics of the farmers' geographical locations. Thus, the study endeavoured to: (i) distinguish levels of farmers' participation in agricultural project's activities by their geographical locations, (ii) distinguish levels of farmers' participation in agricultural project's activities by their socio-demographic characteristics, and (iii) determine the influence of interactions between farmers and other actors on farmers' participation in agricultural project's activities.

Guided by the Ostrom's Institutional Analysis and Development (IAD) framework and the theory of social exchange, the variables to be studied were identified. According to the IAD, action situation (space where individuals, groups, NGOs and institutions interact) influences farmer's decision to participate in groups / agricultural projects. Action situation is used to refer to an analytic concept that enables an analyst to isolate the immediate structure affecting a process of interest to the analyst for the purpose of explaining regularities in human actions and results, and potentially reform them (Ostrom, 2011). The social exchange theory proposes that actors possess different levels of information, power and motivation that influence their decision making and interaction (Thomas and Thigpen, 1993). An individual farmer will make a decision based on a certain benefit found in agricultural project through interaction with different social actors (institution, researchers, buyers and agro-company) which offer different benefits (training, access to credit, market and agricultural inputs) to the farmers.

Thus, actors' interactions are crucial in understanding farmers' participation in groups' or projects' activities. The main proposition of the study was that farmers' decisions whether to participate in project activities or not, and actions, are motivated by their interactions with other actors, coupled with institutions and incentives surrounding them. Therefore, the study intended to pay particular attention to group members' interactions, availability of income generating opportunities and biophysical conditions which, potentially, influence participation in project activities, but have received little attention in the farmer groups' and participation literature.

2.3 Methodology

2.3.1 Study area

This study was conducted in Morogoro Region covering two districts namely Morogoro Municipal Council and Mvomero District. In Morogoro Municipal Council two wards, namely Magadu and Kauzeni, were selected. In Mvomero District three villages were selected; they include Changarawe, Tangeni and Mnyanza. Morogoro Municipal Council and Mvomero District are among the six districts of Morogoro Region. Morogoro

Municipality and Mvomero District have a bimodal type of rainfall namely short rains which start from October to December, and long rains starting from February to May/June with an average rainfall of 600-2000mm per annum (Mchomvu, 2015). The climate ranges from tropical savanna to semi-arid (UMADEP, 2001). The two districts were purposively selected because RIPAT-SUA project, which has been used as a case study, started being implemented in the districts since February 2018. The community in the selected study area depends mainly on agriculture as a source of their income and means of livelihood (Malisa *et a*l., 2017).

2.3.2 Research design

A cross-sectional research design was employed in the study area. The design allows gathering data at one-time point and creates a kind of “snapshot” of social life (Neuman, 2014) and

(Levin, 2014). The reason for choosing this design is that it examines information on many cases at one point in time (Lavrakas, 2008).

2.3.3 Sampling procedure and sample size

In this study the sampling unit is farmer group members. The sampling frame includes all members in the 8 groups, from 5 villages/wards in Morogoro Municipal Councils and Mvomero District, which are involved in RIPAT-SUA project. Towards the end of 2019, RIPAT-SUA project was working with 16 groups, each with 25-30 members, from seven villages in Mvomero District and five wards in Morogoro Municipal Council (RIPAT-SUA Project, 2019). However, 8 of the groups were formed during the RIPAT "spreading" phase which started a year after the RIPAT "start" phase[1] during which the first 8 groups were formed. It was considered to be too early to establish participation levels among group members for the RIPAT "spreading" phase groups as they were still in their early development stages with members still figuring out whether to continue with the groups or not. Therefore, the sampling frame included all members in the 8 RIPAT "start" groups.

A list of farmer group members for RIPAT-SUA's RIPAT start groups was obtained from the groups' leaders. Respondents were randomly selected from the list using "=Rand ()" command in Microsoft excel to generate a random number against each group members.

Table 2.1: *Number of respondents selected from each group*

District	Ward	Village/Street	Group name	Number of group members	Number of respondents
Mvomero	Mzumbe	Tangeni	Tupendane	29	15
			Uchumi	28	15
		Mnyanza	Twikinde	27	15
			Chikena	25	15
		Changarawe	Nuru	30	15
			Amani	31	15
Morogoro Municipality	Magadu	Mgambazi Street	Faraja	30	15
	Kauzeni	Kauzeni	Mshikamano	22	15

[1] RIPAT “start” phase involves formation of groups to participate in the RIPAT project from the start while

Total	**222**	**120**

In each group, random numbers generated using “=Rand ()” command were arranged from smallest to the largest number whereby the first 15 members (at least 50%) were selected making a total of 120 respondents (Table 2.1). FGDs were conducted using three groups from the RIPAT “start” phase. The groups were selected based on their location along the land catena of the Uluguru Mountains where the project was being implemented. In this regard, one group was selected from the highland, one from the midland and one from the lowland. 8 participants were purposively selected from each group with 5 females and 3 males.

RIPAT "spreading" involves formation of new farmer groups in villages adjacent to the RIPAT "start"

2.3.4 Data collection

Primary data were collected through questionnaire survey, Focus Group Discussion (FGD) and Key Informant Interviews (KIIs). Questionnaire survey was administered to group member, FGD and KIIs were used to collect data using FGD guide and checklist respectively. Both methods were used to provide proof of answers from the respondents.

villages. RIPAT "spreading" is implemented one to two years after project start (RECODA/WVT, 2017).

2.3.5 Data analysis

Primary data collected using questionnaire were coded and entered into IBM SPSS version 20. To ensure the quality of data, data cleaning was done. Multiple regression model was used to estimate factors influencing farmer's participation in agricultural projects. Before analysis, independent variables were checked for multicollinearity. According to Frost (2020), multicollinearity in regression model occurs if the independent variable correlates with one another. To avoid including variables which are highly correlated in the model, variables with less than 0.1 tolerance value and VIF of more than 10 were not included in the regression model (Daoud, 2017).

Multiple regression model was used to determine the influence of interaction on farmer's participation in agricultural project. Participation of farmers was captured as a continuous variable whereby the number of agricultural trainings attended, group meetings attended and farm management activities a group member attended were combined. According to

Field (2009), multiple regression model with more than one independent variable can be written as:

$$Y = \beta o + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \epsilon$$

Whereby X_1, X_2, …, X_n are variables shown in Table 2.2.

Table 2.2: Measurement of the independent variables

Variables	Measurement
Respondent’s years since born	Number of the year of respondent since born
Respondent’s level of education	1=Primary level. 2=Secondary level. 3=Certificate level. 4=Diploma level. 5=Degree level. 6=Never attended school
Respondent’s marital status	1=Married 2=Single 3=Divorced 4=Widow
Group leader encourage member participation	1=Yes 2=No
Religion of the respondent	1=Christian , 2=Muslim

Variables	Measurement
Experience in years working with an agriculture project	Number of year farmer worked in an agricultural project
Distance from home to demonstration plot in a minute if walking	Time spent if walking from home to demonstration plot
Perceived Benefit	Comparison of cost and benefit, 1=Costs are higher than benefits 2=Costs and benefits are equal 3=Benefits are higher than costs

Variables	Measurement
Interaction	The number of actors+ Number of information type+ Frequency of information flow measured at scale level.
Respondent’s sex	Measured as 1=male, 0=female
Availability of income generation opportunities	Number of employment available measured at the scale level
Road condition throughout the year	Accessibility of the area (1=passable throughout the year, 0=not passable throughout the year)

Variables	Measurement
Number of institutions available	The number of institution operation in the group member’s location.

2.4 Results and Discussion

2.4.1 Status of farmers’ participation in agricultural project in the study area

The RIPAT-SUA project was being implemented in the lowland, midland and highland areas whereby remoteness increases with altitude and biophysical conditions differ across the various altitudes. Therefore, it was of interest to find out if there was any difference in participation by farmers' geographical location and biophysical conditions. In subsequent sections, is presented an account of the role of actors' interactions and other factors on farmers' participation in agricultural projects. According to the IAD, biophysical conditions and interactions have the potential to influence decision to participate in agricultural projects.

Participation in agricultural activities was measured by combining the number of agricultural training the farmer attended, farm management activities attended and the number of group meetings attended. Each member of the groups under RIPAT-SUA project was expected to participate in the mentioned activities. Expressed in percentages, the participation scores were grouped using percentile technique in which three categories were obtained: 1%-49%, 50%-75%, and 76%-100%, which represent farmers with poor participation, satisfactory participation, and high participation respectively. Table 2.3 shows levels of participation of farmers (group members) in RIPAT-SUA project.

Results show that majority of the respondents (40.8%) corresponded with satisfactory level of participation, followed by poor participation (30.8) and lastly high participation (28.3) (Table 2.3).

Table 2.3: Farmers' participation by location (village/ward/altitude)

Village/Ward	Altitude	Sample size	Level of participation by group members		
			Poor (1%-49%)	Satisfactory (50%-75%)	High (76%-100%)

Magadu (Mgambazi Street)	Highland	15	1(6.7)	4(26.7)	10(66.7)
Mnyanza Village	Highland	30	8(26.7)	16(53.3)	6(20.0)
Tangeni Village	Midland	30	3(10.0)	13(43.3)	14(46.7)
Changarawe Village	Lowland	30	14(46.7)	12(40.0)	4(13.3)
Kauzeni Ward	Lowland	15	11(73.3)	4(26.7)	0(0.0)
Total		**120**	**37(30.8)**	**49(40.8)**	**34(28.3)**

Note: In brackets are percentages

Farmers in the highland area, especially Mgambazi Street, showed the highest participation levels. In this street, 66.7% of the farmers were ranked high in terms of participation in agricultural activities. For the lowland area (Changarawe Village and Kauzeni Ward), the overall participation level was poor. While in Kauzeni Ward none of the farmers was ranked high, only 13.3% of the farmers in Changarawe Village were ranked high in terms of participation in agricultural activities. Higher participation in the highland area could be explained by the fact that in the area, agriculture is the predominant activity with limited alternative income generation opportunities. The findings are in line with the results reported by Umunnakwe (2014) that majority of youth in the rural are self-employed in agricultural activities and involve less in non-agricultural activities because they are scarce compared to peri-urban areas. Therefore, farmers have limited options and thus are more likely to participate in agricultural activities.

In the midland area (Tangeni Village) farmers had higher participation than farmers in the lowland area and lower participation than farmers in one of the administrative units (village/ward) in the highland area, that is, Mgambazi Street in Magadu Ward. However, the participation level demonstrated by farmers in the midland area was higher than that of one of the administrative units in the highland area, that is, Mnyanza Village. While the area (Tangeni Village) has limited income generation opportunities, it is closer to crop market and has all year round passable road ensuring crop marketability and low transportation cost for farm produce. The findings are supported by Tamene and Megento (2017) who reported that farmers who are distant from the market centre are less likely to produce crops for market surplus compared to farmers near market centre.

2.4.2 Associating socio-demographic characteristics of the respondents with their participation in agricultural project's activities

Results, as indicated in Table 2.4, show that 61.7% of the respondents were females and 38.3% were males. Males showed higher levels of participation (71.4%) than women (51.4%). Lower participation of female farmers can be explained by more engagement of women, than men, in household chores leading to less time available for project's activities. The findings are in line with those presented by FAO (2011) that women are responsible for household management and children rearing, this addition of work burden limit women time to engage income earning activities (agricultural project) which require a minimum fixed time before being profitable.

Table 2.4: *Socio-demographic characteristics and participation levels of the respondents in RIPAT-SUA project*

Variables	Categories	Overall	Mvomero District	Morogoro Municipality	Participation		
					Poor (1-49)	Satisfactory (50-75)	High (76-100)
Sex	Male	46(38.3)	34(74)	12(26)	3(6.5)	10(21.7)	33(71.4)
	Female	74(61.7)	56(75.7)	18 (24.3)	13(17.6)	23(31.1)	38(51.4)
Age	22-40	33(27.5)	20(60.6)	13(39.4)	4(12.1)	8(24.2)	21(63.6)
	41-59	59(49.2)	46(78)	13(22)	9(15.3)	18(30.5)	32(54.2)

Variables	Categories	Overall	Mvomero District	Morogoro Municipality	Participation		
					Poor (1-49)	Satisfactory (50-75)	High (76-100)
	60-79	28(23.3)	24(85.7)	4(14.3)	3(10.7)	10(35.7)	15(53.6)
Marital status	Married	96(80)	73(76)	23(24)	11(11.5)	25(26)	60(62.5)
	Never married	9 (7.5)	4(44.4)	5(55.6)	2(22.2)	2(22.2)	5(55.6)
	Widow/er	15(12.5)	13(86.7)	2(13.3)	3(20)	6(40)	6(40)
Education level	Primary	93(77.5)	72(77.4)	21(23.6)	10(10.8)	25(27)	58(62.4)
	Secondary	10(8.3)	7(70)	3(30)	2(20)	3(30)	5(50)
	Certificate	2(1.6)	1(50)	1(50)	2(100)	0(0)	0(0)
	Diploma	1(0.3)	1(100)	0(0)	1(100)	0(0)	0(0)

Variables	Categories	Overall	Mvomero District	Morogoro Municipality	Participation		
					Poor (1-49)	Satisfactory (50-75)	High (76-100)
	Bachelor degree	2(1.7)	2(100)	0(0)	1(50)	1(50)	0(0)
	Informal education	12(10)	7(58.3)	5(41.7)	0(0)	4(33.3)	8 (66.7)
Major sources of income	Crop production	81(67.5)	59(72.8)	22(27.2)	6(7.4)	24(29.6)	51(63)
	Livestock production	8 (6.7)	6(75)	2(25)	1(12.5)	2(25)	5(62.5)
	Petty business	19(15.8)	14(73.7)	5(26.3)	4(21)	4(21)	11(58)

Variables	Categories	Overall	Mvomero District	Morogoro Municipality	Participation		
					Poor (1-49)	Satisfactory (50-75)	High (76-100)
	Formal employment	3(2.5)	2(66.7)	1(33.3)	3(100)	0(0)	0(0)
	Informal/ casual works	7(5.8)	7(100)	0(0)	1(14.3)	2(28.6)	4(57.1)
	Remittance	2(1.7)	2(100)	0(0)	1(50)	1(50)	0(0)

N.B.: In brackets are percentages

As for age, the respondents’ ages ranged from 22 to 77 years, whereby the majority of the respondents (49.2%) were at the age ranging from 41 to 59 years (middle-age). According to URT (2006), economically active age ranges from 34 to 65, which implies that majority of the respondents involved in the project fall within the economically active age group. Participation was higher (63.6%) for the younger age (22-40) and least (53.6%) for the older age category (60-79). Technologies promoted under the RIPAT-SUA project involved drudgery at the beginning. For example, they were supposed to dig banana holes sized 1 metre wide and 1 metre deep, which is bigger and difficult to make compared to their conventional practice. On this one key informant said:

> *“When we started, many farmers showed interest in the project and joined the group; however, many dropped out after learning it was very demanding to dig banana holes” (27/2/2020, Morogoro).*

According to Ngeywo *et a*l. (2015), young farmers tend to adjust and adopt technology very fast compared to elder people.

Furthermore, the results showed that the majority of the respondents (80%) were married, 7.5% never married, and 12.5% were widow/widower. Their participation was such that, 62.5% of the married respondents participated highly in the project. This shows that married people are more likely to participate in an agricultural project compared to unmarried ones. The main reason is that the married farmer has more labour force to be involved in agricultural activities and is more likely to have more mouths to feed compared those who are single. According to Etwire *et a*l. (2013), although married farmer may take longer time to decide whether to participate in the agricultural project or not but a spouse serves as an additional source of farm labour for a farmer and his/her family.

As for the education level of the respondents, the results show that majority of the respondents (77.5%) had primary education level which is the basic education in Tanzania.

According to URT (2015), the basic education is primary level and secondary level. Those with informal education, that is, have not gone through the formal education system, accounted for 10% of the respondents. Participation in agricultural project activities was highest (66.7%) for farmers with informal education followed by primary education level (62.4%). This can be explained by the fact that there are fewer employment opportunities for people with primary education or informal education, making their engagement in agriculture obligatory. This result agrees with findings by Lugamara *et al*. (2017) which showed that most of the households in Mvomero and Gairo Districts depend on agriculture as a major source of income.

2.4.3 Influence of interaction between farmers and other actors on farmers' participation in agricultural projects

The regression model had R^2 of 0.426 and adjusted R of 0.349 which means that independent variables were able to explain the dependent variable in the model by 42.6%, and explanatory power was 34.9% for individual independent variable added in the model respectively (Table 2.5). Multiple regression results (Table 2.5) show that the following variables have statistically significant influence on participation of farmers in agricultural projects: availability of income generation opportunities (p=0.054), group leadership (p=0.070), interaction (p=0.079), number of institutions available (p=0.001), and road condition (p=0.027).

Income generation opportunities available in the area were negatively influencing participation of farmers in agricultural activities at a 5% significance level. That is, participation of farmers in agricultural activities decreases with increase in income generation opportunities. This implies that alternative income generation opportunities diversify employment opportunities making the engagement in agriculture optional. A farmer exposed to diverse income generation opportunities may opt to diversify their income generating activities (IGA) reducing their time to participate in agricultural activities. This findings corroborate the observation by Ovwigho (2014) that despite farming being predominant activity in rural areas, farmers participate in non-agricultural activities which are either supplementary or complementary to agricultural activities.

Table 2.5: *The influence of interaction on farmers' participation in agricultural projects*

Independent Variable	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Respondent's level of education	-0.210	0.249	-0.067	-0.846	0.399	0.884	1.131
Perceived benefit	-0.840	0.604	-0.110	-1.390	0.167	0.865	1.155

Independent Variable	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Group leadership: encouraging members to participate	2.533	1.384	0.152	1.830	0.07*	0.790	1.266
Interaction	0.118	0.067	0.146	1.776	0.079*	0.808	1.238
Number of institutions available	-0.395	0.118	-0.536	-3.351	0.001***	0.214	4.671

Independent Variable	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Religion of the respondent	1.826	0.975	0.155	1.872	0.064*	0.800	1.250
Distance from home to demonstration plot	0.028	0.023	0.098	1.203	0.232	0.829	1.207
Availability of income generation opportunities	-0.248	0.128	-0.324	-1.945	0.054**	0.197	5.072
Sex	-1.755	.829	-0.171	-2.118	0.036**	0.839	1.191

Independent Variable	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Age	0.042	0.034	0.099	1.237	0.219	0.846	1.183
Marital status	-0.021	0.372	-0.005	-0.058	0.954	0.834	1.199
Group constitution enforcement	1.061	0.762	0.116	1.391	0.167	0.790	1.266
Road condition	3.701	1.645	0.365	2.250	0.027**	0.208	4.801

Independent Variable	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Experience in working with agricultural projects	-0.373	0.584	-0.051	-0.638	0.525	0.841	1.189
(Constant)	12.329	4.202		2.934	0.004**		

Dependent variable: Overall participation (Unstandardized R=+0.652, R^2=0.426, Adjusted R^2=+0.349).

N.B.: ***, **, * are significance at 1%, 5%, and 10% respectively

The results (Table 2.5) show further that group leadership, in this case persuasion of group members by their leaders, has significant influence on farmers' participation in agricultural project activities. When members are reminded and encouraged by their leaders regarding activities they are supposed to implement, they are more likely to participate in such activities. This implies that good leadership of farmer groups has an important role in promoting members' participation in agricultural activities. This findings agree with Ofuoku *et al*. (2013) who reported that group leadership has a positive relationship on member performance and participation. Group leader plays a great role in agricultural group by ensuring that group members get the required information so that they participate in different activities of the group. One of the focus group discussion (FGD) participants said during the FGD that:

"Sometimes our group leader sends short messages (SMS) to remind us about activities, or meetings ahead of us before the planned date" (27/2/2020, Tangeni village).

From the social exchange theory, as SWDG (2019) asserts, cost and rewards found in farmer groups will drive the behaviour of farmers to participate in agricultural projects through farmer groups. Thus, good leadership provides an incentive (reward) for the farmer to participate in agricultural projects.

Study findings show further that interaction of farmers with other actors had statistically significant and positive influence on their participation in project's activities. That is, increasing interaction is associated with increasing participation. Interaction of a farmer with other farmers, or with service providers such as input suppliers, crop buyers, and government or private extension officers, helps the farmer to acquire a specific set of information which in turn influences farmers to participate in group activities. The social exchange theory proposes that actors possess different levels of information, power and motivation that influence their decision making and interaction (Thomas and Thigpen, 1993). Thus, through interaction farmers increase their level of information and resources necessary for agricultural activities in question, which in turn motivates their decision to participate in the activity. The findings also vindicate Duinen *et al.* (2012) observation that farmers interact directly on market present within their social network and farmers who are not involved in the social network observe spatial characteristics of the field of other farmers involved in the social network and seek information from them leading to more interaction of farmers. Further, the findings (ibid) reported that information available in the social network of interaction (famers, farm inputs firm, religion, NGOs, buyers, and institutions) influence farmers' decision on agricultural project depending on the sensitivity of the information.

While the study findings associate increase in participation with an increase in interaction, the same findings show that in the lowland area where interaction was high (46.6%) (Table

2.6), farmers' participation in agricultural projects was poor. This can be explained by the fact that in this area there were diverse income generation opportunities and therefore farmers were free to choose additional IGAs from available alternatives which in turn reduced their time to participate in agricultural activities. The findings corroborate the assertion by RIPAT-SUA Project Officer that:

> *"Challenges we are facing at lowland area include low participation of the group members due to their involvement in different income generating activities" (27/2/2020, Morogoro).*

In the same vein, the highland area was characterized by low interaction (33.3%) but participation was high (Table 2.6). The same explanation holds in that there were limited options for income generation in the highland area and therefore participation in agriculture was obligatory.

In the midland area, there was high interaction (60%), as shown in Table 2.6, and majority of the respondents (46.7%) had high participation (Table 2.3). In the midland area there is a Roman Catholic Church and a crop market centre where people from the neighbouring villages gather for Sunday services and crop marketing respectively. Therefore, the local communities meet and interact with one another in the church, and they interact with buyers and their fellows at the market. In this area, income generation opportunities are limited when compared to the lowland area and therefore the effect of interaction on participation was uninterrupted. This implies that while interaction is an important factor for farmers' participation in agricultural projects, availability of alternative income generation opportunities is a stronger force and may mask the effect of interaction.

Table 2.6: *Interaction by altitude*

Farmer’s location	Sample size	Level of interaction	
		Low (%)	High (%)
Highland area	45	30(66.7)	15(33.3)
Midland area	30	12(40.0)	18(60.0)
Lowland area	45	24(53.3)	21(46.7)

The road condition was also found to influence participation of farmers in agricultural activities. The variable had a positive effect implying that participation increases with increase in the extent to which the road is passable throughout the year. A farmer will be attracted to participate in agricultural activities if their location is accessible throughout the year. Road condition is associated with marketability of agricultural produce. In the midland where the road was passable all year round there was high participation. However, in the lowland area there are better roads but participation was low and this, as it was for interaction, could be attributable to the effect of availability of alternative IGAs. These findings agree with findings of Tamene and Megento (2017), which show that the presence of all-time accessible road influences availability of transport, in turn, increases agricultural productivity in the rural areas.

Results show also that the number of institutions available in the farmer's location is statistically significant in influencing farmer's participation in agricultural activities. Thus, participation of farmers in agricultural projects increases as the number of institutions decrease in farmers' location. Institutions considered in this regard include formal education system, religious institutions (Christianity and Islam), crop markets and military services. Some of these institutions increased employment opportunities thereby limiting participation in agricultural activities.

Thus, the findings corroborate the main assumption of the Ostrom's Institutional Analysis and Development (IAD) framework that the action situation, in this case biophysical conditions-represented by road conditions, interaction of a farmer with other actors and institutions, influences farmer's decision to participate in agricultural activities. According to Ostrom (2011), the action situation involves a number of institutions which influence decision; the institutions interact and provide incentives for actors to generate outcomes.

2.5 Conclusions and Recommendations

2.5.1 Conclusions

Guided by the social exchange theory and Ostrom's Institutional Analysis and Development framework, the study assessed the influence of interactions on farmer's participation in agricultural projects. The study used the RIPAT-SUA project, which was being implemented in the lowland, midland and highland areas of the Uluguru Mountains, as a case study.

Based on the study findings, it can be concluded that participation of farmers in agricultural projects increases with increasing remoteness, this being largely due to lack of alternative income generation opportunities in remote areas.

Interaction of a farmer with other actors influences their participation in agricultural projects. Through interaction, the farmer increase access to information and resources necessary for their participation in agricultural projects. Availability of alternative income generation opportunities is a strong force influencing farmers' participation in agricultural activities. Where alternative income generating opportunities exist, interaction is likely to influence the farmer to take up additional IGAs limiting their participation in agricultural activities. Institutions, biophysical conditions and farmer group's leadership are important factors for farmer’s participation in agricultural project’s activities. These variables serve as incentives or deterrents for the farmer in the course of their decision making.

Therefore, the study findings corroborate the social exchange theory which postulates that actors possess different levels of information, power and motivation that influence their decision making and interaction. It also confirms Ostrom's Institutional Analysis and Development (IAD) framework that the action situation, in this case biophysical conditions, interactions and institutions, influences farmer's decision to participate in agricultural activities.

2.5.2 Recommendations

The following recommendations are made based on the study findings:

Adoption of the group approach in executing agricultural projects: Government and non-governmental organizations involved in promoting agriculture need to embrace farmer groups approach as it fosters interaction among farmers and between farmers and service providers hence increasing their access to information and resources necessary for implementation of agricultural activities. Farmer groups reduce transaction cost of knowledge transfer and provide incentives for participation in agricultural activities.

Since accessibility of an area is important for participation in agricultural projects, efforts to improve feeder roads should continue to be given priority in the national budgets. Also, the study calls for support to local efforts to rehabilitate feeder roads. Such efforts include organizing community members to improve water ways and do minor repairs to the roads.

Decision to participate in agricultural activities is influenced by available incentives, which include agricultural information, agricultural inputs, extension support and the way farmers are organized. This requires an appropriate approach to designing and implementation of agricultural projects. The RIPAT approach, which was adopted by the RIPAT-SUA project, is the case in point. It is through the RIPAT approach that farmers in the study area were organized into strong producer groups, relevant information and inputs availed to farmers and meaningful interaction with various service providers made possible. It is therefore recommended that government and non-governmental organizations embrace the RIPAT approach in designing and implementing agricultural interventions.

Lastly, the study recommends a study on economic and social implications of engagement in multiple IGAs in addition to agricultural activities by farmers in Morogoro Municipal Council and Mvomero Districts.

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CHAPTER THREE

3.0 Influence of Exogenous Variables on Interaction of Farmers with Other Actors in Agricultural Projects: Experience from RIPAT-SUA Project

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3.1 Abstract

Studies on farmers' interactions in agricultural projects have reported on the importance of the interaction of farmers with other actors on their participation in agricultural projects and subsequent adoption of agricultural technologies. The patterns of farmers' interactions, and the exogenous variables, though have the potential to influence interactions, have received little attention in the literature. Guided by Ostrom's Institutional Analysis and

Development (IAD) framework and social exchange theory, the study sought to describe the patterns of interactions between farmers and other actors, and determine exogenous factors influencing farmers' interactions using RIPAT-SUA project as a case study. Quantitative data were collected through a questionnaire survey. Qualitative data were collected using Focus Group Discussion (FGD), and Key Informant Interview (KII).

Descriptive or multiple regression and content analysis were used to analyse quantitative and qualitative data respectively. Farmers' interactions with other actors in agricultural projects increase with decrease in distance from the crop market. Also, diversity of crops/livestock produced and number of resources shared by the actors showed a statistically significant influence on farmers' interactions. The findings support the IAD and the social exchange theory, which, respectively, postulate that biophysical conditions (in this case proximity to crop market), and cost and rewards (in this case resources shared) are important driving forces for farmers' interactions. Rather than referring to it just as cost and rewards, it should be explicit in the social exchange theory that both material and social benefits are important when it comes to motivating factors for actors'

interactions. The study recommends the establishment of market infrastructures in strategic locations, and ensuring that agricultural interventions are rewarding to farmers.

Key words: Interaction, farmers, agricultural projects, actors, action situation

3.2 Introduction

In Sub-Saharan Africa (SSA), small-scale farming is a key component for food security, economic development and sustainable livelihood. Among other things, agriculture has great importance in the production of foods and income generation in SSA. Small scale farming is estimated to represent 80% of all smallholder farmers in SSA and serves as economic stability for small scale farmers' in the area (Freeman and Qin, 2020; Aref, 2011). Despite the importance of agriculture in a developing country, access to agriculture information, agriculture inputs/ resources and markets are very little in the rural areas where most of the agriculture activities are done (Abdul-rahaman and Abdulai, 2018; Mojo *et al*., 2017). These challenges stimulated governments, development agency and agro-inputs firms to form farmer groups to smoothen the flow of information, knowledge sharing, resources flow, and market information flow from one farmer to another.

Farmers involved in agricultural activities have different knowledge, production experience and agricultural information. Under this condition, farmers' interact to learn from one another. Interaction of farmers involves the exchange of resources and information, which probably influence farmers' decision to participate in agricultural projects or group activities (Duinen *et al.*, 2012). Famers rely on interaction with various actors (fellow farmers, buyers, agro-inputs firms, NGOs, agricultural professionals/researchers) for information pick up, resources sharing, and knowledge sharing (Warnet, 2015; Duinen *et al.*, 2012). This makes different projects implementing organizations like Research, Community, and Organizational Development Associates (RECODA) and Sokoine University of Agriculture (SUA), together implementing RIPAT-SUA project, to collaborate with local government authorities, different stakeholders and farmer groups which in turn increases interactions.

Rural Initiatives for Participatory Agricultural Transformation (RIPAT) approach uses farmer groups for training, transferring information, resources, and sharing market information (Vesterager *et al.*, 2017). Projects applying the RIPAT approach collaborate with extension officers, local government authorities, farmers, buyers and village leaders, and this, in turn, increases the interaction among farmers and other actors. Therefore, the study considers interaction as one of the appropriate ways for farmers to access/ share ideas, knowledge, resources and information from different actors.

Farmers' decisions, whether to participate in project activities or not, and actions, are motivated by their interactions with other actors[2], among others. Studies done in the farmer groups field indicate that farmers' social interaction had a positive effect on farmers' adoption of new technology and increase in farm productivity (Duinen *et al*., 2012; Mashavave *et al*., 2013; Muanga and Schwarze, 2014; Freeman and Qin 2020; . Since interaction is important for participation in agricultural projects, and subsequently, the adoption of new technologies, a thorough exploration of farmers' interactions with other actors is imperative.

In Morogoro Municipal Council and Mvomero Districts, where the study was conducted, farmers interact with different actors and this differs by the specific location of the farmer.

In this area, RIPAT-SUA project, which served as a case study, was being implemented. The project area entails the lowland, midland and highland areas. Relevant questions here are, firstly, whether there is any difference in interaction across the slope and, secondly, what are the factors influencing farmers' interactions. Therefore, the paper attempted to: (i) examine the association between interactions and the farmer's location (ii) describe the

[2] Actors refer to individuals, groups, NGOs or other organizations/ institutions. In this study an actor shares

patterns of interactions between farmers and other actors (iii) determine the influence of various factors, including types of information shared, resources shared, diversity of income-generating activities, diversity of crop/ livestock produced, and distance to the market, on farmers' interactions. These factors have the potential to influence farmers' interactions but have received little attention in the farmer groups' literature.

Identification of the variables to be studied was guided by the Ostrom's Institutional Analysis and Development (IAD) framework and the theory of social exchange According to the IAD, action situation (space where individuals, groups, NGOs and institutions interact) influences farmer's decision to participate in groups / agricultural projects. The

information and/ or resources with farmers.

action situation[3], on the other hand, is influenced by external forces such as biophysical conditions (climatic condition, the status of road infrastructure, soil property, and slope) surrounding the actors (individuals or groups), characteristics of the community, interaction with actors from outside the community and institutions (including religious and educational institutions, policies, norms, and beliefs) (Ostrom, 2011). The social exchange theory proposes that actors possess different levels of information, power and motivation that influence their decision making and interaction (Thomas and Thigpen, 1993). The theory views human interaction and exchange a kind of result-driven social behaviour related to cost and rewards (SWDG, 2019). An individual farmer will make a decision based on a certain benefit found in agricultural project through interaction with different social actors (institution, researchers, buyers and agro-company) which offer different benefits (training, access to credit, market and agricultural inputs) to the farmers.

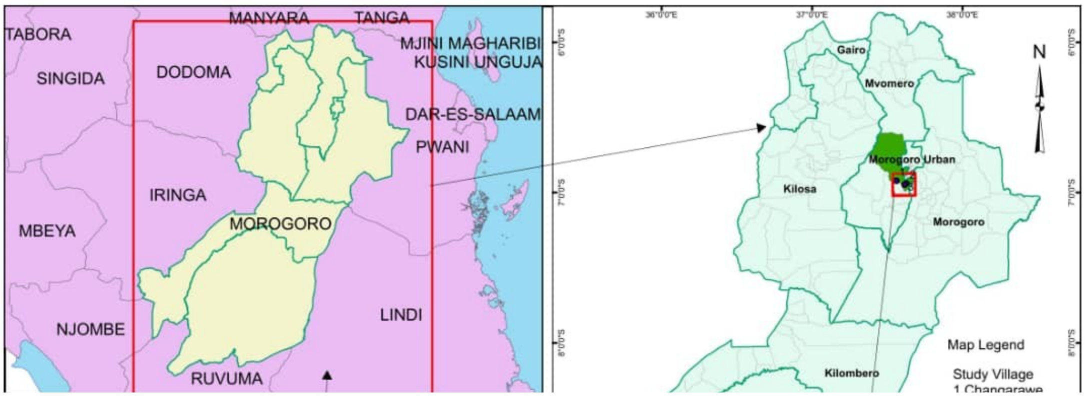
3.3 Methodology

3.3.1 Study area

Morogoro Municipal Council and Mvomero Districts were purposively selected for the study because RIPAT-SUA project was being implemented in the area since the year 2018. The two districts are located in Morogoro Region (Fig. 3.1), which lies at an altitude ranging from 400 to 2000 meters above sea level (Mchomvu, 2015). The districts have a bimodal type of rainfall namely short rains which start from September to December, and long rains which start from February to May/ June with an average rainfall of 600-2000 mm per annum (WS, 2020). The project covers 13 villages/ wards and 16 farmer groups, each with 25-30 members from seven villages in Mvomero District and five wards in Morogoro Municipal Council (RIPAT-SUA Project, 2019). The districts were selected because RIPAT-SUA project started in the two districts. The community in the selected

[3] Action situation refers to social space where individual interact, exchange goods/services, and solve

study area depends mainly on agriculture as a source of their income and means of livelihood (Malisa *et a*l., 2017).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MOROGORO
MBEYA
NJOMBE
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Mvomero
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Figure 3. 1: Map of Morogoro Municipal Council and Mvomero Districts showing the study area

RIPAT-SUA project is a SUA-RECODA[4] collaborative project, implemented in the lowland, midland and highland areas of the Uluguru Mountains within Mororogo Municipal Council and Mvomero Districts following the RIPAT approach. The project started in February, 2018 with eight farmer groups. RIPAT approach is a participatory extension approach that aims to close the agricultural technology gap (Vesterager *et al.*,

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2017). According to Larsen and Lilleør (2016), the stated overall development goal of RIPAT is to reduce poverty and improve food security among smallholder farmers by facilitating high and sustainable levels of adoption of improved agricultural and livestock technologies disseminated through local farmer groups.

[4] SUA-Sokoine University of Agriculture-is a Tanzanian public University whose mission is to

Founded in 2006 in a partnership between the Rockwool Foundation and RECODA, RIPAT approach is founded in three cornerstones, which are creation of a vision of better future through sensitization of communities to the potential for change and the mobilization of farmers to take charge of their own development; establishment of farmer/producer groups with good leadership to enable the transfer of appropriate agricultural technologies through participatory demonstration learning technique, and ultimately the establishment of producer association to leverage marketing skills and opportunities; and close collaboration with local government authorities, village leaders and government agricultural extension officers to ensure the project sustainability and further spreading to the wider community. Farmer groups and associations, and

promote development in agriculture, natural resources and allied sectors through training, research collaborations that are part and parcel of the RIPAT approach, necessitate interaction of farmers with other actors. The study intended to explore the patterns and determinants of such interactions.

3.3.2 Study design

A cross-sectional research design was used in the study area. The design allows researchers to measure the outcome and exposure in the participant over short period (Setia, 2016; Levin, 2014). The reason for choosing this design is that it allows making inferences about the population of interest at one point in time (Lavrakas, 2008).

and delivery of services.

3.3.3 Sampling procedure

The study population consisted of all group members of the RIPAT "start" groups under the RIPAT-SUA project. The study focused on the RIPAT "start"[5] groups because farmers in the groups had already spent more than one year of membership in the group and had interacted with different actors within and outside their groups. Towards the end of 2019, RIPAT-SUA project was working with 16 groups, each with 25-30 members, from seven villages in Mvomero District and five wards in Morogoro Municipal Council (RIPAT-SUA Project, 2019). However, eight farmer groups were purposively selected based on their being the RIPAT-SUA “start” groups. The rest of the groups were formed during the RIPAT “spreading” phase and were less than one year old during the time of data collection for this study.

A list of farmer group members from the project's RIPAT "start" groups was obtained from the group leaders. Respondents were randomly selected from the list using "=Rand ()" command in Microsoft Excel to generate a random number against each group members. In each group, random numbers generated using "=Rand ()" command were arranged from

RECODA-Research, Community and Organizational Development Associates-is a Tanzanian NGO smallest to the largest number whereby the first 15 members (at least 50%) were selected making 120 respondents (Table 3.1).

Table 3.1: *Number of respondents selected from each group*

District	Ward	Village/Street	Group name	Number of group members	Number of respondents

Mvomero	Mzumbe	Tangeni	Tupendane	29	15
			Uchumi	28	15
		Mnyanza	Twikinde	27	15
			Chikena	25	15
		Changarawe	Nuru	30	15
			Amani	31	15
Morogoro Municipality	Magadu	Mgambazi Street	Faraja	30	15
	Kauzeni	Kauzeni	Mshikamano	22	15
Total				**222**	**120**

established in 2000 with the aim of bridging the technology gap in development through research, Focus Group Discussions (FGDs) were conducted using three groups from the RIPAT "start" phase. Each of the FGDs comprised 8 participants with 5 females and 3 males. The groups were selected based on their location along the land catena of the Uluguru Mountains where the project was being implemented. In this regard, one group was

consultancy, capacity-building, and facilitation of community-based projects.

selected from the highland, one from the midland and one from the lowland. In line with Bryman, (2008), 8 participants were selected from each group.

3.3.4 Data collection

Primary data were collected through questionnaire survey, Focus Group Discussion (FGD) and Key Informant Interviews (KIIs) in which project manager and project facilitator from RECODA were interviewed. Using questionnaires, quantitative data were obtained from group members, while qualitative data were gathered through FGD and KII methods with the aid of FGD guide and checklist respectively. The FGDs aimed at obtaining information related to information and resource flow from and to the group and diversity of actors the group collaborate with. Information which was captured through KIIs include: mode of information sharing used in farmer groups, and resources supplied to the group. In addition to triangulation purpose, the use of quantitative and qualitative approaches was meant to ensure complementarity.

[5] RIPAT "start" phase involves formation of groups to participate in the RIPAT project from the start while

3.3.5 Data analysis

Data collected using questionnaire were coded and entered in IBM SPSS (version 20). To ensure the quality of data, data cleaning was done. Frequencies, percentages and mean were used to describe the patterns of interactions. Specifically, the technique aided in quantifying the set of actors involved in the interactions, direction of information flow, means of sharing information, frequency of resources and information flow from one actor to the other, and perceived strength of interactions. Cross-tabulation was used to establish the association of the interaction and farmer's geographical location. A multiple regression model was used to estimate factors influencing interaction in agricultural projects. Before

RIPAT "spreading" involves expansion of the project area through formation of new farmer groups in analysis, predictor variables were checked for multicollinearity. According to Frost (2020), multicollinearity in regression model occurs if the predictor variable correlates with one another. To avoid including variables which are highly correlated in the model, variables with less than 0.1 tolerance value and VIF of more than 10 were not included in the regression model (Daoud, 2017).

villages adjacent to the RIPAT “start” groups’ villages. RIPAT “spreading” is implemented one to two years

The dependent variable, interaction of farmers with other actors, was captured as a continuous variable using a composite index whereby the number of information type shared, frequency of information flow and number of actors present in the farmers' location were combined. The equation is presented hereunder based on (Healey, 2013 and

after project start (Vesterager *et al.*, 2017)

Field, 2009) who asserted that multiple regression model with more than one predictor variables can be written as:

$$Y = \beta o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \cdots \beta_n X_n + \epsilon$$

Whereby Y = farmer's extent of interaction captured as continuous variable, and $X_{1,}\ X_{2,}\ X_{3,}$ X_3, X_4, X_5,…..X_n are predictor variables used in the regression model, whose description is indicated in Table 3.2.

Table 3.2: Description of the predictor variables

Variables	**Measurement**
Age of the farmer	Number of years since born
Sex of the farmer	1= Male 0= Female
Accessibility of the farmers' location (road condition)	1 = road passable throughout the year and 0 = road not passable throughout the year

Institutions/organizations available	Number of the institutions available in the farmers' location measured as a continuous scale
Distance from the market	Measure as time farmers used to walk from home to the nearest market measured at the scale level
Diversity of income-generating activities	Number of income-generating activities done by farmers measured at scale level
Diversity of crops/ livestock produced	Number of livestock species/crops varieties produced by farmers measured at the scale level

Number of resources shared by the actors	Number of resources supplied to the farmers measured at the scale level
Diversity of information access	Number of information sources farmers have access to, measured at the scale level

3.4 Results and Discussion

A key part of the IAD is the identification of an action situation and the resulting patterns of interactions and outcomes, and evaluating these outcomes (Ostrom, 2011). Having understood the initial structure of an action situation, one needs to dig deeper and inquire into the factors that affect the structure of the situation (Kiser and Ostrom, 1982). Thus, in subsequent subsections, the study focuses on patterns of farmers-other actors' interactions and factors affecting actors' interactions.

3.4.1 Association between interaction and farmers' location

The RIPAT-SUA project was being implemented in the lowland, midland and highland areas which differ by institutions available, community attributes, biophysical conditions, and information flow. These variables were hypothesized to potentially influence farmers' interactions. Interaction of farmers in the agricultural project was measured by combining the number of actors, the number of information type shared and frequency of information flow to the farmers. Levels of interaction among the respondents were categorized into “low” (those scoring 13-27) and “high” (those scoring 28-44) (Table 3.3).

Table 3.3: *Farmers' interactions by location*

Location of the farmer	Village/Ward	Sample size	Level of interaction		χ^2	Sig
			Low (13-27)	High (28-44)		
Highland	Mnyanza village &	45	30(66.7%)	15(33.3%)		
	Mgambazi street				5.253	0.072
Midland	Tangeni village	30	12(40.0%)	18(60.0%)		
Lowland	Changarawe village	45	24(53.3%)	21(46.7%)		
Total		120	66(55.0%)	54(45.0%)		

The results show that there is a significant association between interaction and location of the group member at 10% significant level. The results show that majority (66.7%) of farmers located in the highland area, that is, Mnyanza village and Mgambazi Street had lower interaction level as compared to other villages (Tangeni and Changarawe villages).

The main reason for the low interaction could be the relatively low number of actors found in the area and poor road infrastructure restricting the movements of different actors to the area. The highest interaction (60%) was observed in the midland area while in the lowland area, the proportion of farmers belonging to high levels of interaction was 46.7%, which is a medium position when compared with the rest of the areas (Table 3.3).

A possible explanation for the highest interaction among farmers located at the midland (Tangeni village) is that the village possesses a market where farmers, especially those from Tangeni and Mnyanza villages, meet with buyers from Morogoro town and other areas at least twice a week to sell their crops and buy some items. At Tangeni market different actors, including farmers, buyers, inputs suppliers, domestic item dealers, transporters and tax collectors, meet and share miscellaneous information, including agriculture-related ones. The findings agree with those reported by Mutenje *et al.* (2016) which showed that market area is a centre for sharing information with different actors (inputs supplier, buyers, and other farmers). Besides, Tangeni village has a church which serves people not only from the village but also from the neighbouring villages. People meet in the church at least every Sunday.

In the lowland area, there was high number of institutions/ organizations and therefore, expected that there would be higher interactions compared to the midland. However, the findings were the contrary; lower levels of interaction, though not as in the highland area, were recorded in this area. This can be explained by the presence of the church and the market in the midland (at Tangeni village). In addition to providing an avenue for farmers to meet with diverse types of actors, the two institutions appear to be instrumental in facilitating the flow of diverse information types. Not only that but also people from lowland come to the crop market to buy goods in bulk for retailing in the lowland area which in turn, increases the rate of information sharing in the midland area. During the FGD, one participant said:

> *"Tangeni market collects people from all villages in Mzumbe ward, as well as some other wards and villages in Morogoro Municipal Council and Mvomero Districts*

respectively. In addition, some people come from as far as Dar es Salaam to sell or advertise their products at the market" (27/2/2020, Tangeni village)

3.4.2 Patterns of farmers-other actors' interactions

Farmers' interactions are mainly about communication for information and resource sharing among farmers and between farmers and other actors in the action situation. Interaction patterns have been conceived of, and therefore, discussed in terms of: the actors involved, information/resources shared among actors, frequency of information/resources flow, the direction of information/resources flow, means of information/resources sharing and perceived strength of interactions.

3.4.2.1 Type and frequency of information/resources flow, and actors involved

Farmers-actors interactions in the study area involved several actors. Actors with interest in agriculture, and relevant for the study's action situation, were identified by the FGD participants. They include Sustainable Agricultural Tanzania (SAT)-an NGO involved in promoting agro-ecological farming; *Mtandao wa Vikundi vya Wakulima Tanzania* (MVIWATA) meaning Network of Farmers Groups in Tanzania, which is involved in facilitating farmers' networking; Institute for Fish Pen Production Kingolwira (IFPPK)-involved in promotion of fish farming; AKM Glitters-a company involved in chicks supply; NMBU/SUA-a SUA and NMBU (Norwegian University of Life Sciences) collaborative project known as Enhancing Pro-poor Innovation in Natural resources and Agricultural Value Chains (EPINAV) involved in natural resources management; UNITA-a Roman Catholic sister organization; and Research Community and Organizational Development Associates (RECODA) and Sokoine University of Agriculture (SUA), which are involved in research, consultancy and outreach activities (Table 3.4). SUA and RECODA have been treated as one actor because they were implementing a joint project namely RIPAT-SUA project in the study area.

All these actors have been sharing a diversity of agriculture-related information and/or resources with farmers. FGD findings showed that most of the information and resources were coming from RECODA/SUA and were meant to facilitate farmers' engagement in agricultural activities. Supply of resources is usually accompanied by information on how to use them, which in turn increases the rate of information flow to the famers. Resources shared, which include seeds, chicks, dairy goats, piglets, and farm equipment like chaka hoes, are necessary for farmers’ participation in agriculture. Supply of the resources involved linking farmers with service providers or RECODA/SUA acquiring such resources and supplying them to farmers (RIPAT-SUA project, 2019).

Table 3.4: Patterns of interaction – across actors' comparison

Interaction patterns		Actors								
		RECODA/SUA	**Extension oficers**	**Buyers**	**SUANMBU/**	**SAT**	**MVIWATA**	**UNITA**	**IFPPK**	**AKM Glitters**
Direction of information/ resources flow	From actors to the farmer	101(78.3)	14(10.8)	2(1.6)	4(3.1)	8(6.2)	0(0)	0(0)	0(0)	0(0)
	From farmers to the actors	0(0)	2(40)	1(20)	1(20)	1(20)	0(0)	0(0)	0(0)	0(0)

Interaction patterns	Actors								
	RECODA/SUA	Extension oficers	Buyers	SUANMBU/	SAT	MVIWATA	UNITA	IFPPK	AKM Glitters
Both ways	19(29.7)	21(32.8)	16(25)	1(1.6)	3(4.7)	1(1.6)	1(1.6)	1(1.6)	1(1.6)
Frequency of information/ resources flow per year	47 (36.1)	13(10)	18(13.8)	6(4.6)	31(23.8)	6(4.1)	6(4.6)	2(1.5)	1(0.8)

Interaction patterns		Actors								
		RECODA/SUA	Extension oficers	Buyers	SUANMBU/	SAT	MVIWATA	UNITA	IFPPK	AKM Glitters
Means of information sharing	Informal meetings	29(70.7)	7(17)	3(7.3)	0(0)	1(2.4)	0(0)	0(0)	0(0)	1(2.4)
	Formal meetings	44(75.9)	10(17.2)	0(0)	0(0)	4(6.9)	0(0)	0(0)	0(0)	0(0)
	Trainings	47(87)	1(1.9)	0(0)	0(0)	6(11.1)	0(0)	0(0)	0(0)	0(0)

Interaction patterns	Actors								
	RECODA/SUA	Extension oficers	Buyers	SUANMBU/	SAT	MVIWATA	UNITA	IFPPK	AKM Glitters
Farmer to famer extension	0(0)	19(82.6)	0(0)	3((13)	0(0)	0(0)	1(4.3)	0(0)	0(0)
Farmers' study tour	0(0)	2(33.3)	0(0)	1(16.7)	1(16.7)	1(16.7)	0(0)	1(16.7)	0(0)

Interaction patterns		Actors								
		RECODA/SUA	Extension oficers	Buyers	SUANMBU/	SAT	MVIWATA	UNITA	IFPPK	AKM Glitters
	Exchange at the market	0(0)	0(0)	10(100)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Strength of	Strong	83(79.8)	12(11.1)	2(1.9)	1(1.0)	4(3.8)	1(1.0)	1(1.0)	0(0)	0(0)
	Moderate	33(51.6)	12(18.8)	8(12.5)	5(7.8)	5(7.8)	0(0)	0(0)	1(1.6)	0(0)

Interaction patterns		Actors								
		RECODA/SUA	oficersExtension	Buyers	SUANMBU/	SAT	MVIWATA	UNITA	IFPPK	AKM Glitters
interaction	Weak	4(14.8)	15(55.6)	4(14.8)	0(0)	3(11.1)	0(0)	0(0)	0(0)	1(3.7)

NB: In brackets are percentages

As for the frequency of information sharing, the highest frequency of information/ resource flow (36.1%) was depicted by RECODA/SUA followed by SAT (23.8%) while the least was AKM Glitters (0.8) (Table 3.4). There were fewer cases of information sharing by extension officers (10%) when compared with RECODA/SUA and SAT. This could be due to limited number of extension officers which makes it difficult to reach many farmers. Likewise, FGD findings revealed that most of the farmers located in the midland and highland areas have limited access to extension services, which in turn decreases the rate of information flow from either side.

3.4.2.2 Direction of information/resources flow

Information and/or resources flowed mainly from other actors to the farmers (65.2%), followed by information flowing both ways (32.3%) and lastly information flow from farmers to other actors (2.5%). This trend implies that the existing farmers-other actors interaction is characterised by farmers acting largely as information/resources recipients. Other actors-farmers information flow was most evident for RECODA/SUA-farmers interaction (84.2%) followed by SAT and NMBU/SUA, both of which scored 66.7% (Table 3.5). This is logical because the three actors have been involved in training farmers as well as in availing resources which are necessary for the adoption of the newly introduced production technologies. Therefore, they acted as the source of information/resources for farmers. Farmers-other actors' information/resource flow pattern was non-existent for the actors, like AKM Glitters, IFPPK and UNITA, whose relationship with farmers involved farmers acting as buyers of the resources. For these actors, both ways information/resource flow pattern was the exclusive pattern.

Table 3.5: Patterns of interaction - individual actors' comparison

Interaction patterns		Actors									
		RECODA/ SUA	Extension oficers	Buyers	NMBU/SUA	SAT	MVIWATA	UNITA	IFPPK	AKM Glitters	Total
Direction of information/ resources flow	From actors to the farmer	101(84.2)	14(37.8)	2(10.5)	4(66.7)	8(66.7)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	129(65.2)

Interaction patterns		Actors									
		RECODA/ SUA	**Extension oficers**	**Buyers**	**NMBU/SUA**	**SAT**	**MVIWATA**	**UNITA**	**IFPPK**	**AKM Glitters**	**Total**
	From farmers to the actors	0(0.0)	2(5.4)	1(5.3)	1(16.7)	1(8.3)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	5(2.5)
	Both ways	19(15.8)	21(56.8)	16(84.2)	1(16.7)	3(25)	1(100)	1(100)	1(100)	1(100)	64(32.3)
Means of information	Informal meetings	29(24.2)	7(17.9)	3(23.1	0(0.0)	1(8.3)	0(0.0)	0(0.0)	0(0.0)	1(100)	41(20.7)

Interaction patterns		Actors									
		RECODA/ SUA	Extension oficers	Buyers	NMBU/SUA	SAT	MVIWATA	UNITA	IFPPK	AKM Glitters	Total
sharing											
	Formal meetings	44(36.7)	10(25.6)	0(0.0)	0(0.0)	4(33.3)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	58(29.3)
	Trainings	47(39.2)	1(2.6)	0(0.0)	0(0.0)	6(50)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	54(27.3)

Interaction patterns	RECODA/ SUA	Extension oficers	Buyers	NMBU/SUA	SAT	MVIWATA	UNITA	IFPPK	AKM Glitters	Total
Farmer to famer extension	0 (0 . 0)	19(48.7)	0 (0 . 0)	3 (7 5)	0(0.0)	0(0.0)	1(100)	0(0.0)	0(0.0)	23(11.6)
Farmers' study tour	0 (0 . 0)	2 (5 . 1)	0 (0 . 0)	1 (2 5)	1(8.3)	1(100)	0(0.0)	1(100)	0(0.0)	6(3.03)

Interaction patterns		Actors									
		RECODA/ SUA	Extension oficers	Buyers	NMBU/SUA	SAT	MVIWATA	UNITA	IFPPK	AKM Glitters	Total
	Exchange at the market	0 (0 . 0)	0 (0 . 0)	10(76.9)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	10(5.05)
Strength of interaction	Strong	83(69.2)	12(30.8)	2(14.3)	1(16.7)	4(33.3)	1(100)	1(100)	0(0.0)	0(0.0)	104(52.5)
	Moderate	33(27.5)	12(30.8)	8(57.1)	5(83.3	5(41.7)	0(0.0)	0(0.0)	1(100)	0(0.0)	64(32.3)

Interaction patterns		Actors									
		RECODA/ SUA	Extension oficers	Buyers	NMBU/SUA	SAT	MVIWATA	UNITA	IFPPK	AKM Glitters	Total
	Weak	4 (3 . 3)	15(38.5)	4(28.6)	0(0.0)	3(25)	0(0.0)	0(0.0)	0(0.0)	1(100)	27(13)

NB: In brackets are percentages

Both ways information/resource flow pattern was most evident with extension officers (56.8%) followed by SAT (25%), NMBU/SUA (16.7%) and RECODA/SUA (15.8%) in case of extension service and agricultural training-related actors (Table 3.5). Results show that information flow from farmers to extension officers took place mainly through farmer-to-farmer extension (48.7%), which involves extension officer visiting a farmer on-farm for advice. With this channel, the farmer explains to the extension officer his/her agricultural problems based on which the extension officer advises. The arrangement necessarily calls for an exchange and hence both ways pattern of interaction. Similar findings were observed by Development for International Department (2003), which reported prevalence of two way communication between farmers and researchers, extension staff, veterinary staff and local administrators. Both ways information flow pattern was also highly evident for buyers (84.2%) (Table 3.5) and this can be explained by farmers-buyers relationship involving the farmer giving commodities to the farmer and the buyer giving money to the farmer in return.

3.4.2.3 Means of information flow and strength of farmers-other actors' interactions

Information flow channels, which existed in the study area, include formal meetings (29.3%), training (27.3%), informal meetings (20.7%), farmer-to-farmer extension (11.6%), exchange at the market (5%) and farmers' study tours (3%) (Table 3.5). Formal meetings were most applicable to RECODA/SUA (36.7%) followed by SAT (33.3%)

(Table 3.5). The RIPAT approach, which RECODA/SUA embraces, requires that project implementing organization (RECODA/SUA) meets with farmers at least once every week during the first year of the project (Vesterager *et al.*, 2017). This forms the possible explanation for higher scores on formal meetings by RECODA/SUA. Another clue to the findings is implied in the following quote by RIPAT-SUA project facilitator:

“We share information through quarterly meetings with farmers, but also individual farmers are supposed to fill quality control forms which help us to understand progress and challenges which famers are facing” (11/03/2020 Changarawe village).

For training, SAT scored the highest (50%) followed by RECODA/SUA (39.2%). SAT has been visiting the area for specific training and therefore, when the actor is in the study area, often times the purpose is to conduct training. On the other hand, based on KII with RIPAT-SUA Project Manager, RECODA/SUA field officers are always (at least four days a week) in the area, not necessarily for training, but for follow-ups (farmer-to-farmer extension) or meetings. The exchange at the market was only applicable for the buyers (76.9%), this been their most important avenue for exchange; market place brings farmers and buyers together. The other channels used for farmers-buyers interaction pattern was informal meetings (23.1%) (Table 3.5). In practice, farmers and buyers conduct their exchanges through haphazard meetings; they meet at the market without prior agreement.

As for the strength of interactions, the respondents scored their interaction with most of the actors as strong (52.5%) followed by moderately strong (32.3%) and lastly, weak interaction (13.6%) (Table 3.5). Majority of the respondents (79.8%) indicated that there is a strong interaction with RECODA/SUA. This was followed by 11.1% who assigned their interaction with extension officers as strong, with SAT holding the third position (3.8) (Table 3.4). This implies that, RECODA/SUA was closer to the farmers in terms of conducting trainings, sharing information, and providing resources that are required for farmers' engagement in agricultural activities. From the following quote from an FGD participant, the findings are vindicated:

"RIPAT-SUA project facilitators make a follow-up on everything they teach us and provide necessary information on different crops and livestock we produce. Not only that, but also they come to visit us in case of any emergence on crops and livestock provided through solidarity chain arrangement" (11/3/2020, Changarawe village)

Lower scores for the strength of farmers-extension officers' interaction, when compared with RECODA/SUA could be due to few numbers of extension officers in the study area which makes it difficult for them to reach every farmer.

From the discussion above, it is clear that RECODA/SUA has scored the highest in terms of frequency of information and resources flow, other actors-farmers resource flow pattern, and perceived strength of farmers-other actor interaction. The respondents saw RECODA/SUA as the most instrumental actor in the provision of resources and information necessary for their engagement in agricultural activities. The findings corroborate the IAD's postulation that actors interact in light of the incentives they face to generate outcomes directly in the world (Ostrom, 2011).

3.4.3 Factors influencing farmers' interaction

Predictor variables included in the regression model were having R of 0.343 and adjusted R of 0.289 which means that predictor variables were able to explain the dependent variable in the model by 34.3% and the explanatory power was 28.9% for individual predictors included in the model respectively (Table 3.6). Multiple regression results (Table 3.6) show that the following variables have a statistically significant influence on farmers' interactions: distance to the market (p=0.028), diversity of crops/livestock produced (p=0.021), and the number of resources shared by the actors (p=0.000). Against expectations, institutions did not have statistically significant influence on farmers' interactions. This is probably due to the fact that, institutions which act also as organizations, such as the village government, the market, and religious and educational institutions, were considered as actors and therefore formed one of the three variables which were combined to generate the dependent variable. The study villages are barely distinct in terms of policies, rules, norms and beliefs.

Distance to the market was negatively affecting farmers' interaction with fellow farmers and other actors at 5% significant level. This means that the interaction of farmers decreases with increase in distance from the market. The result implies that as the distance from farmer's home to the market increases, the chances that a farmer will attend to the market frequently decreases and therefore the likelihood of a decrease in information flow from different actors at the market. As indicated in Table 3.3, farmers located in the highland area had lower interaction levels than farmers located in the midland area, which is closer to Tangeni market. The findings are similar to the observations by Ayalew *et al*. (2016) and Mutenje *et al.* (2016) that farmers located away from social services (market and other institutions like finance institutions) are less likely to get information of new crops or agricultural inputs slowing their rate of adoption of agriculture technology. The market being closer is a location advantage for the farmers to interact and share information concerning crop price, required crops/crop products and the best season to produce a certain type of crops.

Table 3.6: Factors influencing farmers' interaction

Independent variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. error	Beta			Tolerance	VIF
Institution/organizations available	0.069	0.135	0.076	0.511	0.611	0.273	3.665

Independent variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. error	Beta			Tolerance	VIF
Diversity of income generation activities	0.151	0.774	0.017	0.195	0.846	0.793	1.261
Distance to the market	-0.018	0.008	-0.187	-2.222	0.028**	0.843	1.187
Diversity of crops/livestock produced	0.620	0.264	0.227	2.347	0.021**	0.638	1.566

Independent variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. error	Beta			Tolerance	VIF
Road condition	1.920	1.772	0.153	1.084	0.281	0.299	3.350
Age of the farmer	-0.024	0.043	-0.046	-0.554	0.581	0.876	1.141
Sex of the farmer	-0.449	1.096	-0.035	-0.410	0.683	0.797	1.255

Independent variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. error	Beta			Tolerance	VIF
Number of resources shared by the actors	1.796	0.284	0.525	6.319	0.000***	0.865	1.156
Diversity of information access	-0.104	0.496	-0.021	-0.209	0.835	0.570	1.755
(Constant)	13.164	3.953		3.330	0.001***		

Dependent variable: Interaction (Unstandardized R=+0.586, R^2=0.343, Adjusted R^2=+0.289)
N.B. ***, ** are levels of significance at 1%, 5% respectively

Distance from the market may also imply likelihood with which agricultural activities can be rewarding because it has to do with transport cost and overall post-harvest handling cost. The proximity of market infrastructures to the farmers' location can also be looked at from the biophysical conditions' perspective, which Ostrom (2011) identifies as an important factor influencing interactions. Thus, in line with the IAD and the social exchange theory, biophysical conditions, and cost and rewards are important driving forces for farmers' interactions.

Results show further that the diversity of crops/livestock produced; in this case, farmers involved in diversifying crops/livestock were significantly affecting farmers' interaction in agricultural projects. This implies that, a farmer producing a diversity of crops/livestock will also receive and/ or share diverse information according to the crops/livestock he/she produces and hence the likelihood of higher levels of interaction than those involved in single crops/livestock. Therefore, farmers with different types of crops/livestock meet with different actors (buyers, farmers, extension officers and NGOs) for different crops/livestock leading to more information sharing compared to a farmer with fewer types of crops/livestock.

As for resources shared, the findings show that the number of resources shared by the actors to the farmers was positively affecting farmers' interaction. Often, the supply of resources to farmers is accompanied with information such as why are the resources supplied, how to use them, and what are the expected results. Thus, it is logical to contend that the more the number of resources shared the more the likelihood of high interaction levels. Also, resource supply, from the point of view of agricultural projects, could involve the supply of agricultural inputs and/ or equipment to farmers. In this case, the more the number of resources supplied by agricultural projects the more likely it is that farmers will interact more with resource suppliers and with fellow farmers. For example, through the RIPAT-SUA project, farmer groups' members have accessed several resources, including day-old chicks from AKM Glitters Company, banana suckers from biotechnology laboratory in Arusha, iron bean seeds from Tanzania Agricultural Research Institute

(TARI) Selian, orange-fleshed sweet potato (OFSP) vines from SUGECO[6] and cassava stem cuttings from TARI Kibaha (RIPAT-SUA project, 2019).

Acquisition of these resources involved the interaction of the farmers with at least six service providers. The FGD findings revealed that there was a surge of farmers’ inclination to the production of OFSP, thanks to the availability of the crop's market at SUGECO. This sellers-buyer relationship, between farmers and SUGECO, was driven by the existing transactions between the two actors. Elaborating her motivation for participating in agricultural projects, the FGD participant said:

"Some of the famers participate in groups to work together in agricultural activities, not only that we interact with different stakeholders who supply to us resources necessary for agriculture production" (27/2/2020, Mnyanza Village)

[6] SUGECO stands for Sokoine University Graduate Entrepreneurs Cooperative

From the FGD findings, it is implied in the first case (farmers-SUGEGO interaction) that the driving force for the interaction was the anticipated material benefits. In the second case, however, participation is driven by expected social gains. Thus, the findings corroborate the social exchange theory which, according to SWDG (2019), views human interaction and exchange a kind of result-driven social behaviour related to cost and rewards. However, rather than just referring to it as cost and rewards, it should be explicit in the social exchange theory that both material and social benefits are important when it comes to motivating factors for actors' interactions.

3.5 Conclusions and Recommendations

3.5.1 Conclusions

Actors with the highest scores in terms of frequency of information and resources flow scored the highest in terms of other actors-farmers resource flow pattern, as well as perceived strength of farmers-other actors' interaction. Thus, consistent with the IAD's postulation, actors interact in light of the incentives they face to generate outcomes directly in the world. The study concludes also that exogenous factors, including biophysical conditions such as proximity to the crop market infrastructures, cost and rewards such as resources brought by actors to the action situation, and diversity of resources sought based on diversity of crops or livestock produced, influence farmer’s interaction. It is through interaction with various actors and biophysical conditions at farmer’s disposal that a farmer accesses information and resources necessary for their production activities. Cost and rewards offer deterrents and incentives necessary for the farmers' interactions. The findings agree with the IAD and the social exchange theory, which, respectively, postulate that biophysical conditions, and cost and rewards are important driving forces for farmers' interactions. The study findings suggest that, rather than just referring to it as cost and rewards, it should be explicit in the social exchange theory that both material and social benefits are important when it comes to motivating factors for actors' interactions.

3.5.2 Recommendations

The study recommends that individuals, government and non-governmental organizations involved in the promotion of agriculture ensure that the interventions promoted are rewarding to the farmer, both in the short- and long-term. As exemplified by the RIPAT-SUA project, interactions that are rewarding are likely to result in the participation of farmers in agricultural projects. This could be through ensuring the right information and resources are shared appropriately and at the right time, and that there are avenues for information sharing. Recommended avenues include village/ward level agricultural stakeholders' meetings, which could be conducted quarterly. These meetings bring together farmers, extension officers, NGOs, and technical and political leaders. Establishment of market infrastructures in strategic locations, where farmers could reach with their products and meet with buyers, is also recommended. Lastly, it is recommended that further studies be conducted to establish empirically the effect of interactions on farmer's participation in agricultural projects.

References

CHAPTER FOUR

4.0. SUMMARY OF THE MAJOR FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

4.1. Summary of the Major Findings

Presented hereunder are the major findings of the study based on the study objectives and research questions the study endeavoured to address.

4.1.1. Influence of exogenous variables on interaction of farmers with other actors in agricultural projects

The first objective of the study was to describe the pattern of interaction of the group members with other actors while the second objective was determining exogenous variables influencing farmers' interactions with other actors. Results showed that there was significant association between farmers' interactions and location of the famers in the study area (p=0.072). In this regard, holding constant the effect of the crop market and the church which are located at the middle altitude area, interactions decreased with increase in altitude in the project area. Access to the high altitude area was highly impaired by poor road infrastructure.

Interaction patterns were discussed in terms of: the actors involved, information/ resources shared among actors, frequency of information /resources flow, the direction of information/ resources flow, means of information/ resources sharing and perceived strength of interactions.

The frequency of information flow from other actors to the farmers was highest for RECODA/SUA (36.1%), followed by SAT (23.8%), extension officers (10%), and AKM Glitters (0.8%). Extension officers had low frequency of information flow compared to RECODA/SUA and SAT due to limited number of extension officers in the study area.

Direction of information/resources flow included the following: from other actors to famers, which was the most common (65.2%); both ways, which was the second most prevalent (32.3%); and from farmers to other actors, which was the least (2.5%). Therefore, farmers mainly acted as recipients of the information/resources in the study area. Information/resources flow from RECODA/SUA to farmers was the most evident

(84.2) other actors–farmers information/resources flow. Both ways information/resources flow was most evident with extension officers (56.8%).

Information flow channel used in the study area include formal meetings (29.3%), training (27.3%), informal meetings (20.7%), farmer-to-farmer extension (11.6%), exchange at the market (5%), and farmers’ study tours (3%). As for the strength of interactions, it was found that majority (52.5%) of the farmers had strong interactions with most of the actors. Moderately strong and weak interactions were demonstrated by 32.3% and 13.6% of the respondents respectively.

The finding that actors with the highest scores in terms of other actors-farmers resource flow pattern, showed the highest perceived strength of farmers-other actors' interaction is consistent with the IAD's postulation that actors interact in light of the incentives they face to generate outcomes directly in the world.

As for factors influencing farmers' interactions with other actors, the study found that distance to the market was negatively affecting farmers' interactions with fellow farmers and other actors (p=0.028). That is, the market being closer is a location advantage for the farmers to interact and share information. Further it was found that farmers diversifying crops/livestock production had higher levels of interaction (p=0.021) than those with single or fewer crops/livestock. The number of resources shared by the actors to the farmer was positively affecting farmer's interaction (p=0.000). Thus, exogenous factors, including biophysical conditions such as proximity to the crop market infrastructures, cost and rewards such as resources brought by actors to the action situation, and diversity of resources sought based on diversity of crops or livestock produced, influence farmer’s interactions with other actors.

Therefore, conclusively, the study findings agree with the IAD and the social exchange theory, which, respectively, postulate that biophysical conditions (in this case proximity to the market infrastructures), and cost and rewards (in this case number of resources shared) are important driving forces for farmers' interactions.

Lastly, the study findings suggest that, rather than just referring to it as cost and rewards, it should be explicit in the social exchange theory that both material and social benefits are important when it comes to motivating factors for actors’ interactions.

4.1.2. Influence of interactions on farmers’ participation in agricultural projects

The third objective aimed at determining the influence of interactions on farmers’ participation in agricultural projects. In the study area, majority of the respondents (40.8%) corresponded with satisfactory level of participation. Poor participation and high participation were demonstrated by 30.8% and 28.3% of the respondents respectively. Also, it was found that, holding availability of alternative income generation opportunities constant, participation in agricultural projects increased with increase in altitude. In the highest altitude, there are fewer alternative employment opportunities and therefore farmers are obliged to participate in agricultural activities. Therefore, participation of farmers in agricultural projects increased with increasing remoteness

Interaction of farmers with other actors had statistically significant ($p=0.079$) and positive influence on their participation in agricultural activities. That is, increasing interaction was associated with increasing participation. Interaction of a farmer with other farmers, or with service providers such as input suppliers, crop buyers, and government or private extension officers, helps the farmer to acquire a specific set of information which in turn influences farmers to participate in group activities. On the other hand, availability of income generation opportunities in the area ($p=0.054$) influenced participation negatively. That is, participation of farmers in agricultural activities decreases with increase in income generation opportunities. This implies that alternative income generation opportunities diversify employment opportunities making engagement in agriculture optional. This implies that while interaction is an important factor for farmers' participation in agricultural projects, availability of alternative income generation opportunities is a stronger force and may mask the effect of interaction.

Other factors include interaction of farmers with other actors (p=0.079), group leadership (p=0.070), and the road condition (p=0.027), which had positive influence. The number of institutions available in the farmer's location (p=0.001) influenced participation negatively.

Therefore, it can be concluded that interactions, institutions, biophysical conditions and farmer group's leadership are important factors for farmer's participation in agricultural activities. These variables serve as incentives or deterrents for the farmer in the course of their decision making. The findings of the study corroborate the main assumption of the Ostrom's IAD framework that the action situation, in this case the interaction of a farmer with other actors and institutions, and biophysical conditions-represented by road conditions, influences farmer's decision to participate in agricultural projects.

4.2 Conclusions

Generally based on the study findings it can be concluded that farmers' participation in agricultural project is influenced by actors' interactions and differ across various altitudes across Uluguru Mountains land catena. The study findings concluded that actors with the highest scores in terms of frequency of information and resources flow scored the highest in terms of other actors-farmers resource flow pattern, as well as perceived strength of farmers-other actors' interaction. In addition the study findings concluded that exogenous factors, including biophysical conditions such as proximity to the crop market infrastructures, cost and rewards such as resources brought by actors to the action situation, and diversity of resources sought based on diversity of crops or livestock produced, influence farmer's interaction with other actors. Thus, it is through interaction with various actors and biophysical conditions at farmer's disposal that a farmer accesses information and resources necessary for their production activities. Therefore, the findings agree with the IAD and the social exchange theory, which, respectively, postulate that biophysical conditions, and cost and rewards are important driving forces for farmers' interactions. The study findings suggested that rather than just referring to it as cost and rewards, it should be explicit in the social exchange theory that both material and social benefits are important when it comes to motivating factors for actors' interactions.

It is further concluded that through interaction, the farmer increase access to information and resources necessary for their participation in agricultural projects. The study findings concluded that although interaction is important factor influencing farmers' participation in agricultural projects, but, availability of alternative income generation opportunities is a strong force influencing the farmer to take up additional IGAs limiting their participation in agricultural activities. Generally, the study findings concluded also that institutions, biophysical conditions (road condition) and farmer group's leadership are important factors for farmer’s participation in agricultural activities. These variables serve as incentives or deterrents for the farmer in the course of their decision making. Thus, the study findings corroborated the social exchange theory which postulates that actors possess different levels of information, power and motivation that influence their decision making and interaction. It also confirms Ostrom’s Institutional Analysis and Development (IAD) framework that the action situation, in this case biophysical conditions, interaction and institutions, influences farmer's decision to participate in agricultural activities.

4.3 Recommendations

The study recommends that individuals, government and non-governmental organizations involved in the promotion of agriculture ensure that the interventions promoted are rewarding to the farmer, both in the short- and long-term. As exemplified by the RIPAT-SUA project, interactions that are rewarding are likely to result in participation of farmers in agricultural projects. This could be through ensuring the right information and resources are shared appropriately and at the right time, and that there are avenues for information sharing. Recommended avenues include village/ward level agricultural stakeholders meetings, which could be conducted quarterly. These meetings bring together farmers, extension officers, NGOs, and technical and political leaders. Improvement of the road infrastructure and establishment of market infrastructures in strategic locations, where farmers could reach with their products and meet with buyers, is also recommended.

Further the study recommends that government and non-governmental organizations involved in promoting agriculture embrace farmer groups approach as it fosters interaction among farmers and between farmers and service providers hence increasing their access to information and resources necessary for implementation of agricultural activities. Farmer groups reduce transaction cost of knowledge transfer and provide incentives for participation in agricultural activities.

Decision to participate in agricultural activities is influenced by available incentives, which include agricultural information, agricultural inputs, extension support and the way farmers are organized. This requires an appropriate approach to designing and implementation of agricultural projects. The RIPAT approach, which was adopted by the RIPAT-SUA project, is the case in point. It is through the RIPAT approach that farmers in the study area were organized into strong producer groups, relevant information and inputs availed to farmers and meaningful interaction with various service providers made possible. It is therefore recommended that government and non-governmental organizations embrace the RIPAT approach in designing and implementing agricultural interventions.

4.4 Area for Further Research

The study recommends a study on economic and social implications of engagement in multiple income generating activities in addition to agricultural activities by farmers in Morogoro Municipal Council and Mvomero Districts.

APPENDICES

Appendix 1: A Questionnaire for Farmers

SOKOINE UNIVERSITY OF AGRICULTURE
DEPARTMENT OF POLICY PLANNING AND MANAGEMENT

Research title: The Role of Actors' Interactions on Farmers' Participation in Agricultural Projects: A Case of RIPAT-SUA Project.

Consent

My name is Ringo, Gasper Ph. from Sokoine University of Agriculture. I am here to conduct a study which aims at identifying differential participation in agricultural projects by groups. This area has been selected for the study due to presence of agricultural projects groups of RIPAT-SUA and its potential for agriculture. The interview will last for about 15 minutes and collected information will be used only for the purpose of the study. In addition, your identity and answers will be kept **confidential**. When answering these questions, remember that there are no correct or wrong answers. Your views is most important and highly needed.

Do you consent to participate in the study? Yes [ ] No [ ]

PART A: Respondent’s General Information

1. Questionnaire Number: ………
2. Village/Street: ……………………..
3. Ward: …………………
4. District: …………………….

5. Relationship of the respondent with the household head: ………………… (1= Head 2= Spouse 3=Member of household)

PART B: Socio-economic characteristics of the respondent

6. Respondent's sex (Tick√)
    1) Male [ ]
    0) Female [ ]
    7. Respondent's age (Years)……….
8. Education level of respondent (Tick√)
    i. Primary level [ ]

ii. Secondary level [ ]
iii. Certificate level [ ]
iv. Diploma level [ ]
v. Degree level [ ]
vi. Never attended formal education [ ]

9. Respondents' marital status (Tick√)
   i. Married [ ]
   ii. Divorced [ ]
   iii. Never married [ ]
   iv. Widow [ ]

v. Widower [ ]

10. Respondents' income generating activities (Tick√ all applicable)

i. Crop production [ ]
ii. Livestock keeping [ ]
iii. Public service (formal employment) [ ]. Mention……………………………
iv. Petty business [ ]. Mention actual business(es)
a)…………………………………………………….
b)…………………………………………………….
c)…………………………………………………….
d)……………………………………………………..

v. Others [ ]. Mention

a)……………………………………………………

b)……………………………………………………

c)……………………………………………………

d)……………………………………………………

11. What are your major sources income? (Tick√)

i. Crop production [ ]
ii. Livestock production [ ]
iii. Business [ ]
iv. Formal employment [ ]Casual work [ ]

v. Remittance [ ]
vi. Others [ ]. Please mention…………….

PART C: Pattern of Interaction

12. Are you a member of farmer group(s)? (Tick√)
 i. Yes [ ]
 ii. No [ ]

13. If Yes in (12) above, please respond to the following questions

Group name	Group's main activity	Duration of membership (months)

i.		
ii.		
iii.		

14. Kindly let me know about your interaction with various actors

Actor (individual or	Informatio n/ resources/	Direction of transfer	How many times in	Means of information/re source	Strength of the relationshi	Benefits of the informatio

organization /media) you interact/ relate/ collaborate with (indicate where they come from)	**knowledge transferred** (what information/ resources do you share?)	**of informati on/ resources** 1 = To you 2 = To him/her/it 3 = Both ways	**a year has the transfer of informati on/resour ce happene d?**	**sharing?** 1 = Informal meetings; 2 = Formal meetings; 3 = Training; 5 = Farmer to farmer extension; 6 = Observation; 7 = Farmers study tours and exchange visits; 8 = Other, mention……	**p** 1 = Weak relationship 2 = Moderate relationship, 3 = Strong relationship	**n/resources to you** (1=Highly beneficial; 2=Beneficial; 3=Not beneficial)

15. Please indicate the condition of road infrastructure from town to your area.
    i. The road is passable all year round [ ]
    ii. The road is passable only during the dry season [ ]
16. How far is your home to the nearest trading centre(in minutes if walking) ……………………….
17. Please mention the centre …………………………..

PART D: Factors influencing interactions

18. Please show how the following help you access agricultural information:

Media	Do you have it/access it?	Does it help you access agricultural information?
a) Mobile phone	i. Yes [ ] ii. No [ ]	i. Yes [ ] ii. No [ ]
b) Television	i. Yes [ ] ii. No [ ]	i. Yes [ ] ii. No [ ]
c) Radio	i. Yes [ ] ii. No [ ]	i. Yes [ ] ii. No [ ]
d) Newspaper	i. Yes [ ] ii. No [ ]	i. Yes [ ] ii. No [ ]

19. What type of crops do you produce? (Tick√ all applicable)

i. Maize [ ]
ii. Banana [ ]
iii. Cassava [ ]
iv. Beans [ ]
v. Potatoes [ ]
vi. Others [ ]. Mention…………………………………..
   a) ……………………………………………
   b) …………………………………………….

c) ………………………………………………….

20. What type of livestock do you keep? (Tick√ all applicable)

i. Cow [ ]
ii. Goats [ ]
iii. Sheep [ ]
iv. Pigs [ ]
v. Others [ ]. Mention……………………………….
   a) …………………………………………..
   b) …………………………………………..

21. Where do you sell your crops or livestock? (Tick√ all applicable)

i. At farm gate (right at farm/home) [ ]
ii. Market [ ]. Mention the market places you sell in

Crop / livestock	Market place	Distance: Farm-Market (minutes if walking)	Do you sell in person or through middlemen?
a)			
b)			
c)			
d)			
e)			

f)			
g)			

22. Benefit expected/perceived from interaction
    i. ………………………….
    ii. ………………………….
    iii. ………………………….
    iv. …………………………..
23. What are the cost /perceived cost to be incurred in interaction
    i. …………………………….

ii. …………………………….
iii. …………………………….
iv. ……………………………

24. If farm gate in (18) above, indicate areas the buyers come from
………………………………………………………………………………………
………………………………………………………………………………

PART E: Factors influencing farmers' participation in agricultural projects/ group activities

25. How long have you been working with agricultural projects? …………….Years

26. How far are you from your group's demo plot (consider RIPAT group)?......minutes (for someone walking)
27. Which of the demonstrated technologies are you applying at home?
    i. …………………………………………………
    ii. …………………………………………………
    iii. …………………………………………………
    iv. ………………………………………………….
    v. ………………………………………………….
28. What are the reasons for not implementing some other technologies promoted under RIPAT SUA project?

…………………………………………………………………………………………
…………………………………………………………………………………………
………………………………………………………………………………

29. What motivated you to join the group (consider RIPAT groups)? (Tick√ all applicable)

i. Training [ ]
ii. Credit [ ]
iii. Work with others [ ]
iv. Exchange ideal/socialization [ ]
v. Acquire knowledge [ ]
vi. Market access [ ]

vii. Others [ ]. Mention ………..
viii. …………………………….
ix. …………………………………
x. ……………………………………
30. Do you expect to get any benefit from being a member of the group? (Tick√)
i. Yes [ ]
ii. No [ ]
31. If Yes in (25) above, what are the expected benefits?
i. ………………………………
ii. ………………………………

iii. ………………………………
iv. ………………………………
v. ………………………………

32. What are the costs associated with your participation in the group?
…………………………………………………………...
....

33. How do you compare the costs and benefits of participating in group?
i. Costs are higher than benefits [ ]
ii. Costs and benefits are equal [ ]

iii. Benefits are higher than costs [ ]

34. Does your group have a constitution? (Tick√)
    i. Yes [ ]
    ii. No [ ]
35. If Yes in question 27, how do you rate the implementation of the constitution in your group? (Tick√)
    i. Very Good [ ]
    ii. Good [ ]
    iii. Poor [ ]
    iv. Very poor [ ]

36. Is your group leader encouraging your participation in agricultural projects/ group activities
    i. Yes [ ]
    ii. No [ ]

    Please explain…………………………………………………………………………

37. Please indicate your agreement or disagreement with the following statements by putting a tick in the response that reflects your opinion for each statement. Use SA =

Strongly Agree (5), A = Agree (4), N = Neutral (3), D = Disagree (2), SD = Strongly disagree (1)

S/No	Statement	SA	A	N	D	SD
		5	4	3	2	1
i)	By-laws are instrumental in enhancing participation in agricultural projects/ group activities					
ii)	Traditional land tenure practice in this area enhances participation in agricultural					

	projects/group activities					
iii)	Religion is instrumental in promoting participation in agricultural projects/group activities					
iv)	Land policies and other agriculture related policies encourage participation in agricultural projects/group activities					
v)	Credit system supports participation in agricultural projects/group activities					

vi)	The extension system in this area triggers participation in agricultural projects/group activities					
vii)	Norms in our area encourage participation in agricultural projects/group activities					
viii)	Traditional beliefs in our area encourage participation in agricultural projects/group activities					

38. How is RIPAT approach useful in enhancing participation in agricultural projects/ group activities?
…………………………………………………………………………………………
……………………………………………………………………………………..

THIS IS THE END OF THE INTERVIEW AND THANK YOU FOR YOUR COOPERATION

Appendix 2: Checklist for Key Informant Interview

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Research title; The Role of Actors' Interactions on Farmers' Participation in Agricultural Projects: A Case of RIPAT-SUA Project.

1. Are farmers willing to participate in agricultural project freely?
2. How do share information with farmers?
3. What resources provided to farmers to ensure that project is implemented as intended?
4. Apart from agriculture what other type of activities people do for a living in this area?

5. What is your opinion about participation of groups’ members in Agricultural projects?

Appendix 3: Focus Group Discussion Guide

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Research title; The Role of Actors' Interactions on Farmers' Participation in Agricultural Projects: A Case of RIPAT-SUA Project.

1. Distance from town
2. Distance from nearby markets
3. What is the name of the group?
4. When was the group formed?
5. How many members does your group have (male/female)?
6. How many were the founding members?

7. How long did it take to have the highest number of members?
8. How many have dropped out since the group started?
9. What are the activities performed in your group?

10. How is participation of members in group activities? Show participation of each group member since the start to date. Fill such information in matrix below

S.No	Name	Trainings					Farm management					Meetings																				Reasons for absence
1.																																
2.																																

3.																																
4.																																
5.																																
6.																																
7.																																
8.																																
9.																																
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27.																																
28.																																
29.																																

30.																																

11. List organizations operating in the area (village for Mvomero, ward for Morogoro)?
12. List institutions (formal and informal) which have influence on participation in agricultural projects/ group activities agriculture in your area
13. Describe each institution (beliefs, norms, extension system, traditional land tenure system, religion, etc), showing how it influences participation in agricultural projects/ group activities
14. Group level interactions:
    - How do you strategize/ make decisions?