PERSONALITY TRAITS OF HIGH-PERFORMING LEAD FARMERS IN FARMER-TO-FARMER EXTENSION PROJECTS EMPLOYING THE RIPAT APPROACH IN TANZANIA

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EXTENDED ABSTRACT

One of the main challenges facing agricultural extension in the 21st century is how to develop low-cost sustainable approaches for service provision that go beyond extending messages to playing a key role in promoting farmers as the principal agents of change in their communities. Despite Farmer to Farmer Extension (F2FE) being considered effective in responding to extension delivery needs, it has been observed that in the selection and performance of the lead farmers (LFs), greater emphasis has been put on their socio-economic characteristics with limited consideration of personality traits. The overall objective of the study was to determine the relationship between personality traits and performance of Lead Farmers in the F2FE as used in the Rural Initiatives for Participatory Agricultural Transformation (RIPAT) approach. Specifically, the study aimed to: determine factors considered in the selection of LFs with a personality traits lens, assess the performance of LFs based on their roles under the RIPAT approach, determine the influence of personalities on performance of LFs and assess the role of institutions in the performance of LFs. Data were collected using a structured questionnaire from 384 farmers selected systematically from a list of population of 1 800 beneficiaries of projects applying the RIPAT approach. Findings from the Friedman test show that household labour and size of the land cultivated between LFs and non-LFs were significantly different (p ≤ 0.05). Results about factors considered in selection of the LFs based on the assessment of personality traits fits for high performing LFs using the Big Five Personality Trait Model and Friedman test show that high performing LFs had personalities related to openness (being curious, having a wide range of interests and being independent) and consciousness (hardworking, dependable and organized). The findings also indicate that the use of LFs has narrowed the extension officers: farmers ratio by ten-fold at the village level and facilitated the uptake of technologies at a reduced cost since the LFs are from within the community and are not necessarily paid for what they do. The results on the influence of personalities in the performance of LFs show that the most needed personalities and

associated soft skills to LFs include integrity, being courageous and volunteerism. It is further established that soft skills (personalities) complement hard skills in the improvement LFs' performance. Generally, personalities contribute to the performance of LFs through enabling them to become role models, improving individual LFs' integrity and honesty, and enhancing their ability to bring harmony to the groups. Eleven institutions which were grouped into four categories i.e. local government authorities, research institutions, non-governmental organizations and the community have been observed to have a significant influence on the performance of LFs in the study area. Based on the Friedman test, perceptions of the respondents regarding the importance of institutions in enhancing the performance of LFs showed significant difference ($p = 0.000$) in all groups. The study concludes that high performing LFs are individuals who are open (curious, wide range of interests and independent) and conscious (hardworking, dependable and organized), and agreeable (voluntarism spirit). It is also concluded that LFs play an important role in narrowing the extension officers: farmer ratio leading to farmers being reached by advisory services hence, facilitating bridging of the agricultural technology gaps. In addition, it is concluded that the most important personalities for LFs are integrity, courage, volunteerism and interpersonal skills, which are related to leadership and facilitation skills to farmer groups and in the uptake of technologies. Further, influence of institutions on the performance of LFs is related to them creating conducive environment and providing moral incentives for the LFs to execute their roles during and beyond the project, in which period they act as community change agents and social entrepreneurs. The study recommends that the personality traits of openness and consciousness be given higher considerations in selection of high performing LFs. It is further recommended that development actors should put equal emphasis on soft skills as they do to hard skills, especially personalities related with enhancing LFs' integrity and being honest, enabling them to become role models and bringing harmony to the group. Based on the good

performance of LFs in ensuring uptake of technologies, which, among others, is attributable to their close interaction with ward and village agricultural extension offices and farmer groups, it is recommended that LFs and farmer groups be integrated into the government extension system.

DECLARATION

I, DOMINICK E. RINGO, do hereby declare to the Senate of Sokoine University of Agriculture that this thesis is my own original work done within the period of registration and that it has neither been, nor concurrently being, submitted for an academic award to any other institution.

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DEDICATION

This work is dedicated to my Mother Eliluyana Makyawo Ringo and my elder Sister Dosa Ringo (currently Mrs. Dosa Menyasumba Lyatuu) who offered good care to me after my father passed away when I was only six years old. It is also dedicated to the late Isaria S. Ringo who cared for my welfare and studies. Lastly, but not least, the work is dedicated to my Brother Samuel Elimringi Ringo who was born disabled and could not by any means go to school to enjoy the academic world.

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LIST OF ABBREVIATIONS AND ACRONYMS

AGRA   -   Alliance for a Green Revolution in Africa

ASDP   -   Agricultural Sector Development Programme

AU   -   African Union

DAICO   -   District Agricultural, Irrigation and Cooperative Officer

DPC   -   District Project Coordinators

DRO   -   Democratic Rural Organizations

EADD   -   East African Dairy Development

FFS   -   Farmer Field School

F2FE   -   Farmer to Farmer Extension

FGD   -   Focus Group Discussion

FGDs   -   Focus Group Discussions

GAP   -   Good Agricultural Practices

ICT   -   Information and Communication Technologies

IMF   -   International Monetary Fund

KDC   -   Karatu District Council

KII   -   Key Informant Interview

LFs   -   Lead Farmers

LGA   -   Local Government Authority

MoU   -   Memorandum of Understanding

NBS   -   National Bureau of Statistics

NEPAD   -   New Partnership for Africa's Development

NLFs   -   Non-Lead Farmers

OCGS   -   Office of Chief Government Statistician

ODK   -   Open Data Kit

OFSP	-	Orange-Fleshed Sweet Potatoes
PL	-	Programme Leader
PRA	-	Participatory Rural Appraisal
RECODA	-	Research, Community and Organisational Development Associates
RF	-	Rockwool Foundation
RIPAT	-	Rural Initiatives for Participatory Agricultural Transformation
SPSS	-	Statistical Package for Social Sciences
SSA	-	Sub-Saharan Africa
SUA	-	Sokoine University of Agriculture
TARI	-	Tanzania Agricultural Research Institute
URT	-	United Republic of Tanzania
VAs	-	Village Assemblies
VCs	-	Village Councils
VGA	-	Village General Assembly
VSLA	-	Village Savings and Loans Association
WARCs	-	Ward Agricultural Resource Centres
WB	-	World Bank
WDC	-	Ward Development Committees
WVAEOs	-	Ward and Village Agricultural Extension Officers

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Agriculture is the mainstay of Tanzanian's economy contributing about 24.5% of the GDP, 30% of export earnings and employing about 67% of the total labour force as of 2016 (URT, 2016; CIA, 2017). According to the World Bank (2008; 2015), a six and above percent growth in the agricultural sector is considered a key strategy for poverty reduction and food security. This is due to the fact that economic analyses have proved that growth in the agricultural sector in developing countries such as Tanzania is twice as effective in reducing poverty as growth in other areas (World Bank, 2008). Tanzania's current average agricultural growth rate of 3.6% (URT, 2018) is insufficient to lead to significant wealth creation and alleviation of poverty (URT, 2016). The low ability of agriculture to reduce poverty in Tanzania is partly attributed to inability to allocate at least 10% of the annual total budget to the agricultural sector as recommended by the Malabo and Maputo Declarations for African countries (AU and NEPAD, 2003; 2014).

Given the importance of agriculture to Sub-Saharan Africa and Tanzania in particular, the Rockwool Foundation (RF) from Denmark and the Research, Community and Organizational Development Associates (RECODA), a Tanzanian local NGO, collaborated in a study that explored why many agricultural development projects have generated so little impact among rural farmers and why significant technology gaps still exist in small-scale farming contexts while so many improved agricultural technologies have been developed, but the same have not readily been adopted by small-scale farmers (Ringo *et al.,* 2014). The study resulted into development of an extension approach called Rural Initiatives for Participatory Agricultural Transformation (RIPAT). This approach aims at bridging the agricultural technologies gap using a step-by-step process by organizations

working with small-scale farmers (Vesterager *et al.,* 2017). The evaluation of the RIPAT approach for agricultural technology adoption in Tanzania has been documented in a book titled Farmers' Choice (Lilleør and Sørensen, 2013). The approach is founded on three pillars (cornerstones) which are creation of vision (roadmap) of the better future, establishment of farmer/producer groups with the ultimate aim of forming producer associations, and close collaborations with local government authorities and extension agents. Based on the evaluation, among the notable successes of the approach include sustained adoption and diffusion of most of the agricultural technologies leading to increased levels of food security and improved levels of nutrition among adults and children. Reasons behind the good performance of the RIPAT approach were choice of what to implement from a 'basket of options' developed through participatory methods, strong farmer groups, organizational management structure around the approach and use of locally available resources and opportunities.

The RIPAT approach has been applied in different districts of Tanzania including Korogwe, Moshi, Hai, Meru, Arusha, Karatu, Babati, Singida, and Morogoro and in other countries mainly Kenya and Burundi. The projects applying the RIPAT approach are on the way to be introduced to small-scale farmers in Nicaragua (RECODA, 2019). In addition, the approach has been identified by Sokoine University of Agriculture (SUA) in Tanzania as among the extension approaches in its academic curricula.

The RIPAT approach uses the 'farmer-to-farmer extension' (F2FE) approach. Scarbourough *et al.* (1997) define F2FE as the provision of training by farmers to farmers, often through the creation of a structure of farmer promoters and farmer trainers. However, the approach is used in combination with other extension approaches in which the farmer extension agents are variously referred to as lead farmers (LFs), model farmers, farmer

promoters or trainers, or extension multipliers (Franzel and Simpson, 2013). In the Training and Visit (T&V) approach, they were called contact farmers/innovators (Blum and Isaak, 1990; Anderson *et al.,* 2006). The East African Dairy Development (EADD) programme called them farmer trainers or farmer advisors (Kiptot *et al.,* 2011). In the RIPAT approach, they were originally referred to as super farmers but, currently they are called lead farmers (LFs), a term which is more commonly known. Under RIPAT, LFs are defined as people who have developed social entrepreneurship as agents for change and are among the more successful farmers among project participants (Vesterager *et al.,* 2017).

Lead farmers as used in various F2FE programmes, play a major role in the enhancement of uptake of agricultural technologies. Therefore, selecting the right persons for this role is important because they determine the success of the extension effort. Several studies have been conducted on socio-economic characteristics of LFs to gauge the success of the F2FE model (Heller *et al.,* 2002; Simpson and Owens, 2002; Franzel *et al.,* 2015; Simpson *et al.,* 2015; Tsafack *et al.,* 2015). However, to the best of my knowledge no studies have been done in Tanzania specifically focusing on personality test fits for performing LFs. Llewellyn and Wilson (2003) define personality traits as constructs that explain the consistency of an individual's behaviour, which help to explain why different people react to the same situation in different ways. According to Ciroka (2014), a better understanding of personality makes it easy to build relationships, organize tasks, find the right job for the right person and identify those promising careers from those who are destined to fail. This knowledge, though crucial, is largely missing in influencing the performance of LFs. The high performing LFs were assessed in this study based on the roles they play under projects applying the RIPAT approach as influenced by among other factors, their personality traits.

Besides socio-economic factors and personality traits, the performance of LFs is also affected by institutional and gender issues. According to Vatn (2005), institutions influence individuals and their motivations. In this study, institutions are referred to as rules and procedures that are created, communicated, and enforced through channels widely accepted as official (Haro-Marti, 2013). Malisa (2016) argues that local institutions (farmers groups and associations) are important in influencing decision making of households and that of decision makers. Formation of local institutions and their development indicators as reported by Pors (2018) shows that the RIPAT approach facilitates democratic rural organization (DRO) through community mobilization to form producer and savings groups which later form producer and market associations.

According to URT (1998), there is gender imbalance in the division of labour at the household level, especially in rural areas where women do most of the activities while men rest most of the time, resulting in low production. In most cases, women can acquire land user rights but, it is very difficult to get ownership rights. Disregarding the imbalance, Wellard *et al.* (2013) argues that gender balance is an important criterion to be considered in the selection of LFs. Based on this observation, this study has evaluated the influence of gender in the performance of LFs.

1.2   Problem Statement

Insufficient financial support and field extension staff have been mentioned among the major constraints to the transfer of agricultural technologies to small-scale farmers. According to Gabagambi (2013) and Hella (2013), limited funds allocated to the agricultural sector are a major constraint to agricultural extension work. Hella (2013) observed that field extension officers in Tanzania have large numbers of farm households to serve, and the extension officer: farmers ratios vary greatly among districts; in two

districts the ratios varied from 1: 469 to 1: 2307; the national average stands at 1: 630. Hella (2013) further points out that extension services only reach about 10% of the farming households in Tanzania. The extension officer: farmers ratios in 2020 could be slightly different from the ratios just written above. As a consequence of the poor extension-farmer ratios, most farmers have limited access to extension services.

The declining role of the public extension service in Tanzania and in other developing countries in general has created a delivery gap necessitating the emergence of new extension service providers (Anandajayasekeram *et al*., 2008; URT, 2013; Berthe, 2015). To fill the gap, organic (community-based) extension approaches have become important, and one of such approaches is the F2FE, which has been adopted by many sub-Saharan African countries as an important strategy to fill the gap of inadequate staff and resources hampering uptake of technologies (Franzel *et al*., 2015).

Despite the above-mentioned merits of the F2FE, information about the same as well as performance of LFs in agricultural technology transfer is still limited (Khaila *et al.*, 2015). For example, studies to explore and document the experiences of F2FE in Africa which were conducted in Malawi, Cameroon and Kenya (Simpson *et al.*, 2015) revealed varied personal attributes used in selecting LFs. Moreover, Khaila *et al*. (2015) found that the most important characteristics for being a lead farmer in Malawi were to be hard-working, being an active farmer, and being interested in helping others. In Kenya the selection criteria were based on availability, trainability, acceptability, ability to communicate, literacy, passion and expertise (Franzel *et al.,* 2014). In Cameroon, the criteria comprised of being hard-working, having good communication skills, being available, and showing interest and desire to help others (Tsafack *et al.,* 2015).

A common element from the above-mentioned studies is the fact that the criteria for selecting LFs are mainly socio-economic characteristics. However, Zamani and Karami (2006) argue that the importance of using specific criteria in the selection of LFs is that desirable personal characteristics and ethics should be taken into account. They further argue that there are leaders who, because of their personality traits, will not change much for betterment in their career, even if they attend several courses and training sessions. Therefore, this study together with socio-economic characteristics, aimed to determine how personality traits influence the performance of LFs so as to factor them in the criteria for selection of LFs and improving their performance.

1.3   Justification for the Study

One of the main challenges facing agricultural extension in the 21st century is how to develop low-cost sustainable approaches for service provision that goes beyond extending messages to playing a key role in promoting farmers as the principal agents of change in their communities (Lukuyu *et al.,* 2012). This implies that the use of F2FE is very important for the performance of LFs. However, only scanty information exists on the roles of personality traits in the performance of LFs. Ciroka (2014) suggests the use of personality to find the right job for the right person. Hence, the study endeavoured to address the information gap by assessing the association of personality traits with performance of LFs in the F2FE.

The empirical information generated by this study contributes to knowledge about how to best select effective LFs who are more effective and who have personality of high performance under projects applying the RIPAT approach, effective use of performing LFs under RIPAT as well as similar F2FE approaches in uptake of technologies. The information has the potential to be used by different actors in applying F2FE including

development partners, academicians, farmer groups, policy makers and government extension services. In addition, findings from this study have broadened the understanding of how Tanzania's extension services can be improved using LFs. The understanding sheds light on plans to work on the argument by the World Bank (2007), cited by Philip (2014) that *"until it learns to grow its agriculture, Tanzania is unlikely to register significant developmental advances"*. The study contributes to agricultural growth through informing policy making on practical ways to address the problem of extension-farmer ratios gaps and inadequate government funds.

1.4   Objectives

1.4.1   Overall objective

The overall objective of the study was to determine the relationship between personality traits and performance of Lead Farmers in the farmer-to-farmer extension approach as used in the RIPAT approach.

1.4.2   Specific objectives

Specifically, the study aimed to:

  i. Determine factors considered in the selection of LFs with a personality traits lens,
 ii. Assess the performance of LFs based on their roles under the RIPAT approach,
iii. Determine the influence of personalities on performance of LFs, and
iv. Assess the role of institutions in the performance of LFs.

1.4.3   Research questions

Based on the literature reviewed, the study was guided by the four questions below:

  i. How are personality traits and social economic factors considered in the process of selection of LFs?
 ii. How effective are LFs with respect to their roles under RIPAT?
iii. What is the contribution of personalities to the performance of lead farmers?
iv. How important are institutions in the performance of LFs?

1.5   Theoretical Framework

1.5.1   Personality theory

Personalities are constructs that explain the consistency of an individual's behaviour; these help to explain why different people react to the same situation in different ways (Llewellyn and Wilson, 2003). The personality theory provides guidance on the personality traits which influence the performance of LFs and how personality traits can be factored into the criteria for selection of LFs. According to Nettle (2007), personality is what makes people who they are. After numerous studies on personality theory, a remarkably strong consensus of basic personality theory emerged in the 1980s and in the 1990s by Costa and McCrae (1987) who developed what is referred to as the Big Five Model of Personality. The model has five broad domains which define human personality traits and account for individual differences by determining why people respond differently to the same situation. The measurement of the big five personality traits includes the six facets (sub-traits) within each category of the trait, i.e. i) <u>openness to experience</u> (imagination, artistic interests, depth of emotions, willingness to experiment, intellectual curiosity, tolerance for diversity); ii) <u>conscientiousness 'work ethic'</u> (sense of competence, orderliness, sense of responsibility, achievement striving, self-discipline and deliberateness); iii) <u>extraversion</u> (warmth, sociability, assertiveness, activity level, excitement-seeking, positive emotions); iv) agreeableness (trust in others, sincerity, compliance, modesty, sympathy and altruism) and v) neuroticism-anxiety (angry, moodiness, self-consciousness, self-indulgence, sensitivity to stress). According to Judge and Bono (2000), human resources professionals often use the Big Five personality dimensions to help place employees because these dimensions are considered to be the underlying traits that make up an individual's overall personality. This study adopted the Big Five Personality Traits Model in assessing the

personality traits of LFs. The theory is used quite often in placing the right people with the right jobs, and it can as well be used in selection of the right people for the LFs career.

1.5.2   Diffusion theory

The diffusion theory was also used to guide the study in determining the degree to which goals are achieved by LFs. Among the main roles used in determining the performance of LFs was facilitation of the uptake of technologies (adoption and diffusion of technologies). This study adopted the diffusion theory by Rogers (1995) with four unified theories of diffusion i.e. innovation decision process, individual innovativeness, rate of adoption and perceived attributes. This study employed the theory of perceived attributes because the theory was very relevant to the RIPAT approach based on how the approach tries out the innovations at group fields while moulding them to be compatible with the local conditions without complexity and prove its comparative advantages when compared to other technologies. Technologies introduced under projects applying the RIPAT approach were put into the matrix and adoption rate assessed to determine the performance of LFs. The theory is used quite often in matching the right job with the right person, and it can as well be used in selection of the right people when it comes to high performing LFs.

1.5.3   Institutional theory

This study adopted the institutional theory which generally considers the processes by which structures; including schemas, rules, norms, and routines; become established as authoritative guidelines for social behaviour. According to Scott (2008), the institutional theory is a widely accepted theoretical posture that emphasizes on rational myths, isomorphism and legitimacy. Scott and Meyer (1983) emphasize that the theory seeks to explain the elaboration of rules and requirements to which organizations must conform if they are to receive support and legitimacy. The theory helps in studying how institutions

are formed and/or facilitated to enhance project performance and sustainability. Scott (1995) indicates that, in order to survive, organizations must conform to the rules and belief systems prevailing in the environment and that because of institutional isomorphism, both structural and procedural aspects will earn the organizational legitimacy.

1.6   Conceptual Framework

The study adapted the Big Five Personality Trait Model (Costa and McCrae, 1987) in the determination of the personality traits of LFs as it assumed that personalities have an influence in the performance of LFs in facilitating the uptake of technologies. The study's conceptual framework (Figure 1.1) shows the interrelationships of variables, which include demographic, socio-economic, institutions, the introduced technologies, and the personality traits, in influencing the performance of LFs. The main aim of personality theories is to highlight some personal characteristics which determine the most useful traits in the selection of performing LFs. From the Big Five Personality Trait Model (Costa and McCrae, 1987), there are five main categories of personality traits which are further sub-divided into six facets for easy comprehension and assessment. The Personality Traits abbreviated as OCEAN with six facets (sub-traits) in the bracts of each category of the trait are i) Openness to experience (imagination, artistic interests, depth of emotions, willingness to experiment, intellectual curiosity, tolerance for diversity); ii) Conscientiousness 'work ethic' (sense of competence, orderliness, sense of responsibility, achievement striving, self-discipline and deliberateness) and iii) Extraversion (warmth, gregariousness/sociability, assertiveness, activity level, excitement-seeking, positive emotions). The others are iv) Agreeableness (trust in others, sincerity, compliance, modesty, sympathy and altruism); and v) Neuroticism (anxiety, angry/hostility, moodiness/contentment, self-consciousness, self-indulgence, sensitivity to stress).

As shown in Figure 1.1, the personality traits can be modified by the environment in which an individual is found (Bickhard, 1992). Hence, consideration of the demographic and socio-economic factors (age, sex, household size, marital status, income, education level, credit accessibility, capital and labour) was seen as important with regard to the performance of lead farmers (LFs).

On the other hand, local institutions were also assumed to be important in building capacity and facilitating the performance of LFs (Davis *et al*., 2016). Institutions tend to influence individuals and their motivations which can as well influence the performance of LFs. The institutions under the project applying the RIPAT approach are assumed to affect the performance of LFs in areas related to capacity building and availability of inputs and finances. It is further assumed that each institution may have a different importance to the performance of LFs as well the interaction among the institutions.

The study assumed that the interaction between demographic, socio-economic, institutional and the introduced technologies in association with personality traits would influence the performance of LFs. It was further assumed that the degree of associations may differ (can be strong or weak) among the factors that influence the performance of LFs.

Institutional factors
Extension services
Implementing
 organization
Village government
Access to training
Groups

Introduced technologies
Improved crop varieties
Conservation agriculture
Improved animal
 production
Improved root crops
Micro-finance (VSLA)

**Performance of
lead farmers**
Teaching and
 training
Communications
Self-adoption of the
 technologies
Timely availability
 of agro-inputs
Facilitating adoption
 of new
 technologies
Project monitoring
Report writing

**Socio-economic
factors**
Income
Education level
Credit accessibility
Capital
Labour

Personality traits
Agreeableness
 (Disagreeableness)
Extraversion (Introversion)
Neuroticism (Emotional
 stability)
Openness to experience
 (Closed to Experiences)
Conscientiousness (Lack of
 Conscientiousness)

Demographic factors
Age
Sex
Household size
Marital status

framew

Weak association   ‒ ‒ ‒ ‒ ‒ ►

1.7   General Methodology

1.7.1   Description of the study area

The study was conducted in Karatu and Singida Rural Districts in Arusha and Singida Regions respectively. Geographically, Karatu and Singida are respectively found in the northern and central parts of Tanzania (Figure 1.2).

Karatu District is located between latitudes 3º10' and 4º00' south of the Equator and longitudes 34º47' to 35º56' east of the Greenwich Meridian. The district is a traditional home to the "Iraqw ethnic group" with minor ethnic groups including Barbaig and Hadzabe who are among the last hunters and gatherers in the world. According to Tanzania's 2012 population and housing census report (NBS and OCGS, 2013), Karatu covers a surface area of 3300 km^2 and had a total population of 230 166 people (117 769 male and 112 397 female) in 2012, with an average household size of 5.1 persons. In 2020,

the population of Karatu District was estimated to be 285,660, based on the formula for estimating future populations that is $N_t = P\ e^{(r\ *\ t)}$, where N_t is number of people at a future time, P is the present population, e is base of the natural logarithm that is equivalent to 2.71828, r is time period. From 2012 to 2020 the time is 8, and from NBS and OCGS (2013) the in Tanzania between 2002 and 2012 was 2.7%. Therefore, the estimated p

230 166 x $2.71828^{(0.027\ x\ 8)}$ = 230 166 x $2.71828^{0.216}$ = 230 166 x 1.241102199 = 285,660.

The district experiences varied climatic conditions whereby, in the Eyasi Basin, the annual rainfall is between 300 and 400 mm, while it ranges between 900 and 1000 mm per year in Karatu Town. Karatu has three agro-ecological zones, namely uplands, midlands and lowlands, with altitudes ranging from 1000 to 1900 m above sea level (KDC, 2001; Meindertsma and Kessler, 1997). The principal crops grown in the highlands include wheat, barley, beans, maize, coffee, flowers, pigeon peas, sorghum, finger millet and sunflower while in the midlands and lowlands the main crops grown are maize, beans, pigeon peas, sorghum, millet and sunflower. Onion is a common irrigated crop in the lowlands of Lake Eyasi, especially in Mang'ola Ward.

Singida District lies between 3^0 and 7^0 latitudes south of the Equator and 34^0 and 35^0 Longitudes east of Greenwich. The district has a semi-arid climatic condition with two seasons: the dry season which is longer (April to November) and the rainy season December to March. The average annual rainfall is about 590 mm ranging from 350 mm to 750 mm per year while the average minimum temperature is 15°C to $30°$C. The distinct land physical features are dominated by lowlands and plains with some highland of plateaus. The principal crops grown include maize, sunflower, groundnuts, sorghum, millets, onions and sweet potatoes. The district is traditionally home to the Nyaturu ethnic group by 90%, and according to Tanzania's 2012 population and housing census report

(NBS and OCGS, 2013), the population of the district in 2012 was 225,521, including 111,772 males and 113,749 females. In 2020, the population of Singida District was estimated to be 279,895, based on the formula for estimating future populations that is $N_t = P e^{(r * t)}$, where N_t is number of people at a future time, P is the present population, e is base of the natural logarithm that is equivalent to 2.71828, r is average annual inter-censual population growth rate in per cent, and t is time period. From 2012 to 2020 the time is 8, and from NBS and OCGS (2013) the average annual inter-censual population growth rate in Tanzania between 2002 and 2012 was 2.7%. Therefore, the estimated population of Singida District in 2020 was 225,521 x $2.71828^{(0.027 \times 8)}$ = 225,521 x $2.71828^{0.216}$ = 225,521 x 1.241102199 = 279,895.

The selection of the study areas (Fig. 1.2) was based on the fact that the projects applying RIPAT approach had been implemented in the two districts for four years. Therefore, after that time of implementation it was realistic to assess the contribution of LFs to the projects. (Lilleør and Sørensen, 2013). Normally, projects applying the RIPAT approach last for 2 to 4 years; the project in Karatu (Endabash Division) started in 2008 and ended 2012, while that in Singida (Ilongero Division) started in 2012 and ended 2015.
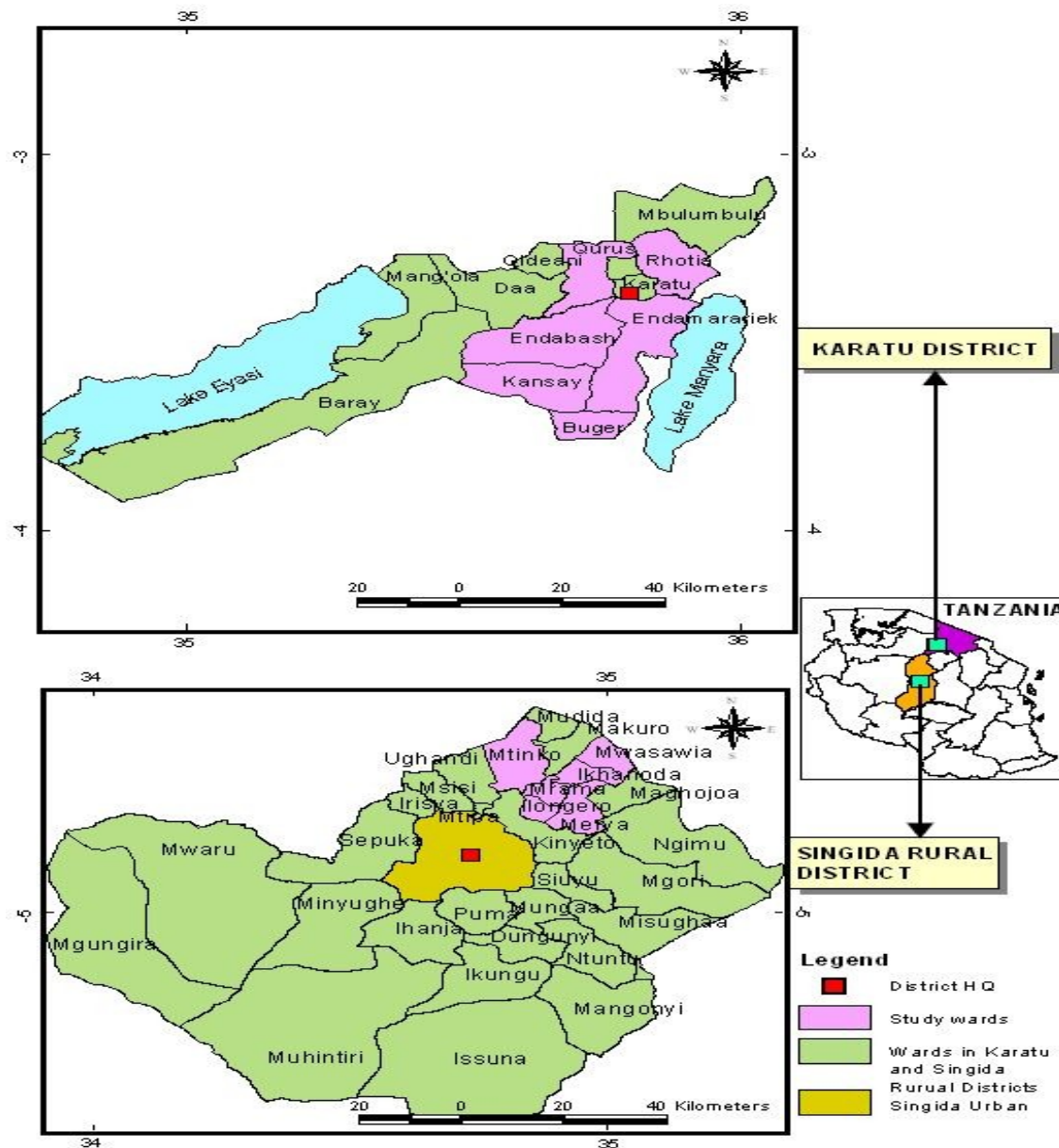
Figure 1. 2: Maps showing the study areas

1.7.2 Study design

The study adopted a cross-sectional research design which has been recommended by several scholars (Babbie, 2010; Delice, 2010) due to its cost and time effectiveness in data collection. The design entails collection of data on more than one case at a single point in time. Through the design one collects a body of quantitative and qualitative data on two or more variables which can then be examined to detect patterns of association (Bryman, 2012).

1.7.3   Study population, sample size and sampling techniques

The study's population included all the households that had benefited from projects applying the RIPAT approach in Karatu and Singida Districts. The sample size (n) of 384 households was determined as per Cochran (1977) formula as cited by Bartlett *et al.* (2001), which is:

$n = \dfrac{z^2 p(1 - p)}{e^2}$

$$n = \frac{z^2(pq)}{e^2}$$

Where:

n =   sample size;

z =   a value on the abscissa of a standard normal distribution (from an assumption that the sample elements are normally distributed), which is 1.96 or approximately 2.0 and corresponds to 95% confidence interval;

p =   estimated variance in a population from which the sample is drawn, which is normally 0.5; and

e =   acceptable margin of error (or precision).

Using a Z-value of 1.96, a p-value of 0.5, and an e-value of 0.5% (which is equivalent to 0.05), the sample size (n) was determined to be 384 households, as seen below:

$= 1.96^2 \, (0.50 \times 0.50)/0.05^2 = 384.$

The study employed a stratified proportionate sampling technique in order to ensure that more respondents were obtained from Karatu District which had more participants in the projects applying the RIPAT approach compared to Singida District. The strata were districts, wards and types of farmers (LFs and non-LFs). The population comprised two sub-populations of lead farmers and non-lead farmers. Both sub-populations were obtained

from RIPAT project officers/managers who had complete lists of RIPAT beneficiaries in the research areas. Male and female representatives of households (Table 1.1) were selected through systematic sampling whereby the first one was selected randomly using random numbers created in MS Excel using the "=RAND ( )" command, which generated random numbers. This was done at the ward level where a sampling interval for a relevant sub-population was obtained by dividing the sub-population N by the sub-sample size (n) to obtain the sampling interval k, i.e. N/n = k. Then, after the first respondent was selected, every k^{th} person was selected until the sub-population was exhausted. At least 15% of the respondents were LFs who were selected based on the notable roles they were expected to play under the RIPAT approach. The roles include teaching and training, communication, adoption of the technologies, facilitating timely availability of agro-inputs, facilitating adoption of new technologies, project monitoring and report writing (RECODA, 2018). The proportion of 15% aimed at including at least 30 LFs based on the suggestion by Bailey (1998) that a sub-sample for a research in which statistical data analysis is to be done should comprise at least 30 cases (respondents). The proportion of males (40%) was less compared to that of females who were 60% (Table 1.1) because women were more than a half of the RIPAT group members (Vesterager et al., 2017).

Table 1.1: Proportions of RIPAT farmers who were sampled

District	Approximate sub-population (20-30% are LFs)	Sampling fraction	Sample	Male farmers (About 40%)		Female farmers (About60%)	
				Non-LFs	LFs (15%)	Non-LFs	LFs (15%)
Karatu	1,200	384/1,800= 0.2133333	256	82	20	134	20
Singida	600	384/1,800= 0.2133333	128	33	18	59	18
Total	**1,800**	**-**	**384**	**115**	**38**	**193**	**38**

Besides the LFs and non-LFs, 20 key informants (KIs) were selected purposively. KIs included people who were considered to be knowledgeable about the RIPAT approach, and

these included Extension Officers (EOs), District Project Coordinators (DPC), Village government leaders and programme leaders/managers from RECODA who are the implementers of the projects using the RIPAT approach. Moreover, focus group discussion (FGD) participants (men and women) were selected from members of groups of the projects applying the RIPAT approach in each ward.

1.7.4 Data collection

Both primary and secondary data were collected so as to obtain complementary information. Primary data were collected through a household questionnaire (Appendix 1) administered to respondents, and through FGDs and KIIs using an FGD guide (Appendix 2) and a KII checklist (Appendix 3). Before conducting the FGDs, demographic and socio-economic data from all participants were collected. FGDs were used to get a deeper understanding of the LFs using the RIPAT approach and the ways by which they were selected. In line with Barbour and Schostak (2011), FGDs comprising 6-12 members were organized; the groups composed of both older (above 35 years old) and younger (less than 35 years old), male and female farmers. The Participatory Rural Approach (PRA) was used to facilitate the institutional analysis exercise whereby FGDs used a Venn diagram for institutional analysis. A total of 18 FGDs were organized, three for each of the six wards involved in the study with a total of 114 participants. Key informant interviews (KIIs) and FGDs were conducted so as to allow triangulation of information generated from the survey and household surveys. Secondary data were collected from district agricultural reports, RECODA publications and reports on agricultural technologies disseminated and their rate of adoption.

1.7.5 Data analysis

Data collected using the structured questionnaire were analysed using the Statistical Package for Social Sciences (SPSS) software version 20. The data were first coded before being analysed. The analysis included computing descriptive statistics including frequencies, percentages, means, minimum and maximum values of variables recorded at the scale (interval and ratio) levels, and cross-tabulations in order to describe individual variables in view of temporal and spatial aspects. In addition to the descriptive analysis, inferential analysis was done using chi-square which was employed in determining associations between indicators of the dependent variable and some socio-economic factors as specified.

Qualitative data collected through PRA, KIIs and FGDs were analysed through content analysis whereby codes were developed for various arguments, and the arguments were compared and contracted with information gathered through the questionnaire. The qualitative data were used to triangulate and complement/supplement information collected through the questionnaire. Generally, the study considered performance of LFs as execution of their designated duties.

1.8 Ethical Considerations

The study adhered to research ethics. According to Aluwihare-Samaranayake (2012), research is about expanding knowledge, supporting values required for collaborative work such as mutual respect and fairness as well as supporting important social and moral values, such as the principle of doing no harm to others. Paul and Elder (2006) refer to ethics as a set of concepts and principles that guide us in determining what behaviour helps or harms living creatures. Research ethics involve requirements on daily work, the protection of formality of subjects and the publication of the information in the research.

Based on that, consideration on the research ethics was observed as advised by the University and based on some ethical principles and the various codes explained by and Gajjar (2013) and Resnnik (2015).

Among the specific research ethical issues observed in this study include developing a research proposal which upon approval led to provision of an introduction letter by Sokoine University of Agriculture which introduced me as a PhD student to those involved in the study. In addition, the research was conducted with honesty in relation to communication, collecting reliable data, data analysis and presentation of study findings. Moreover, participants in the study did so following their informed consent and no one was coerced into being involved in the study.

1.9   Study Limitations

The study's major challenges or limitation was the respondents understanding of the soft skills related to personality traits and behaviours, many respondents had a good understanding on the hard skills. To overcome this limitation, the respondents were given a thorough explanation of what soft skills were using examples till they understood. Another challenge in data collection was related to research fatigue of some respondents in Karatu district who felt they have been asked quite a lot which is time wastage. In addition, they failed to see how they will benefit from the study. This limitation was solved through provision of an explanation of the potential contribution of the study in attempting to solve the problem of access to extension services due to staff shortages which in turn will help them and other small-scale farmers. In addition, respondents were assured that the interviews and FGDs will only take an hour.

Limitations related to validity and reliability were overcome through pretesting of the data collection tools in Karangai Village in Arusha District, applying the RIPAT approach. The

pretesting involved interviewing 20 households. A review of the questionnaire was done whereby some questions were added while ambiguous statements were removed. Later, the amended version of the questionnaire was used for the actual data collection.

1.10 Organization of the Thesis

The thesis is organized based on publishable manuscripts as per Sokoine University of Agriculture guideline. The entire thesis is divided into six chapters where each manuscript stands as a chapter. Chapter one covers the study's background, problem statement and justification as well as general and specific objectives, theoretical and conceptual frameworks. General methodology, research ethics and study limitations are also presented in chapter one.

Chapter two covers the first manuscript on personality traits of selected high-performing lead farmers in projects applying the RIPAT approach in Tanzania. The manuscript examines the process of selecting high performing LFs based on the commonly used socio-economic characteristics but, with a personality traits lens.

Chapter three comprises of manuscript two which is about the roles of LFs in facilitating the uptake of agricultural technologies in the RIPAT Approach in Tanzania. The manuscript assesses the roles LFs in the uptake of agricultural technologies and how they fill the gap of inadequate extension staff.

Chapter four consists of manuscript three on the contribution of personalities to the performance of lead farmers under projects applying the RIPAT approach. The manuscript explores the needed personalities fit for LFs' career and the way they can be improved. .

Chapter five consists of manuscript four which explores the influence of institutions on lead farmers' performance in projects applying the RIPAT approach. The paper examines how various institutions influence the performance of LFs..

Lastly, chapter six presents the study's summary of general conclusions and recommendations. In addition, it highlights areas for further research and also the study's contribution to the body of knowledge.

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CHAPTER TWO

2.0   SELECTION OF HIGH PERFORMING LEAD FARMERS BASED ON SOCIO-ECONOMIC CHARACTERISTICS AND PERSONALITY TRAITS, A CASE OF PROJECTS APPLYING THE RIPAT APPROACH, TANZANIA.

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2.1 Abstract

The Training and Visit (T&V) and Farmers Field School (FFS) approaches of delivering agricultural extension services are facing some challenges that have necessitated a look into community based approaches focusing on a broader reach and cost-effectiveness. Thus, the use of lead farmers (LFs) has become important in recent years. However, the selection of LFs has mainly been based on socio-economic characteristics with limited consideration of personality traits. The paper examines the process of selecting high performing LFs in Karatu and Singida Districts based on the commonly used socio-economic characteristics but, with a personality traits lens. Using a cross-sectional research design, a sample of 384 farmers was selected randomly from a population of 1800 farmers. Primary data were analysed using SPSS whereby variables related to socio-economic characteristics and personal traits of LFs and Non-Lead Farmers (NLFs) were compared using Friedman test. The results show that the selected LFs when compared with NLFs, had higher households labour and size of the land cultivated. The assessment of personality traits fits for high performing LFs using a Big Five Personality Trait Model and the Friedman test showed a statistically significant difference ($p = 0.000$). Openness had the highest score, followed by extroversion, agreeableness, consciousness and finally neurotic. The study concludes that personality traits are important to LFs selection and therefore, recommends that personality traits related with openness and consciousness should be more considered for selection of LFs for high performance.

Key words: Lead farmers, Personality traits, Socio-economic characteristics, RIPAT.

2.2 Introduction

The modalities of conducting agricultural extension through Training and Visit (T&V) and Farmers Field Schools (FFSs) are changing due to the challenges encountered, including inadequate operational funds (Ahmad, 2007; Wambura *et al.*, 2012; Gabagambi, 2013), and

few extension agents compared to the number of farmers to be advised (Hella, 2013). Other challenges necessitating the change in modalities of extension delivery include increasing pressure on land and other resources (Ringo *et al.,* 2018), and the need to train farmers to raise productivity through the use of new technologies (Bekele *et al.*, 2017). Some of the more promising steps to deal with the challenges have been to adopt organic (community-based) approaches focusing on broader reach (Franzel and Simpson, 2013; Bekele *et al.,* 2017), cost-effectiveness and sustainability of their efforts beyond the investment cycle (Simpson *et al.,* 2015). Among these organic approaches is the Rural Initiatives for Participatory Agricultural Transformation (RIPAT), which extensively makes use of Lead Farmers (LFs). According to Scarborough *et al.* (1997), LFs are individual farmers who have been selected by the community to perform technology-specific activities in Farmer to Farmer Extension (provision of training by farmer to other farmers) whereby they get trained on the use of the technology. Under the RIPAT approach, LFs are those individuals who, during the project implementation period, have been identified as people who have developed social entrepreneurship as agents for change and are among successful farmers from within their group (Vesterager *et al.,* 2017). LFs' specific roles tend to differ from one project to another, but generally the LFs are trained by external agents; thereafter, they share their knowledge and skills with other farmers in their communities.

The study on which this paper is based adopted the 'Big Five Personality Trait Model' by Costa and McCrae (1987) to analyse and interpret LFs' personalities. The model has five broad domains which define human personality traits and account for individual differences by determining why people respond differently to the same situation. The Big Five Personality Traits Model, which is abbreviated as OCEAN (i.e., Openness,

Conscientiousness, Extraversion, Agreeableness and Neuroticism-anxiety) is as indicated in Figure 2.1.

Low Score	Personality Trait		High Score
Practical, Conventional, Prefer routine	O	**Openness**(imagination, feelings, actions, ideas)	Curious (Wide range of interests, Independent)
Impulse, Careless Disorganized	C	**Conscientiousness**(competence, self-discipline, thought-fullness, goal driven	Hardworking, dependable, organized
Quiet, reserved. Withdraw	E	**Extroversion**(sociability, assertiveness, emotional expression)	Outgoing, warm, seeking adventure
Critical, Uncooperative Suspicious	A	**Agreeableness**(cooperative, trustworthy, good-natured)	Helpful, trusting, empathetic
Calm, even-tempered	N	**Neuroticism**(tendency towards unstable emotions)	Anxious, unhappy, prone to negative emotions

Figure 2.1: A Summarized Big Five Personality Trait Model as adapted from Costa and McCrae (1987).

On the selection of high performing LFs, several studies have emphasized the importance of first-line employees, believing that they are significant determinants of the quality of business, service and operational success (Edwards 1996; Heller *et al.* 2002; Tsai *et al.,* 2013; Ciroka 2014). According to Campbell (1990), performance is "what the organization hires one to do and do well", while Edwards (1996) argues that if a person is in the right job, there is a direct link to performance. Zaim *et al.* (2013) further add that, a high performing employee is the one who can demonstrate competency in related areas, motivation and social skills that can be learned through education, job experience or vocational training. High performing LFs under projects applying the RIPAT approach are expected to be skilled, self-motivated, and able to work in difficult conditions under minimum supervision to ensure a good job is done based on the roles they are expected to play (Vesterager *et al.,* 2017).

The use of LFs under projects applying the RIPAT approach is mandatory as the projects are designed with inbuilt up-scaling mechanisms whereby the RIPAT 'start' phase is implemented in a few villages which act as a base for selecting LFs who will later be used in facilitating the uptake of technologies to other neighbouring villages during the RIPAT 'spreading' phase (Vesterager *et al.,* 2017). However, the selection of LFs has mainly been based on socio-economic characteristics with limited consideration of personality traits. Literature (Alkahtani *et al.,* 2011; Tsai *et al.,* 2013; Ciroka, 2014) suggests the use of personality traits to match the right job with the right person. According to Liao *et al.* (2008), personality traits can be used to explain people's attitudes and behaviour, and it is often used to predict outcome variables, such as work attitude and job satisfaction. Hence, there is a need to assess to what extent, in addition to socio-economic characteristics, personality traits are considered in the selection of high performing LFs. The objective of the study on which this paper is based, was to determine factors considered in the selection of high performing LFs with a personality traits lens. To achieve this, the paper attempts to answer three specific questions: are there any differences in socio-demographic characteristics between high performing LFs and Non-lead farmers (NLFs)? How is the process of selecting high LFs conducted? What are the personality traits of high performing LFs?

2.3   Methodology

2.3.1   Study area

The study on which this paper is based was conducted in Karatu and Singida District Councils in Arusha and Singida Regions, respectively. The selection of the study areas was based on the fact that the two districts, for more than three years, had been implementing projects applying the RIPAT approach, whereby the contribution of LFs to the project success was quite significant (Lilleør and Sørensen, 2013).

Geographically, Karatu and Singida are found in the northern and central parts of Tanzania, respectively. Karatu District experiences varied climatic conditions whereby in the Eyasi Basin, the annual rainfall is between 300 and 400 mm, while it ranges between 900 and 1000 mm per year in Karatu Town. Karatu has three agro-ecological zones namely: the uplands, midlands and lowlands, with altitudes ranging from 1,000 to 1,900m above sea level (Meindertsma and Kessler, 1997; KDC, 2001). The principal crops grown in the highlands include wheat, barley, beans, maize, coffee, flowers, pigeon peas, sorghum, finger millet and sunflower while in the midlands and lowlands the main crops grown are maize, beans, pigeon peas, sorghum, millet and sunflower (URT, n. d.). Onion is a common irrigated crop in the lowlands of Lake Eyasi, especially in Mang'ola Ward.

According to URT (2013), the climatic conditions of Singida District are generally semi-arid with an average annual rainfall of about 590 mm ranging from 350 mm to 750 mm per year. The principal crops grown include maize, sunflower, groundnuts, sorghum, millets, onions and sweet potatoes. Both districts are faced with shortage of extension officers. For Singida District, out of the 84 village extension officers required, there are only 19 (23% of the requirement), and out of the 21 Ward Agricultural Resource Centres (WARCs) required, there are only two in the whole district (URT. n. d). In Karatu District, out of 58 village extension officers required there are only 35 (60% of the requirement), and out of 14 WARCs required there is only one WARC (URT, n. d).

2.3.2   Research design

The study adopted a cross-sectional research design. This design has been recommended by several scholars. For example, Babbie (2010) argues that the design is cheap and time effective in data collection. The design entails collection of data on more than one case

(usually quite a lot more than one) at a single point in time. In order to collect a body of quantitative and /or qualitative data, about two or more variables (usually many more than two) are then examined to detect patterns of association (Bryman, 2012). According to Babbie (2010), the design is also useful for descriptive purposes as well as for determination of relationships between variables at the time of the study. Moreover, the design allows the use of other methods of data collection such as observation and use of official records.

2.3.3   Study population, sample size and sampling techniques

2.3.3.1 Study population

The targeted population (N) was the 1,800 households that had benefited from the RIPAT projects in Karatu and Singida Districts.

2.3.3.2   Sample size

The sample size (n) was 384 households; the number was determined as per Cochran (1977) formula as cited by Bartlett *et al.* (2001) which is:

n = $\underline{z^2 p(1 - p)}$

$\qquad$ e^2

$$n = \frac{z^2(pq)}{e^2}$$

Where:

n =   sample size;

z =   a value on the abscissa of a standard normal distribution (from an assumption that the sample elements are normally distributed), which is 1.96 or approximately 2.0 and corresponds to 95% confidence interval;

p =   estimated variance in a population from which the sample is drawn, which is

        normally 0.5;

and,

e =   acceptable margin of error (or precision).

Using a Z-value of 1.96, a p-value of 0.5, and an e-value of 0.5% (which is equivalent to

0.05), the sample size (n) was determined to be 384 households, as shown below:

$n = 1.96^2 (0.50 \times 0.50)/0.05^2 = 384$.

2.3.3.3   Sampling techniques

The study employed stratified proportionate sampling in order to ensure that no district

was over-represented or under-represented. Karatu District had more participants in the

RIPAT project compared to Singida District. The strata were districts, wards and types of

farmers (LFs and non-LFs). The representatives of households (Table 2.1) were selected

through systematic sampling. The population comprised two sub-populations of lead

farmers and non-lead farmers. Both sub-populations were obtained from RIPAT project

officers/managers who had complete lists of RIPAT beneficiaries in the research areas. The

first one was selected randomly using random numbers created in MS Excel using the

"=RAND ( )" command, which generated random numbers. This was done at the ward

level where a sampling interval for a relevant sub-population was obtained by dividing the

sub-population N by the sub-sample size (n) to obtain the sampling interval k, i.e. N/n = k.

Then, after the first respondent was selected, every k^{th} person was selected until the sub-

population was exhausted.

At least 15% of the respondents were LFs who were purposively selected and assessed

based on their seven roles under the projects applying the RIPAT approach. Based on

points scored, an index summated scale, high performing lead farmers scored 64% and above. The seven roles of LFs under RIPAT include teaching and training, communication, adoption of the technologies, facilitating timely availability of agro-inputs, facilitating adoption of new technologies, project monitoring and report writing. The proportion of 15% who were selected purposively, aimed at including at least 30 LFs based on the suggestion by Bailey (1998) that a sub-sample for a research in which statistical data analysis is to be done should comprise at least 30 cases (respondents). The number of males (40%) was less compared to females who were 60% (Table 2. 1) because women were more than a half of the RIPAT group members (Vesterager *et al.*, 2017).

Table 2.1: Proportions of RIPAT farmers who were sampled

District	Approx. sub-pop. (20-30% are LFs)	Sampling fraction	Sub-sample	Male farmers (About 40%)		Female farmers (About 60%)	
				Non-LFs	LFs (15%)	Non-LFs	LFs (15%)
Karatu	1,200	384/1,800= 0.2133333	256	82	20	134	20
Singida	600	384/1,800 = 0.2133333	128	33	18	59	18
Total	**1,800**	**-**	**384**	**115**	**38**	**193**	**38**

Besides the LFs and non-LFs, 20 key informants (KIs) were selected purposively. KIs included people who were considered to be knowledgeable about the RIPAT approach, including Extension Officers (EOs), District Project Coordinators (DPC), Village government leaders and Programme leaders/Managers from Research, Community and Organisational Development Associates (RECODA) who are the implementers of the projects using the RIPAT approach. Moreover, focus group discussion (FGD) participants

were selected from members of groups of the RIPAT projects in each ward, including men and women. Key informant interviews (KIIs) and FGDs were conducted to allow triangulation of data collection through the questionnaire survey and secondary data from the district agricultural and RECODA offices.

2.3.4 Data collection

Both primary and secondary data were collected so as to complement each other. Primary data were collected through a questionnaire administered to respondents, and through FGDs and KIIs using an FGD guide and a KII checklist. However, before conducting the FGDs, demographic and socio-economic data from all the participants were collected and other data related to their involvement in project applying the RIPAT approach. FGDs were used to get an in-depth understanding of the LFs using the RIPAT approach and the ways by which they were selected. In line with Barbour and Schostak (2011), FGDs comprising 6-12 members were organized; the groups were composed of both older (above 35 years old) and younger (less than 35 years old), male and female farmers. Groups of LFs were isolated from the NLFs. A total of 18 FGDs were organized, three for each of the six wards involved in the study and two special groups of LFs making a total of 20 FGDs, with a total of 116 FGD participants. Secondary data were collected from district agricultural reports/data, RECODA publications and RIPAT project reports on agricultural technologies disseminated and their rate of adoption.

Checklists of behaviour statements with interpretation based on the Big Five Personality Traits Model by Costa and McCrae (1987) were used in the establishment of the personality traits of LFs to be assessed, and an index scale was used in rating the main personality traits (Openness, Consciousness, Extroversion, Agreeableness and Neurotic) ranging from 1 (strongly disagree) to 5 (strongly agree). According to Funder (2001) and

Funder and Colvin (1991), the model is the most accurate approximation of the basic personality traits dimensions. The five personality traits were put into the matrix under pair-wise ranking to compare each trait with one another to establish how farmers prioritize them.

2.3.5 Data analysis

Primary data collected using the household questionnaire were coded and then analysed using the Statistical Package for Social Sciences (SPSS) computer software version 20 whereby descriptive statistics (i.e. frequencies, percentages, means, minimum and maximum values of variables) were determined. The Friedman test, which is a non-parametric statistical test was used to detect differences in treatments across multiple test attempts by ranking each row (or block) together, then considering the values of ranks by columns. T-Tests and chi-square test were also used for data analysis. Qualitative data collected through key informant interviews and FGDs were analysed through content analysis whereby codes were developed for various arguments and themes. Information generated from analysis of the qualitative data was used to complement/supplement from household survey.

2.4   Results and Discussion

2.4.1   Socio-demographic characteristics of the farmers

Socio-demographic characteristics such as age, sex, household size, marital status and education are considered as important variables in this study since performance of LFs can vary with respect to these variables.

| | Frequency | Percent |

Demographic Attributes		LFs	NLFs	LFs	NLFs	Chi-square	Sig. (2-tailed)
Respondents Age							
	18-30	0	40	0	10.4		
	31-43	39	189	51	49.2		
	44-56	24	119	32	31		0.025
	57-70	13	35	17	9		
	+70	0	1	0.3	0		
Respondents Sex							
	Male	38	152	50	40	-	-
	Female	38	232	50	60		
Respondents Marital status							
	Single	2	19	2.6	6.2	1.475	0.224
	Married	74	289	97.4	93.8		

Table 2.2: Socio- demographic characteristics of LFs and NLFs (n=384)

2.4.1.1 Respondents' age

Age is among the factors considered in the selection of participants of the projects applying the RIPAT approach. In order to participate in the project, one has to have acquired the age 18 years old, a minimum age of an adult person as per Tanzanian laws. The age of NLFs ranged between 18 to more than 70 years while for LFs, ranged between 31 and 70 years (Table 2.2). When the ages of LFs and NLFs were compared, it was found that their averages were 43.5 and 41.6 years, respectively. Independent samples t-test showed that there was a statistically significant difference (p = 0.025) in average age between the LFs and NLFs. Generally, LFs were older than NLFs. From the FGDs, it was noted that age was among the factors considered in the selection of LFs whereby the older people stood the highest chance of being considered than the younger ones. This was based on the assumption that they would be more respected and reliable. Further, consideration of age in the selection of LFs was also placed on the working age as the majority (83%) of LFs age ranged between 31 and 56 years. Scholars (Franzel *et al*., 2015; Tsafack *et al.,* 2015; Simpson *et al.,* 2015) maintain that age is an important factor to consider in the adoption of innovations and consequently is among the important factors for selecting high performing LFs. However, although Kotur and Anbazhagan (2014) agree that generally there is an increase of performance with increased age, they warn that this depends on the nature of

the tasks. While some tasks are better done by older and experienced people; other tasks are poorly done by people above 45 years old. This argument echoes Warr (1994) who observed that, the performance of the individuals will gradually deteriorate or improve with age depending on their work. In this study, based on the average age range of the LFs and Non-LFs, high performing LFs are older people above 30 years but, in the working age of 31 to 56 years.

2.4.1.2   Respondents' marital status

The number and proportion of those who were married and single are given in Table 2 in terms of groups of lead farmers (LFs) and Non-Lead Farmers (NLFs). Chi-square test showed that there was no statistically significant association (p-value=0.224) between being LFs or NLFs and marital status, which means that marital status does not add more value to LFs' performance. The findings concur with the study on F2FE in Malawi, Cameroon and Kenya which did not consider marital status as among the criteria used for the selection of LFs (Kundhlande *et al.,* 2014). According to the study, socio-economic characteristics such as income, education level, credit accessibility, capital and labour were considered as among the important variables which are considered in selection of LFs.

2.4.1.3   Education level

As presented in Table 2.3, only 17% of the NLFs had not attained formal education as opposed to LFs whereby all of the respondents had formal education.   From the FGDs and RECODA reports, it was revealed that the ability to read and write was among the requirements in the selection of LFs as they were expected to be able to read training materials and write reports. According to Bandiera and Rasul (2005), apart from being able to read and write, education encourages more interaction and instils confidence. Moreover, Kundhlande *et al.* (2014) insist that literacy is an important aspect for a person to be a lead

farmer. This is because a low level of education makes it very difficult to train LFs to become effective in communicating information and disseminating technologies. However, although 100% of the LFs could read and write, only a few (4%) had attained post primary education. This implies that the implementing organization and EOs should prepare teaching materials and conduct training, keeping in mind the education level of the selected LFs.

Table 2.3: Socio - economic characteristics of the LFs and NLFs (n = 384)

Characteristics		LFs		NLFs	
		Frequency (F)	Percent (%)	Frequency (F)	Percent (%)
Education level	No formal education	0	0	51	17.0
	Formal education (could read and write properly)	76	100	257	83.0
Land size	<0.41ha	1	1.3	20	6.5
	0.41 – 0.83 ha	19	25.0	87	28.3
	>0.83 – 1.66 ha	27	35.5	139	45.1
	>1.66 - 2.9ha	29	38.2	62	20.1
Access to loans	Yes	76	100	286	92.9
	No	0	0	22	7.1

2.4.1.4 Respondents' land holding size

Many scholars have argued that land is among the important factors in the selection of LFs as it is used for practising the introduced technologies (Simpson *et al.*, 2015). The land sizes that the respondents owned are as presented in Table 2.3. As shared in Table 2.3, the mean land holdings of LFs and NLFs were 2.70 ha and 2.57 ha respectively, which were significantly different (p=0.001). Generally, LFs had larger land holdings as compared to the NLFs. The land holding size of >0.83 to 2.9 ha is similar to what was reported by Anderson *et al.* (2016) for the average land holding size of small-scale farmers in Tanzania. Although a quarter (25%) of the LFs had land ranging from 0.41 to 0.83 ha (1 - 2 acres), this land can suffice the purpose of practising the project interventions (Vesterager *et al.*, 2017). Under the RIPAT approach, selection of the LFs foresees the farmers who, besides adopting the introduced technologies, become role-models and

sources of planting materials for the introduced crops which helps in ensuring project sustainability and continuity of the LFs' roles even after the project's lifespan.

2.4.1.5   Access to loans

Vesterager *et al*. (2017) observed that the ability to take a loan is one of the indicators of a social entrepreneur thus, they advocate ability to access loan to be one among the factors for becoming LFs. As shown in Table 2.3, study findings show that all of the LFs had been taking loans from different sources including village savings and loans associations (VSLAs) for various activities. It was learnt through the FGDs that introduction of rural microfinance schemes (i.e. VSLAs) under projects applying the RIPAT approach had increased access to loans hence, increased ability to access capital.

2.4.2   Process of selecting LFs under RIPAT

It was established from the secondary data from RECODA reports and scholarly publications (Vesterager *et al.*, 2017) that the process of selecting LFs comes at least in the second year of the project and used the following procedure; Thirty (30) members in a particular farmer group are divided into sub-groups of 4 to 6 members, depending on the technologies in the basket of options[1]. Each sub-group selects two leaders known as a Technical Lead Farmers (TLFs) who, in addition to undergoing practical training, attend in-house training together with an extension officer (EO). The TLFs are then exposed to study visits to learn about the technologies in question. Later, each group, in collaboration with the EO and project manager from the implementing organization, select one or two LFs from amongst all the TLFs in each group who become spreading (overall) LFs. Overall LFs are further trained on project facilitation procedures, communication skills and adult learning so as to become competent social entrepreneurs to offer notable services in

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[1]*Basket of options is a range of selected technologies aiming at exploiting certain opportunities and/or curbing challenges identified during the project situation analysis.*

the development of crop/product based value chain in the course of project implementation or after the project lifespan. According to Vesterager *et al.* (2017), the spreading LFs are selected based on seven factors, which are: i) active group member (with good attendance, performing well group activities and abiding by group's constitution); ii) understanding of the concept of RIPAT approach; iii) competence in adopting the introduced technologies; iv) ability to pass on knowledge to others; v) good reputation among the group members and community; vi) ability to read and write; and vii) passing an individual interview.

Through the FGDs and KIIs, it was revealed that when farmers work together in a group they are able to identify individuals possessing the qualities as proposed by Vesterager *et al.* (2017), and some other important personality traits fit for being LFs. During a KII, a LF from Karatu said:

> "*It was my first time to work in a group. Initially, I was a bit doubtful. But, I have one thing in myself, that if I say yes to something, I put all my efforts; and if I say no, I just abandon it completely. I was selected by my fellow group members to be the group leader, and after one year I was selected to be a sub-group lead farmer of Conservation Agriculture (CA). We received more intensive practical and in-house training. Afterwards, I was selected to be the overall Lead Farmer because from the offered basket of technologies by the project I adopted CA (zero tillage with intercropping of maize and cover crops), livestock (poultry, pigs and dairy goats) and vegetables. In addition, I shared project technologies with my neighbours by providing them with planting materials and knowledge.*" (A Lead Farmer from Karatu District, Endamarariek Village - September 2017).

The above testimony on the way the lead farmer was selected shows that selection of high performing LFs is a systematic process. It suggests that the selection of LFs looked beyond

project contexts and lifespan by putting into consideration value chain development, market associations and general community development. In this case, the factor of social entrepreneurship was considered in the selection of LFs. Kiptot and Franzel (2015) describe the selection of LFs similar to the one adopted by the RIPAT approach. According to them, farmer extension facilitators (in the case of the RIPAT approach these are called LFs) were identified and vetted by their communities, then they received broad-based technical training on particular subject matters, leadership and value chain management thereafter, they were deployed to their own communities. The same study revealed that farmer extension facilitators (FEFs) were comprehensively trained and developed their model farms sufficiently to even cater for the needs of the more progressive farmers in the communities. According to Simpson *et al.* (2015), allowing the communities and organizations to select LFs helps increase local ownership and accountability. The above is generally critical when it comes to sustainability of the promoted project activities.

During a KII, a RECODA management staff argued that the LFs should be selected by the community and preferably from the strong groups that have worked and demonstrated competence and good character. LFs emanating from strong groups tend to be effective as their group members support the formation of new groups by supplying planting materials. This argument reflects what has been reported by Khaila *et al*. (2015) that the selection LFs in Malawi considered factors such as being a hard-worker, an active farmer, and being interested in helping others. In Kenya, the factors considered in the selection were based on availability, trainability, acceptability, ability to communicate, literacy, passion and expertise (Franzel *et al.,* 2014) while in Cameroon considered factors such as hard-working, good communication skills, availability and showing interest and desire to help others (Tsafack *et al.,* 2015). Under the RIPAT approach, to be conserved as LF one has to demonstrate the following factors; being an active member of a group, ability to adopting

the introduced technologies, good reputation among the group members and the community and ability to read and write (Vesterager *et al.*, 2017). The process and factors mentioned indicate that the selection of LFs is largely based on the farmer's socio-economic characteristics.

2.4.3   Selection of LFs based on the personality traits lens

In order to analyse personality traits of the high performing LFs, the Five Personality Traits Model by Costa and McCrae (1987) was used in measuring personality traits parameters which include Openness, Consciousness, Extroversion, Agreeableness and Neurotic. As shown in Table 2.5, respondents (both LFs and NLFs) were required to rate the opinion on what they considered to be personal traits that would lead to high performing LFs. The scale contained 15 behaviour statements whereby in each statement, an index summated scale was used in rating personality traits ranging from 1 (strongly disagree) to 5 (strongly agree). The descriptive statistics are summarized in Table 2.4, a higher score indicated more preferred trait for the high performing LFs.

Table 2.4: Descriptive statistics for personality traits scores as assessed by LFs and NLFs

Personality traits	n	Mean	Std. Deviation
Openness/intellect	384	3.98	0.683
Extroversion	384	3.80	0.773
Agreeableness	384	3.70	0.713
Consciousness	384	3.67	0.665
Neurotic	384	2.12	0.629

The assessment of the personality traits under the Friedman test indicated a statistically significant difference (p = 0.000). Openness had the highest score, followed by extroversion, agreeableness, consciousness and finally neurotic (Table 2.4). In order to understand which traits differed significantly, first scores on the neurotic trait were

compared against the remaining four traits, and the results show that the scores differed

significantly (p = 0.000) while comparison among the remaining four traits showed that the

traits differed significantly except Agreeableness and Consciousness (p = 0.355). The

results suggest that in the selection of high performing LFs, personality traits related to

openness (curious, wide range of interests and independent) should be given a higher

consideration, followed by extroversion (outgoing, warm, seeking adventure) while factors

related to neurotic trait (anxious, unhappy, prone to negative emotions) should be given

less weight. McCrae and Costa (1986) established that individuals who score highly on

openness are more likely to employ persistence, positive thinking, retraction and escaping,

and emotional articulation as a way of coping with stressors, the personalities which are

important for the high performing LFs as they tend to encounter a lot of ups and down in

their career.

Furthermore, an analysis of the personality traits of the LFs was conducted under FGDs

whereby the Big Five Personality Traits Model (see Figure 2.1) were used in guiding the

discussions. The model helped in the interpretation of the personalities of high performing

LFs through provision of meaning of each personality traits based on personal behaviours

being high or low. Through FGDs, three scenarios were used in identifying high

performing LFs based on their personality traits. The first scenario was to assess the high

performing LFs in which a respondent was supposed to propose whom s/he thought was a

best LF (see Table 2.5). Secondly, respondents selected a high performing Lead Farmer

who was well known to all group members, and thirdly, self-assessment of the LFs was

done. Before the discussion, each member responded individually to the 15 statements. The

results were discussed and are summarized in Table 2.5 and then interpreted accordingly.

Table 2.5: **Responses on the different behaviours of the high performing LFs under RIPAT projects**

S. No.	Statements used in determining personal characteristics	Individual selection of LF	Best known LF	Self - assessment of LFs	Average range of 1 to 5.
	Neurotic				
1	Gets upset easily	2.1	2	1	1.7
2	Low opinion of myself	1.7	3.2	1.2	2
3	Gets irritated easily	2.1	1.8	2	1.9
	Average				**1.86**
	Extroversion				
4	Enjoys being part of a group	4.7	3.7	4.8	4.4
5	Natural talent for influencing people	4.7	3.6	4.5	4.2
6	Has a lot of fun	3.8	3.6	3.8	3.7
	Average				**4.1**
	Openness/Intellect				
7	Likes to solve complex problems	4	4.5	4.2	4.2
8	Enjoys the beauty of nature	4	3.7	4.5	4
9	Likes to visit new places	4.6	4	4.7	4.4
	Average				**4.2**
	Agreableness				
10	Believes that others have good intentions	4.2	3.5	4.2	3.9
11	Tries to anticipate the needs of others	4.2	4.3	4.5	4.3
12	Loves to help others	4.7	3.7	5	4.4
	Average				4.2
	Consciousness				
13	Always prepared	4.4	4.1	4.6	4.4
14	Can be trusted to keep promises	4.6	4.7	4.9	4.7
15	Sets high standards for myself and others	3.8	4.3	4.2	4.1
	Average				**4.4**

Table 2.5 presents a summary of personality traits for high performing LFs based on attested personal characteristics and corresponeding scores which are between strongly disagree(1) to strongly agree (5) where neurotic traits was the least considered variable scoring an average of 1.86. The findings are in line with Livesley (2008) that each of the big five personality factors represents a range between two extremes (low and high score) whereas in reality most people tend to be somewhere midway along the continuum of each factor, rather than at polar ends. Matthews *et al.* (2003) added that personality traits reflect basic dimensions on which people differ where each individual falls somewhere on each dimension, meaning that they could be low, medium, or high on any specific trait.

Individual asssessments revealed that altruism (spirit of volunteerism) which was defined as love to help others scored 5 (100%). This implies that altruism is and should be among the important elements to be considered in selection of LFs since they is required to deal with the community. According to Yoga (2006), socially volunteering helps to build more cohesive communities, fostering greater trust between people and developing norms of solidarity and reciprocity that are essential to stable communities. It was further learned that, the social capital represented by volunteering plays a key role in economic regeneration. The model in Figure 2.1 was used in carrying out pair-wise ranking where the five personality traits were put into a matrix. After discussions, comparisons of the traits were done and consensus was reached on the preferred personality traits in the selection of LFs (Table 2.6).

Table 2.6: **Pairwise ranking based on the preffered personality traits in the selection of LFs**

Personality traits	Openness	Consciousness	Extroversion	Agreeableness	Neurotic	Scores	Ranking
Openness		Consciousness	Openness	Openness	Openness	3	2
Consciousness			Consciousness	Consciousness	Consciousness	4	1
Extroversion				Openness	Extroversion	1	4

Agreeableness		Agreeableness	2	3
Neurotic			0	5

As illusted in Table 2.6, the pairwise ranking shows that consciousness is the most preferred personality trait in the selection of LFs (scored 4), followed by openness and neurotic ranked last. During FGDs, it was learnt that consciousness was most preferred because of the personal characteristics/behaviours of being hardworking, dependable and being organized, while openness was characterised by curiosity, wide range of interests and independence. Generally, the FGD participants were of the opinion that high performing LFs are those who 'walk their talk'. One of the participants said: *"We need a person who is eager to learn and who is proactive in practising new things so as to lead by example"*. This is in line with Maxwell (2007) who noted that the ability to lead is a collection of skills, nearly all which can be learned and improved, and concluded that successful leaders are learners. By using the same guiding researchable statements and the model (Fig 2.1), a KI (LGA staff) from Singida, although admitting that consciousness and openness are important personality traits in selection of high performing LFs, suggested extroversion personality traits (outgoing, warm, seeking adventure) should be among the factors to be considered when working in a closed society which may need LFs with outgoing behaviour. He had this to say:

> *Charismatic LFs are required in localized areas where communities are very traditional with taboos which sometimes work against development ethics such as working together in groups and even when they come together they are very reluctant to share their ideas. In this case, during introduction of project ideas, the LFs are required to be like salespersons (*Singida LGA staff, September 2017).

A RIPAT project staff expressed the way he admired LFs who were hardworking, dependable, organized and open to new technologies. This implies that he was also of the opinion that selection of LFs should consider consciousness and openness personality traits. He further added that as LFs do not get a salary, their selection should take into consideration personality behaviour of volunteerism (altruism) which, according to Franzel *et al.* (2014), is more about unselfish behaviour which makes someone feel rewarded when helping.

2.4.4   Motivation to become a Lead Farmer

The study explored further if motivation to become a lead farmer would be included in the selection criteria. During the FGDs with LFs, it was noted that there were different motives among most LFs. These include: spirit of helping others, desire to get new knowledge, recognition, income generation and project benefits. One Lead Farmer said:

> *"I decided to be a Lead Farmer because I feel good when I help others to solve their problems. When dairy goats were introduced in our area many were reluctant to keep male goats, but I took one and today (after three years) more than 20 of my neighbours have improved goats (crossbreed) because they have brought their local goats from my place for breeding"* (Lead Farmer, Meria village in Singida, September 2017).

Similarly, during the interview with the Singida District staff, it was revealed that the district experienced a shortage of extension officers thus, the presence of LFs reduced extension gaps. For a better impact, the District staff was of the opinion that, since there is no fund allocated specifically for LFs, the selection of LFs should consider farmers with a spirit of volunteerism (altruism - agreeableness). The current study's finding is in agreement with Kundhlande *et al.* (2014) who revealed that the main motivation for

becoming a Lead Farmer was the increased social status and early access to technologies, followed by altruism, job benefits, social networking and income generating activities. In this regard, project implementing organizations and extension officers need to bear in mind the kind of LFs they want to select because they have different motivations and thus, respond to different incentives. In addition, it was noted that the driving force to become LFs was the experiences and positive results brought by the project with a stipulated guide on how they are going to implement successfully their roles so as to achieve similar results. The RIPAT Manual explains how LFs are trained to become competent and passionate to undertake their roles successfully in collaboration with government extension staff (Vesterager *et al.*, 2017).

2.4.5 Conclusions and recommendations

Based on the study findings, it can generally be concluded that personality traits are among the important factors to be considered in selection of high performing LFs where the use of the Five Factor Personality Traits Model is very important. From this study, it can be concluded that the selection of high performing LFs is a process involving different factors. The main socio-economic characteristics to consider in selecting LFs are age (in the sense of maturity and experience), literacy (ability to read and write) which goes together with trainability and confidence, ability to take a loan to invest in agriculture and ownership of land. It is also concluded that sex and marital status are not considered as important factors for one to be a Lead Farmer unless there is a need of gender balancing. Lastly, it is concluded that high performing LFs are individuals with personality traits related to openness (curious, wide range of interests and independent) and consciousness (hardworking, dependable and organized), followed by agreeableness (voluntarism spirit).

Based on the findings and on the above conclusions, the following recommendations are made:

 i. The process of selecting high performing LFs should put into consideration both personality traits and social economic factors.
 ii. Age, literacy, ability to take a loan to invest in agriculture, and land ownership to allow practising the introduced interventions and being a source of planting materials should be given priority as socio-economic characteristics for selection of LFs. Sex and marital status should only be used for such selection where gender balance is deemed critical.
iii. Personality traits of openness (being curious, wide range of interests and independent) and consciousness (hardworking, dependable and organized) should be given high considerations in selection of high performing LFs.

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CHAPTER THREE

3.0 ROLES OF LEAD FARMERS AND EXTENSION OFFICERS IN FACILITATING UPTAKE OF AGRICULTURAL TECHNOLOGIES IN PROJECTS APPLYING THE RIPAT APPROACH IN TANZANIA

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3.1 Abstract

Low agricultural productivity in sub-Saharan Africa is mainly caused by low uptake of agricultural technologies resulting from the declining role of public extension services. For example, existence of wide extension-farmers ratio in Tanzania has limited access to new agricultural technologies and capacity to turn the knowledge into actual development. In order to contribute to narrowing the ratios, the Rural Initiatives for Participatory Agricultural Transformation (RIPAT) approach has been adopted to bridge agricultural technology gaps through promoting the use of lead farmers (LFs) as the principal agents of

change in their communities. This paper assesses the roles played by LFs in uptake of agricultural technologies and how they fill the gap of inadequate extension staff. The study on which this paper is based involved 384 LFs and non-LFs who were randomly selected from a population of 1800 farmers in Karatu and Singida Districts in 2018. The findings show that the use of LFs has narrowed extension officer: farmers ratio tenfold at the village level and facilitated the uptake of technologies at reduced costs since they are from within the community and are not necessarily paid for. It is concluded that LFs play an important role in bridging agricultural technology gaps. It is recommended that formalization of the use of LFs should be integrated into Tanzania's public extension system. In addition, there is a need for further research on the performance of LFs.

3.2   Introduction

Sub-Saharan Africa remains the world's most food-insecure region in spite of its abundant agricultural potentials. According to Davis *et al*. (2012), agriculture in Sub-Saharan Africa is the main source of livelihood although it exhibits low productivity due to limited uptake of agricultural technologies. Rossato *et al*. (2017) report that yields from rain-fed agriculture are generally less than 50% of the actual potentials. Moreover, the situation is worse in arid and semi-arid areas which register zero yields in some years. According to Lipton (2012), farmers' food security and incomes are directly proportional to the yield increase which in turn is related to the use of agricultural technologies. Kassie *et al*. (2013) argue that uptake of agricultural input packages with high yielding varieties combined with fertilizers and good agricultural practices are among the key solutions to low yields. Furthermore, OECD (2001) points out that improved technologies are expected to reduce costs of production with increased yields and incomes. However, Jack and Kelsey (2013)

argue that there has been no shortage of improved agricultural technologies but, the problem is related to their limited adoption by farmers.

Furthermore, low uptake of agricultural technologies according to Hella (2013), is caused by the declining role of public extension services which has created an agricultural technology delivery gap. The gap is mainly caused by wide extension-farmers ratios varying from 1:469 to 1:2 307. Hella (2013) adds that the national average extension-farmers ratio in Tanzania is 1:630 and that extension service can only reach 10% of the farmers. At the same time, governments in developing countries and development partners have been shying away from investing much in agriculture because of too many failures. For example, a study conducted by Paldam (1997) revealed that much developmental aid has failed to produce the intended results in agricultural programmes in Africa and many development actors in that area are asking if it is worth investing in agriculture considering value for money. Furthermore, OECD (2010) reported the decline of both the proportion and the total amount of funds allocated to agriculture in official development assistance. The decline is due to increased 'agro-scepticism' among donors caused by a series of failed agricultural development interventions. However, because of the importance of agriculture in developing countries, the World Bank and OECD reviewed their agricultural development policies and increased their agricultural development budgets whose main interest was centred on different agricultural extension approaches (OECD, 2012).

Literature (OECD, 2012; Lukuyu *et al.,* 2012) shows that one of the main challenges facing agricultural extension in the 21st century is how to develop low-cost sustainable approaches for service provision that go beyond extending messages to playing a key role in promoting farmers as the principal agents of change in their communities. Among the low cost organic extension approaches developed to enhance the uptake of agricultural

technologies is the Rural Initiatives for Participatory Agricultural Transformation (RIPAT) approach. The approach uses lead farmers (LFs) in bridging agricultural technology gaps to small-scale farmers (Vesterager *et al.,* 2017). RIPAT is the result of a collaborative study by Research, Community and Organizational Development Associates (RECODA) organization from Tanzania and Rockwool Foundation (RF) from Denmark. The study conducted in 2006 to 2012 explored why many agricultural development projects have generated so little impact among rural farmers. It further explored why significant technology gaps still exist amongst small-scale farming contexts while so many improved agricultural technologies have been developed but, are not readily adopted by small-scale farmers (Ringo *et al.,* 2014). The approach is documented as a step-by-step guide on how organizations working with small-scale farmers can transfer various technologies aiming at improving the food and nutrition security and income of poor small scale farmers in the Global South (Vesterager *et al.,* 2017). Evaluation of the RIPAT approach for agricultural technology adoption in Tanzania has been documented in a book titled Farmers' Choice (Lilleør and Sørensen, 2013).

LFs is a term used under the farmer-to-farmer extension (F2FE) and RIPAT to refer to individual farmers who have been selected by the community to perform technology-specific farmer-to-farmer extension and are trained in the use of the technology (Scarbourough *et al.,* 1997). Selener *et al.* (1997) also defines LFs as individuals with little or no formal training who, through a process of training, experimentation, learning and practice, increase their knowledge and become capable of sharing it with others and functioning as extension workers. In the RIPAT approach, LFs are individuals who, during the project implementation period, were identified as people who had developed social entrepreneurship as agents for change and were among the successful farmers from within the group (Vesterager *et. al.,* 2017). Unlike the top-down extension approach, the

recruitment of LFs under the RIPAT approach is very participatory; they are selected by fellow farmers on set criteria[2] in the presence of village government leaders, extension officers and representatives from the implementing organization (IO). The selected LFs whose major role is to facilitate adoption and diffusion of project interventions are equipped with facilitation skills.

Furthermore, the roles of LFs tend to go beyond the project lifespan by sustaining project activities (Vesterager *et al.*, 2017). Projects applying the RIPAT approach are designed in two phases with inbuilt community development based experts (farmers as agents of change to their communities) and sustainability (Ringo *et al.*, 2014). The first RIPAT 'Start' phase takes two years, followed by a one-year 'Spreading' phase, whereby LFs from RIPAT 'Start' are paired with extension officers to start new groups in the neighbouring project villages. The agricultural experts from the project IO are involved in mentoring, supervising and supporting LFs' work.

Studies (Kiptot and Franzel 2014; Franzel *et al.*, 2015; Meena *et al.*, 2017) have shown that F2FE is among the solutions to inadequate extension staff as it uses LFs. Tumbo *et al.* (2010) observed that LFs reduce agricultural risks associated with highly variable weather, technology, markets and support services. In addition, LFs under the RIPAT approach are expected to perform seven roles which include: 1) teaching and training, 2) communicating with fellow farmers, project staff and institutions, 3) self-adoption of the technologies, 4) ensure timely availability of agro-inputs, 5) facilitate adoption of new technologies, 6) monitoring and 7) report writing (Vesterager *et al.*, 2017).

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[2] LFs are selected based on seven factors: i) active group member (with good attendance, performing well group activities and abiding by group constitution); ii) understanding of the concept of RIPAT approach; iii) competence in adopting the introduced technologies; iv) ability to pass on knowledge to others; v) good reputation among the group members and community; vi) ability to read and write; and vii) passing an individual interview.

Uptake of agricultural technologies in the study implies both adoption and diffusion of the technologies thus, resulting into significant impacts. Technologies and innovations are somehow used synonymously by many projects but, according to Sahin (2006), technologies developed through research are innovations, which are perceived as new ideas to a certain individual or other unit of adoption. As regards adoption, the study adopted the definition by Rogers that "*adoption is a decision of full use of an innovation"* while diffusion is the process by which an innovation is communicated over time among the participants in a social system (Rogers, 2003). Kant *et al.* (2018) concretized the definition of diffusion as the process by which an innovation is communicated through certain channels over time among the members of a social system. However, according to OECD (2001), for uptake of agricultural technologies to attain sustainable impact, there must be strategies in place that promote the adoption of the technologies. This requires a thorough understanding of the factors influencing the adoption and diffusion of agricultural technologies under various conditions. The study on which the paper is based endeavoured to answer three research questions; what is the contribution of LFs in narrowing extension - farmer ratios, what capacities do LFs require so as to perform well their expected roles and what challenges do LFs face in the execution of their roles, and what are the possible solutions.

Among the main roles of LFs is to collaborate with the few available extension officers in facilitating the diffusion of agricultural technologies. The study adopted the diffusion theory by Rogers (1995) with four unified theories of diffusion i.e. innovation decision process, individual innovativeness, rate of adoption and perceived attributes. The theory of perceived attributes was very relevant to the RIPAT approach since the approach tries out the innovations in group fields while moulding them to be compatible with the local conditions without complexity and prove their comparative advantages when compared to

other technologies. In emphasizing the above theory, Garbero and Marion (2018) suggested that innovations should be changed to suit the local context and not vice-versa.

3.3 Methodology

3.3.1 Description of the study area

The study on which the paper is based was conducted in Karatu and Singida Districts in Arusha and Singida Regions respectively. Geographically, Karatu and Singida are found in the northern and central parts of Tanzania respectively. The selection of the study areas was based on the fact that the projects applying the RIPAT approach have been implemented in Karatu (Endabash division) in 2008 to 2012, while in Singida (Ilongero division), the project was implemented in 2012 to 2015. Thus, it was easy to assess the contribution of LFs to the projects. Normally, projects applying the RIPAT approach last for 2 to 4 years.

Karatu District is located between latitudes 3º10' and 4º00' south of the Equator and longitudes 34º47' to 35º56' east of the Greenwich Meridian. The district is a traditional home to the "Iraqw ethnic group" with minor ethnic groups including Barbaig and Hadzabe who are among the last hunters and gatherers in the world. The district experiences varied climatic conditions whereby in the Eyasi Basin, the annual rainfall is between 300 and 400 mm, while it ranges between 900 and 1000 mm per year in Karatu Town. Karatu has three agro-ecological zones namely: uplands, midlands and lowlands, with altitudes ranging from 1 000 to 1900 m above sea level (KDC, 2001; Meindertsma and Kessler, 1997). The principal crops grown in the highlands include wheat, barley, beans, maize, coffee, flowers, pigeon peas, sorghum, finger millet and sunflower while in the midlands and lowlands the main crops grown are maize, beans, pigeon peas, sorghum, millet and sunflower. Onion is a common irrigated crop in the lowlands of Lake Eyasi, especially in Mang'ola Ward.

Singida District lies between 3^0 and 7^0 latitudes south of the Equator and 34^0 and 35^0 Longitudes east of Greenwich. The District has a semi-arid climatic condition with two seasons; the dry season which is the longest (April to November) and the rainy season December to March. Average annual rainfall of about 590 mm ranging from 350 mm to 750 mm per year while the average minimum temperature is $15^{\circ}C – 30°C$. The distinct land physical features are dominated by lowlands and plains with some highland of plateaus. The principal crops grown include maize, sunflower, groundnuts, sorghum, millets, onions and sweet potatoes. The district is traditionally home to the Nyaturu ethnic group by 90% and according to Tanzania's 2012 population and housing census report (NBS and OCGS, 2013).

The introduced basket of options in the Karatu include improved banana varieties, conservation (maize intercropped with pigeon peas) agriculture, cassava, dairy goats, VSLA, pigs and local chicken. In Singida the basket of options comprised conservation agriculture, orange fleshed sweet potatoes (OFSP), cassava, VSLA, local poultry improvement, dairy goats and improved banana varieties.

3.3.2 Research design

The study adopted a cross-sectional research design. This design has been recommended by several scholars such as Babbie (1990) and Delice (2010) due to its cost and time effectiveness in data collection. The design entails collection of data on more than one case (usually quite a lot more than one) at a single point in time. Through the design one collects a body of quantitative and/or qualitative data on two or more variables (usually many more than two), which are then examined to detect patterns of association (Bryman, 2012). According to Babbie (1990), the design is also useful for descriptive purposes as

well as for determination of relationships between variables at the time of the study. Moreover, the design allows the use of other methods of data collection such as observation and use of official records.

3.3.3 Sampling size

The sample size (n) of 384 households was determined as per Cochran (1977) formula as cited by Bartlett *et al.* (2001) whereby:

$$n = \frac{z^2 p(1 - p)}{e^2}$$

$$n = \frac{z^2(pq)}{e^2}$$

Where:

n =   sample size;

z =   a value on the abscissa of a standard normal distribution (from an assumption that the sample elements are normally distributed), which is 1.96 or approximately 2.0 and corresponds to 95% confidence interval;

p =   estimated variance in a population from which the sample is drawn, which is normally 0.5; and

e =   acceptable margin of error (or precision).

Using a Z-value of 1.96, a p-value of 0.5, and an e-value of 0.5% (which is equivalent to 0.05), the sample size (n) was determined to be 384 households, as seen below:

$$= 1.96^2 (0.50 \times 0.50)/0.05^2 = 384.$$

3.3.4 Sampling techniques

The study employed a stratified proportionate sampling technique in order to ensure that more respondents were obtained from Karatu District which had more participants in the projects applying the RIPAT approach compared to Singida District. The strata were districts, wards and types of farmers (LFs and non-LFs). Male and female representatives of households (Table 3.1) were selected through systematic sampling. The population comprised two sub-populations of lead farmers and non-lead farmers. Both sub-populations were obtained from RIPAT project officers/managers who had complete lists of RIPAT beneficiaries in the research areas. The first one was selected randomly using random numbers created in MS Excel using the "=RAND ( )" command, which generated random numbers. This was done at the ward level where a sampling interval for a relevant sub-population was obtained by dividing the sub-population N with the sub-sample size (n) to obtain the sampling interval k, i.e. $N/n = k$. Then, after the first respondent was selected, every k^{th} person was selected until the sub-population was exhausted. At least 15% of the respondents were LFs who were selected based on the notable roles they were expected to play under the RIPAT approach that include teaching and training, communication, adoption of the technologies, facilitating timely availability of agro-inputs, facilitating adoption of new technologies, project monitoring and report writing. The proportion of 15% aimed at including at least 30 LFs based on the suggestion by Bailey (1998) that a sub-sample for a research in which statistical data analysis is to be done should comprise at least 30 cases (respondents). The number of males (40%) was less compared to females (60%) (Table 3.1); women were more than a half of the RIPAT group members (Vesterager *et al.*, 2017).

Table 3.1: Proportions of RIPAT farmers who were sampled

District	Approximate sub-population	Sampling fraction	Sample	Male farmers (About 40%)	Female farmers (About60%)

	(20-30% are LFs)			Non-LFs	LFs (15%)	Non-LFs	LFs (15%)
Karatu	1,200	384/1,800= 0.2133333	256	82	20	134	20
Singida	600	384/1,800= 0.2133333	128	33	18	59	18
Total	**1,800**	-	**384**	**115**	**38**	**193**	**38**

Besides the LFs and non-LFs, 20 key informants (KIs) were selected purposively. KIs included people who were considered to be knowledgeable about the RIPAT approach, including Extension Officers (EOs), District Project Coordinators (DPC), Village government leaders and programme leaders/managers from RECODA who are the implementers of the projects using the RIPAT approach. Moreover, focus group discussion (FGD) participants (men and women) were selected from members of groups of the projects applying the RIPAT approach in each ward. The groups were separated LFs from NLFs.

3.3.5 Data Collection

Both primary and secondary data were collected so as to obtain complementary information. Secondary data were collected from district agricultural reports, RECODA publications and reports on agricultural technologies disseminated and their rate of adoption. Primary data were collected through a questionnaire administered to research participants, and through FGDs and KIIs using an FGD guide and a KII checklist. However, before conducting the FGDs, demographic and socio-economic data from all participants were collected. FGDs were used to get more in-depth understanding of the LFs using the RIPAT approach and the ways by which they were selected. In line with Barbour and Schostak (2011), FGDs comprising 6-12 members were organized; the groups composed of both older (above 35 years old) and younger (less than 35 years old), male and female farmers. A total of 18 FGDs were organized, three for each of the six wards

involved in the study with a total of 116 FGD participants. Key informant interviews (KIIs) and FGDs were conducted so as to allow triangulation of information generated from the household surveys.

Performance of LFs on the seven roles they are expected to play under projects applying the RIPAT approach were rated at an index scale ranging from 1 (very low) to 5 (very high).

3.3.6 Data Analysis

Data collected using the household (HH) questionnaire were coded and analysed using the Statistical Package for Social Sciences (SPSS) computer software version 20 whereby descriptive statistics (i.e. frequencies, percentages and means values of variables) were determined. In addition, the Friedman test which is a non-parametric statistical test was used to determine differences in treatments across multiple test attempts by ranking each row (or block) together, then considering the values of ranks by columns. The above test was used in testing the performance (facilitation of the uptake of technologies) of LFs on the interventions introduced by the project. Qualitative data collected through the KIIs and FGDs were analysed through content analysis whereby codes and themes were developed for various arguments.

3.4 Results and Discussion

3.4.1 Government extension services in the study area

It was learnt from various reports that funds for agricultural projects and working facilities in Tanzania had been declining because of the decrease in annual agricultural budget when compared with total national budget from 7.3% in 2012/13 to 1.9% in 2018/19. Grants for Agricultural Extension Block and Capacity Building stipulated in the Agricultural Sector Development Programme (ASDP) had not been disbursed since 2015 (URT, 2016).

Shortage of funds had affected the establishment of agricultural projects and regular farm visits for providing various extension services. For example, in Singida, there were only two out of the 21 Ward Agricultural Resource Centres (WARCs) required while in Karatu District there was only one out of the 14 required WARCs (URT, 2013).

According to Anandajayasekeram *et al*. (2008), agricultural extension services in developing countries are constrained by recruitment freezes or lack of finance to hire new staff or retain existing staff (inadequate support and low pay); with budgets highly committed to staff salaries and benefits. District profile reports and key informant interviews with LGAs (Local Government Authority) staff showed that, for the previous ten years, there had been a decline in the number of extension officers in Singida by 52.3% (i.e. from 72 to 34) while in Karatu there had been an increase of 10% (i.e. from 40 to 44). However, the number of villages in Karatu District increased by 37.5% (from 48 to 58) thus, widening the extension-farmers ratio (Fig. 3.1 a & b).

| a) Singida | b) Karatu |
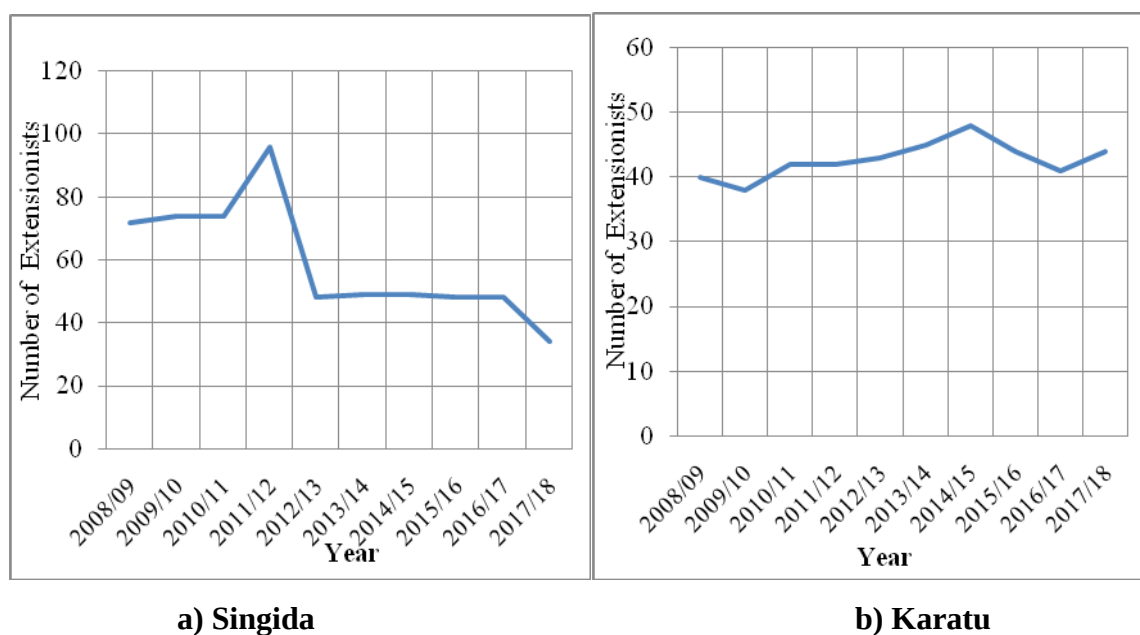
Figure 3.1: A ten-year trend of extension officers in the study

The unfavourable extension farmers ratios imply that most farmers had little access to extension services, and the situation was compounded by inadequate means of transport,

funds and other working facilities which had failed to transform the extension service while it is key to enhancing agricultural production and productivity.

Table 3.2: Number of extension officers in Singida and Karatu in 2018/19

District / Division	Ward	No. of extension officers	No. of villages	Number of households	Ratio
Singida / Ilongero	Ilongero	1	5	2,945	1:2,945
	Mrama	1	4	2,356	1:2,356
	Ikhonda	1	3	1,767	1:1,767
	Mwasawia	1	4	2,356	1:2,356
	Merya	1	4	2,356	1:2,356
	Kinyagigi	1	4	2,356	1:2,356
	Maghojoa	1	4	2,356	1:2,356
	Msange	1	4	2,356	1:2,356
	Kinyeto	1	4	2,356	1:2,356
	Mughamo	1	2	1,178	1:1,178
	Ntonge	1	3	1,767	1:1,767
	Average - 1: 2,195				
Karatu / Endabash	Bugeri	1	3	1,679	1:1,679
	Kansay	4	4	2,481	1:620
	Endamareik	4	9	4,535	1:503
	Endabash	3	5	2,482	1:496
	Average - 1:825				

Source: Karatu and Singida District Councils Survey data of 2018.

The yearly decrease of agricultural development funds availed to districts and the widening of extension-farmers ratio made the use of LFs inevitable. According to Table 3.2, the average extension-farmers ratio for Singida was wider, 1:2 195 compared to Karatu with 1:825, but both had surpassed the 1:600 ratio recommended for Tanzania or at least one extension officer per village (ASHC, 2015). The study noted that the reality for extension services in other districts in Tanzania such as Lushoto that experiences shortage of extension officers resulted into an extension-farmers ratio of 1:3 500 (ASHC, 2015). Also, the study identified inconsistency in the distribution of extension officers among districts and wards. For example, it was observed that Karatu had more officers whose ratio was 1:825 closer to the national average of 1:600, while Singida reported extreme shortage

whose ratio was 1:2 195. In addition, inconsistency was also observed in Bugeri ward where only one extension officer was serving three villages resulting to a wide extension-farmer ratio of 1:1 679. This shows that the balance in using the few available extension officers within districts and at the national level is much skewed to widen the ratios. According to Rockwool Foundation (2009), reasons behind the enormous increase in agricultural production throughout the developed world has been mainly due to having access to new knowledge and the capacity to turn that knowledge into actual improvements. While a country such as Denmark has an extension farmers ratio of about 1: 20-25, in sub-Saharan Africa a country like Ghana has the ratio of agricultural extension agents to farmers of 1:1,500 compared to a more ideal ratio of 1: 400 (MoFA, Ghana, 2014). On the average and across Nigeria, the extension agent: farmer families ratio oscillated from 1: 1700, 1: 2132, 1: 3385, 1: 2950 and 1: 3011 between the years 2008 and 2012 (Haruna and Abdullahi, 2013). And in Senegal, the capacity issues are compounded by the fact that a large proportion of technical staff are approaching retirement age (MARE, Senegal, 2014). According to Van Den Ban and Hawkins (1999) the goal of extension is to ensure that increased agricultural productivity is achieved by stimulating farmers to use improved technologies developed through research. Therefore, for the same to happen in the study areas and Tanzania in general there is a need of bridging the extension - farmers' gaps. Thus, to achieve the above and based on the current resources and constraints (funds and qualified extension officers) use of LFs is imperative.

3.4.2 Roles of LFs in Filling the Gaps of Inadequate Extension Services

3.4.2.1 Roles played by LFs under projects applying RIPAT approach

LFs in projects applying the RIPAT approach are expected to execute seven roles (Vesterager *et al.*, 2017). As demonstrated in Table 3.3, the roles played by LFs under Friedman test which is a non-parametric statistical test that was used to determine

differences in treatments when used in testing the performance of LFs under projects applying the RIPAT approach showed a significant difference (p = 0.000). This implies that performance based on the roles of LFs differ from one intervention to another. When computing the performance on the roles of LFs based on an index scale of 1 to 5, it was shown that the roles of facilitating the adoption of new technologies, self-adoption of the technologies, teaching and monitoring had higher means of 3.85, 3.78, 3.74 and 3.72 respectively; while report writing and ensuring timely availability of agro-inputs had relatively lower mean scores of 3.08 and 3.26, respectively. The observation suggests that high performing LFs are not necessarily mastering their roles equally; so capacity building plans should not be generalized. Capacity building needs assessments for improvement of performance of LFs under the RIPAT approach are conducted during quality control and certification so as to suggest the capacity building plans for all LFs and/or for a certain number of them (RECODA 2014). Performance in this study was as defined by Campbell (1990), that is, *what the organization hires one to do and does well*.

Table 3.3: Friedman test result on roles played by lead farmers (n = 384)

Roles of LFs	Freq.	Mean Score	Std. Deviation
1. Facilitate adoption of new technologies	384	3.85	0.925
2. Self-adoption of the technology	384	3.78	0.910
3. Teaching and training	384	3.74	0.913
4. Project monitoring	384	3.72	0.857
5. Communication - sharing information	384	3.67	0.935
6. Timely availability of agro-inputs	384	3.26	1.098
7. Report writing	384	3.08	1.095

Significant at p≤0.001) difference in attribute

A study on specific roles and responsibilities of LFs across organizations in three countries (Malawi, Cameroon and Kenya) showed that training, advising, monitoring of the implemented activities, organizing meetings and demonstrations in support of technology dissemination were the most common roles carried out by LFs. Generally, training other

farmers was their principal responsibility, followed by advising and monitoring (Simpson *et al.*, 2015). It was learnt from the FGDs with LFs that the roles of self-adoption and facilitating the adoption of LFs had more impact because they were directly related to their daily activities of the uptake of technologies. Report writing was not very effective because of inadequate reading and writing culture of the LFs. The role of facilitating timely availability of agro-inputs was sometimes out of the control of LFs because of unexpected delays from the suppliers or high demand from the project adopters whereby some surpassed the amount allocated by the project. However, improvement of the performance of the LFs can be attained by project implementing organization collaborating with the local government to set a capacity building programme at a cluster of several wards or villages with at least 40 to 60 LFs who can meet together. Moreover, the development and use of Ward Agricultural Resource Centres (WARCs) could play a major role in supporting LFs' capacity building programmes. Kundhlande *et al.* (2014) had similar ideas of WARCs supporting programmes suggesting the need for devising a mechanism setting whereby LFs and other stakeholders can meet periodically to share experiences, both benefits and challenges in implementing lead farmer programmes.

3.4.2.2 LFs Roles in the uptake of agricultural technologies

Adoption of technologies both in Karatu and Singida is as shown in Table 3.4 where seven different technologies were rated during the interviews. In each of these, a farmer was asked to gauge adoption on a scale of 1 to 5 whereby 1 represented lowest and 5 the highest adoption. Adoption of different technologies by LFs showed that conservation agriculture (CA), Village Savings and Loan Associations (VSLA) and improved banana varieties were highly adopted with mean scores of 4.64, 3.92 and 3.81 respectively, while improved local chickens and orange fleshed sweet potatoes (OFSP) were lowly adopted.

Table 3.4: Type of technologies adopted by LFs in the basket of options (n = 76)

Technologies	Mean Score
1. Conservation Agriculture (intercrop of maize & pigeon peas)	4.64
2. Microfinance - Village Saving and Loan Association (VSLA)	3.92
3. Improved banana varieties	3.81
4. Improved animal production – Milking goats	3.51
5. Improved animal production - Pigs	3.24
6. Improved root crops - Orange Fleshed Sweet Potatoes (OFSP)	2.94
7. Improved local chicken ranking	2.86

Secondary information from the quarterly reports of the projects under this study showed a high adoption rate of CA (maize intercropping with legumes and raised zero/under minimum tillage) was attributed to the fact that almost all project participants were dealing with maize production, and they wanted innovations which could increase yields and curb the severities of climate change. Moreover, maize and pigeon peas are commonly grown and are important staples in the study areas serving the dual purpose of food provision and income generation from sale of the surplus. This is in line with the findings of Oyelami *et al.* (2016) on the use of LFs in the improvement of maize production in Oyo State of Nigeria who reported on the compatible operations with little improvement of what farmers were used to, making the adoption possible. They connected with the theory of compatibility that, an innovation that is more consistence with the existing cultural values, norms and experiences of clienteles will be adopted relatively easier.

On the other hand, improved banana varieties was a completely new innovation to most of the project participants but, many adopted the interventions because of good crop performance at the group/demonstration plots and to attested benefits in food security and

income within the first year of the project. The study's observation suggests that the roles of the LFs in facilitating the adoption of the technologies in the basket of options depends also on their competency and confidence, nature of the technology and especially the way it is going to solve the pressing challenges of food insecurity and limited income within a short period of time. The above is supported by information from the FGDs with LFs as shown in the quote below:

> *"... LFs managed to implement the project activities because of the competency and confidence they acquired since joining the group and the theoretical and practical training they received. When they saw the project outcomes from their group plots and from their individual farms, they established new groups and trained members on new technologies with a lot of confidence and passion without hesitation because they knew for sure it was going to work"* (LFs FGD participants, Karatu District, August 2017).

However, from a KII with the Ward Agricultural Extension Officer of Ilongero, it was learned that LFs were not able to implement interventions which required highly specialised skills such as treatment of livestock, calibration for agro-chemical application and the like as shown in the quote below:

> *"... LFs are quite helpful in facilitating the adoption and diffusion of many interventions introduced by the project but, in some cases of highly technical issues they have to consult us, which shows the knowledge seeking behaviour of farmers"* (Extension officer, Singida District, August 2017).

The above views concur with observations by Kankwamba (2015) that, extension officers (EOs) need to be mindful that they are custodians of all technologies while the LFs are implementers and promoters of only some of the technologies, and especially those best managed by them. However, the roles played by LFs to instil knowledge seeking behaviour

is very important as it helps the limited number of EOs to concentrate on few interventions and/or farmers; so there are complementarities between EOs and LFs. There is a common tendency of farmers to claim that, *'we don't see extension officers'* but, in reality they are required also to call them when they need their services. It was learnt that the use of mobile phones has facilitated the communication and sharing of information among the LFs, EOs and farmers. One farmer who benefited from the extension advisory services offered by LFs and EOs shared this:

> *"...I am now 45 years old, and I have been a farmer for more than 20 years. But, I don't remember anytime receiving extension messages leading to the adoption of new technologies. Nevertheless, I have changed from mono-cropping of maize to intercropping with pigeon peas and use of farmyard manure in the nine-seeded holes. Nowadays I harvest 12 bags of maize and two bags of pigeon peas in the area where I used to get 4 - 6 bags of maize. Amazingly, I was instructed by my fellow farmer (Lead farmer) from our neighbouring village* (A farmer, Singida District, August 2017).

3.4.2.3 Comparisons of LFs and NLFs in the adoption of technologies

Essentially, LFs and NFLs are group members (project participants) selected as direct recipients of the project interventions. But, LFs are identified during the project implementation period that has developed social entrepreneurship in them as agents for change and are among the successful farmers from within the group. Generally, LFs were superior to NLFs in the adoption of technologies. Table 3.5 illustrates that, except for the case of improved pig production, there has been a significant difference between LFs and NLFs in the adoption of technologies from the basket of options. This suggests that LFs are more innovative compared to the NLFs; hence, because of their innovativeness they are more proactive which makes them play the role of leading by example (a role model). In addition to self-adoption of the innovations, LFs are expected to team up with EOs to

facilitate adoption to non-project participants (community members) in neighbouring villages. According to Aksoy *et al.* (2011), adoption of agricultural innovations is extremely important for the development of the people in the rural areas. However, Singha and Baruah (2012) noted that farmers, in general, used to adopt recommended practices in partial with wide technological gap especially in those complex practices in nature. This implies that ample time is required to give time for some complicated or costly innovations to be adopted. To enhance adoption, Garbero and Marion (2018) suggested that innovations should be changed to suit the local context and not vice-versa.

Table 3.5: Comparison of the adoption of technologies between LFs and NLFs (n = 384)

Technology	Farmer type	Freq	Mean rank	p-value
1. Improved banana varieties	Lead farmers	76	223.68	
	Non lead farmers	308	184.81	0.004
2. Conservation Agriculture (intercropping maize and pigeon peas)	Lead farmers	76	222.24	
	Non lead farmers	308	185.16	0.002
3. Orange-fleshed sweet potatoes (OFSP)	Lead farmers	76	212.25	
	Non lead farmers	308	189.41	0.025
4. Improved animal production - pigs	Lead farmers	76	199.77	
	Non lead farmers	308	190.71	0.454
5. Improved animal production – milking goats	Lead farmers	76	242.72	
	Non lead farmers	308	180.11	0.000
6. Micro-finance (VSLA)	Lead farmers	76	291.91	
	Non lead farmers	308	167.97	0.000
7. Improved local chicken	Lead farmers	76	212.97	
	Non lead farmers	308	187.45	0.024

According to the Karatu District Project Coordinator (DPC), the major achievement of LFs in their role was their work as service providers and inspiring communities to be pioneers

in relation to initiatives for improvement of their livelihoods and/or project interventions. He said:

"In previous agricultural development projects that applied the top-down approach, the role of LFs was not much valued by the communities as they acted as contact farmers whereby they set demonstration plots of new technologies so that communities could learn from them" (KII - Karatu DPC, August 2017).

However, under Projects applying the RIPAT approach the roles of LFs include mobilization of farmers into groups for setting up of group plots for learning by doing before trying out on their farms.

From the project quarterly meeting reports (RECODA, 2014), it was learnt that, through collaboration with EOs and village governments, LFs played a big role in facilitating group development and solidarity chains whereby direct recipients of project livestock pass on the offspring to other group members. Any group member who received a dairy goat was required to share two female offspring to fellow group members while for the case of direct recipients of a pig they were required to share five piglets. However, the solidarity chain of dairy goats lasted beyond the project lifespan but, through the facilitation of LFs the expected cycle/chain was completed. Because of the facilitation roles played by LFs, out of the 20 RIPAT start and spreading project groups in Karatu which had been established about 10 years previously (2008), 15 (75%) were still functional. The reason for the continued group existence (sustainability) is as captured in the quote below:

"The RIPAT groups have lasted for a long time; ours is now ten years old. The groups are registered and have become good platforms (local institutions) for LFs to practise and share training received through RECODA, Extension Officers and other organizations like World Vision Tanzania who provided beehives to the

groups. The group plots have also been a source of good planting materials to the newly established groups or community members who have decided to adopt the project interventions" (LFs FGD participants, Karatu District, August 2017).

According to DPC and extension officers, the roles of LFs are task-oriented as they rely much on the set project activities. However, unlike other previous projects applying the training of trainers (ToT) approach where LFs cease to function just after the completion of project activities (Gautam, 2000; Anderson *et al.*, 2006), LFs recruited under projects applying the RIPAT approach have been used by other development actors because of their competence, confidence, acquired wide knowledge from the basket of technologies and socio-entrepreneur mindedness which enables them to facilitate various livelihood improvement initiatives in the community. Moreover, based on the philosophy behind the RIPAT approach, LFs and group members have been called village development ambassadors as they are expected to train others (Vesterager *et al.*, 2017).

3.4.4   Filling the gap of inadequate extension officers using the RIPAT approach

Secondary information from project situation analysis reports (RECODA, 2008) focused on projects applying the RIPAT approach where the clusters of 20 and 12 villages for Karatu and Singida respectively were earmarked. Form the 20 villages in Karatu, 8 villages were selected for the RIPAT 'Start' phase while only 4 were selected from Singida. The RIPAT 'Start' phase established two farmer groups in each of the selected villages, each group made up of 30 farmers where the introduction of a basket of options (improved farming methods and technologies) were implemented through participatory demonstrations and reflective learning techniques. In each group, at least five or more LFs were recruited to collaborate with EOs in narrowing the extension-farmer ratio tenfold at

the village level and facilitate the uptake of technologies at reduced cost since they were from within the community and were not necessarily being paid for their services.

It was learnt from the project quarterly reports as shown in Table 3.6, that there has been increased adoption in RIPAT 'spreading' phase hence, results into a direct increase of project beneficiaries by 50% (240) in Karatu District, while for Singida the increase was by 100% (240).

Table 3.6: Project participants in RIPAT 'start' and 'spreading' villages

District	RIPAT 'start' phase			RIPAT 'spreading' phase		
	Villages	Groups	Members	Villages	Groups	Members
Karatu	8	16	480	4	8	240
Singida	4	8	240	4	8	240
Total	**12**	**24**	**720**	**8**	**16**	**480**

Source: Survey data (2018)

The increased number of groups and adopters was mainly attributed to the roles played by LFs in collaboration with EOs. According to Vesterager *et al.* (2017), the cost of the spreading phase tends to be reduced by more than 50% compared with the cost incurred by RIPAT in the 'start' phase. This suggests that there is an increase in project beneficiaries at decreasing project costs, which gives a clear indication of how to develop a low-cost approach for provision of extension services that promotes farmers as the principal agents of change in their communities. It was learnt from the RECODA staff) that the cost reduction was due to the fact that LFs were just coming from the neighbouring villages to assist the new groups; so they could just walk or use bicycles, and they were not paid salaries or per-diems. Some of the planting materials (banana, orange-fleshed sweet potatoes - OFSP, cassava and pigeon peas) obtained from RIPAT 'start' groups were supplied free or at very low cost to the newly formed groups under the sister-group[3]

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[3]Sister group refers to matching of older producer groups from the RIPAT 'start' phase with newly formed groups under RIPAT 'spreading' phase aiming at the newly formed groups to be supplied planting materials freely or at very low cost

approach. According to Sinja *et al.* (2004), LFs are expected to enhance sustainable uptake of agricultural technologies widely and at lower costs compared to other conventional approaches because they live in the community, speak the same language, use expressions that suit their environment and instil confidence in their fellow farmers. Most of the LFs were found to have more influence compared to EOs because they easily created social capital from familiar bonding with other villagers, the network which eases the work of LFs. In addition, Ssemakula and Mutimba (2011) and Wellard *et al.* (2013) argue that LFs in a Farmer to Farmer Model are more inclusive, low-cost, effective, and offer a wide-reaching alternative in supporting agricultural innovations.

It was further noted from the project staff that LFs facilitated the philosophy of "help to self-help" used by projects applying the RIPAT approach that each direct recipient of the project support should support three other community members, which increased the project adoption rate to reach a critical mass (reached at least 40 - 60% of the entire community). According to Grajek *et al.* (2008), critical mass in social dynamics is a sufficient number of adopters of an innovation in a social system so that the rate of adoption becomes self-sustaining hence, creating further growth.

3.4.5 Capacity Building of Lead Farmers (LFs)

It has been argued by Karuhanga *et al.* (2012) that, LFs' specific roles tend to differ from one project to another. But, generally the LFs are trained by external agents, and then in turn share their knowledge and skills with other farmers in the community. Under the RIPAT approach, LFs begin their roles as sub-group leaders trained to be competent in certain technologies availed from the basket of options. The procedure of training LFs resembles that described by Kiptot and Franzel (2015) that they are trained on a certain

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from the old groups.

subject. However, under the RIPAT approach there are well developed Memoranda of Understanding (MoUs) between the implementing organization and the local government authorities on how LFs are further trained to be able to work very closely with the few available extension officers in implementing all interventions availed from the basket of options. During the KIIs with a project staff, it was revealed that there were tailor-made courses prepared for LFs such as some theoretical (in-house) training whereby introduction of new technologies was covered but, practical training was covered through learning by doing using Farmers Field School (FFS)/group plots. LFs apart from learning by doing were also trained on how to set the group plots into sub-plots (replications) for experiential comparisons, preparation of planting materials and quantifications of yields and associated returns. The secondary data obtained from quarterly project progress reports showed that LFs had been attending field study visits as part of the capacity building for the roles they were expected to play. According to Swiergiel (2007), farmers prefer study visits because they want to see things with their own eyes and especially things with direct use on their farms. Matras *et al*. (2013) add that farmer study visits tend to improve the knowledge and practices of the visitors and integrate the experience gained from the visit into their daily lives. Furthermore, the visits develop the capacity of farmers as they allow learning to take place at different stages in the adoption ladder which include awareness, interest, knowledge/comprehension, legitimisation and practice.

The Rockwool Foundation (2009) highlighted the importance of considering socio-entrepreneurs in connection with the roles which LFs are expected to perform at both the group and community levels. According to Thompson *et al*. (2000), socio-entrepreneurs are people who can realize where there is an opportunity to satisfy some unmet needs that the state welfare will not or cannot meet, and who gather together the necessary resources and use them to make a difference. Vyas *et al*. (2015) add that they are people motivated to

serve the community and are not profit-oriented, although they can later generate income which is sometimes used to compensate some of their time and transport incurred in services rendered to the community. Socio-entrepreneur features in the definition of LFs by RIPAT is that, LFs are referred to as individuals who, during the project implementation period, have been identified as people who have developed social entrepreneurship as agents for change and are among the successful farmers from within their groups (Vesterager *et. al.,* 2017).

The organized and systematic studies (Franzel *et al*. 2014; Tsafack *et al*. 2014; Kundlande *et al.* 2014) in Malawi, Cameroon and Kenya revealed that, among the important requirements of LFs in the implementation of their roles, is the nature of voluntarism whereby motivation comes from gaining knowledge and helping others, whereby salaries and allowances are not needed to motivate individuals to volunteer in serving as LFs. The studies showed the importance of making LFs effective by understanding their sources of motivation and strengthening them accordingly. There are those who are motivated by training opportunities, exchange visits, altruism and social status, contests, certificates, badges, and community recognition.

LFs were trained on how to produce quality planting materials of pigeon peas, banana and OFSP so that they could ensure their availability which in turn promotes the uptake of the technologies. They were also trained on how to be sources of improved breeds of local chicken, dairy goats and pigs. According to the DPC of Karatu, the LFs had the ability to supply planting materials which enhanced the uptake of technologies, project sustainability and at the same time ensured the retention of the LFs to play their roles even beyond the project lifespan. This is similar to what Kiptot and Franzel (2014) reported regarding the

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financial benefits LFs received from projects through selling seeds, seedlings, or services such as chaff cutting, hay baling, and silage making.

During the FGDs with LFs, it was revealed that the provision of bicycles to facilitate visits to new groups and farmers was among the conditions that made it conducive for the LFs to perform their roles efficiently. The projects facilitate as much as possible the sister group approach where the newly formed groups were supplied planting materials from the old groups free of charge or at reduced costs. However, in some cases especially in Karatu the project supplied all training materials required in the establishment of training group plots, notes and various working tools such as line level boards for contour demarcation, *Chaka* hoes for making basins, tape measures, etc. It was further learnt that the established MoUs between the district councils and RECODA as the implementing organization helped LFs to be recognized by all levels of local government. The visibility of LFs in the community was facilitated by being introduced publicly by DPC to the Village General Assembly (VGA) and Ward Development Committees (WDC) about their roles in on-going project activities and improvement of livelihoods and resilience of small-scale farmers. The visibility was enhanced by providing them with T-Shirts bearing the implementing organization's name, project name and motto saying; 'Making poverty and food insecurity history in Tanzania is possible'.

3.4.6 Challenges Faced by LFs in Facilitating Adoption of Agricultural Technologies and Suggested Solutions

LFs face several challenges in executing their roles which are mainly related to low cooperation from village governments, cooperation from community and long distances from one village or group to another (Table 3.7). From the FGDs with LFs, despite being introduced to the community and all levels of local government and the roles they ought to

play, LFs felt that the inadequate cooperation received was due to the fact that they were not recognized in the local government administrative structure like the EOs or Village Executive Officers.

Table 3.7: Challenges facing LFs in offering their technology adoption services (n=76)

Challenge	Frequency	Percent
Low/poor cooperation from village government	40	52.6
Low/poor cooperation from the community	36	47.4
Distance from one village or group to another	30	39.5
Low/poor adoption of new technologies	22	28.9
Lack of transport facilities	19	25.0
Poor attitude towards new technologies	9	11.8
Crops and animal diseases	9	11.8

Table 3.7, shows that some of the LFs thought that poor cooperation from the village government officers was based on their feeling that LFs were commanding more respect from the community. In this regard a Village Chairperson from Karatu District said:

"...*the LFs are dealing with the distribution of planting materials and training every week, and the project activities are spreading to the whole village. I thought the distribution of planting materials would have been done by our office as we used to do in other projects but, that is not the case. Anyway, they report to us what they have done"* (Village chairperson, Karatu District, August 2017).

The RIPAT approach encourages the autonomy of LFs in the execution of their roles, but it was learned that most of the EOs wanted to have control over LFs which could create unnecessary bureaucracy. However, the DPC of Karatu was positive on the challenges raised by LFs. He admitted that sometimes these challenges were inevitable because local government staff have had no experience in using LFs so intensively as in the case of the

projects applying the RIPAT approach. The DPC added that to some extent LFs are underutilized because they work effectively under a specific project or for a certain defined task but, unfortunately the district government does not have plans and funds to engage LFs more widely.

Nevertheless, the involvement of LFs is quite limited in the public extension services in Africa. According to Franzel *et al.* (2015), farmer-to-farmer extension approach has been used in Africa for a long time but, with limited documentation and characterization on the use of LFs till 2010 - 2013 when the organized and systematic studies were carried out in Malawi, Cameroon and Kenya.

One of the Karatu project staff was of the opinion that most of the solutions to the challenges which LFs were experiencing could be solved if they could somehow be recognized officially in the local government structures. However, he emphasized that the introduction of LFs to the local government should just be to recognize their roles and autonomy and that they have to work independently but, with various development actors such as NGOs, government etc. According to one Karatu District staff, LFs are playing a key role in solving the challenges of inadequate EOs. However, the problem is lack of funds to expand the project to new areas so as to use their expertise. Therefore, there is need for actors dealing with the development of small-scale farming to advocate for the government to mainstream the roles of LFs in their agricultural development projects.

3.4.7   Conclusions and Recommendations

Based on the study findings, it can generally be concluded that there is a wide extension agent: farmers ratio in the study areas, contrary to the proposed 1: 600 ratio for Tanzania or at least one extension officer per village. It is also concluded that shortage of extension

officers is among factors constraining uptake of agricultural technologies in the study areas, and that use of LFs has reduced the extension agent: farmers ratio by ten folds. Generally, the specific roles played by LFs include teaching and training, self-adoption of the technologies which makes them role models in relation to facilitating adoption of the introduced technologies. Thus, LFs facilitate the uptake of technologies at reduced cost since they are from within the community and work as volunteers without being paid salaries or allowances. Lastly, it is concluded that failure to formalize the use of LFs in the government extension services leads to low cooperation from village governments and community and consequently under-utilization of their potential.

Based on the conclusions above, the following recommendations are made in order to facilitate uptake of agricultural technologies in the research areas:

i. The use of LFs should be formalized under the government extension systems in order to reach needy farmers in the current situation of having few extension staff. Doing so will ensure farmers' extension needs are met at lower costs while at the same time reducing the wide extension agent: farmers ratio.

ii. Local Government Authorities (LGAs) are urged to pilot-test projects applying the RIPAT approach so as to popularize the use of LFs in the community and at the same time establish how the approach can work under the government extension system.

iii. There is a need for further research on the performance of LFs under the government extension systems.

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CHAPTER FOUR

4.0   PERSONALITIES AND PERFORMANCE OF LEAD FARMERS: A CASE OF PROJECTS APPLYING THE RURAL INITIATIVES FOR PARTICIPATORY AGRICULTURAL TRANSFORMATION APPROACH, TANZANIA

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4.1   Abstract

Voluntary adoption and expanding use of the lead farmers (LFs) under farmer to farmer extension (F2FE) approach by organizations in the absence of any direct external promotion confirms its effectiveness in responding to extension delivery needs. Although the F2FE approach has been used by many organizations and projects in Africa, there have been few studies and limited promotion when compared to the FFS approach. This paper explores the needed personalities fit for LFs' career and the way they can be improved. Using a cross-sectional research design, a sample of 384 of farmers was selected through systematic sampling from the population of 1 800 project beneficiaries where the list of them were obtained from RIPAT project managers. Primary data were analysed using SPSS whereby variables related to personalities fit for LFs in leadership and facilitation skills were analysed using cross-tabulation. Checklists were used collecting qualitative data through focus group discussion and key informant interviews were analysed through

content analysis. The results show that the most needed personalities and associated soft skills to LFs include integrity (58.6%), being courageous (54.3%) and volunteerism (37.2%). The contribution of personalities to the performance of LFs includes helping them to become role models, increasing their reliability in the community and enabling them in bringing group harmony. It was learned that improvement of LFs' personalities can be achieved through setting goals for developing good relationship with others and practical training which entails mentorship and coaching. It is concluded that the needed personalities and associated soft skills of LFs are related to leadership and facilitation skills. Therefore, it is recommended that these personality traits should be considered in complementing the hard skills of LFs when it comes to F2FE.

Key words: Lead farmers, performance, personalities, RIPAT

4.2   Introduction

There has been an increase in community-based extension approaches in developing countries because they are considered more inclusive, have a broader reach, and are cost-efficient and sustainable beyond the investment cycle (Franzel and Simpson, 2013; Wellard *et al*., 2013; Simpson, 2015; Bekele *et al*., 2017). The idea of shifting from the conventional training and visit (T&V) and farmers field school (FFS) approaches has made farmer-to-farmer extension (F2FE) a complementary approach which involves lead farmers (LFs) in sharing knowledge on agricultural technologies within their communities (Lukuyu *et al*., 2012; Kundhlande *et al.,* 2014). Although the F2FE approach has been used by many organizations and projects in Africa, there have been few studies and limited promotion when compared to the FFS approach and use of information communication technologies (Franzel *et al.,* 2015). In this regard, a research was conducted in Malawi, Cameroon and Kenya aiming at, among other things, understanding organizations' perceptions of the effectiveness of the F2FE approach (Simpson *et al.,* 2015). Among the notable findings

from all the countries studied are voluntary adoption, and continued and expanding use of the F2FE approach by organizations in the absence of any direct external promotion. These results confirm the effectiveness of the F2FE approach in responding to extension delivery needs (Kiptot and Franzel, 2015).

To add on, Kiptot and Franzel (2015) suggested that among the areas that LFs need training is on social learning dynamics and areas related to soft skills so that they can have the needed personalities for adaptive capacity to flexibly react to the needs and challenges that may arise as they interact with farmer trainees. According to Robles (2012), soft skills which describe the personalities of an individual include interpersonal qualities, also known as people's skills, and personal attributes that one possesses. It is a set of behaviours and personality traits one uses every day, and they are very important in complementing the hard skills (technical knowhow). This implies that the improvement of personalities in a working place is through dealing with soft skills (daily behaviour). In this case, personalities which are characters/behaviours connected with personality traits (in-born character) need soft skills for improvement to fit to the job in question. According to Robles (2012), there are ten common personalities (soft skills) needed for improvement of personalities in the working places; these are integrity, communication, courtesy, responsibility, social skills, positive attitude, professionalism, flexibility, teamwork and work ethics. Nonetheless, the personality traits are modified by the environment in which an individual is found (Bickhard, 1992), so there is a room for personality improvement.

However, valuing soft skills for the improvement of personalities in the workplace has generally been very low, though currently there is an increasing importance. Deloitte (2017) argues that two-thirds of all jobs in Australia would rely on soft skills by 2030 and that the trend would be mirrored globally. In line to that, Majid *et al*. (2012) suggested that

all careers require at least soft skills to make the hard skills valuable. Therefore, it is important to assess how personalities contribute to the performance of LFs.

The study on which this paper is based adopted the big five personality traits model which has been used in the assessment of human personality traits and account for individual differences by determining why people respond differently to the same situation (Costa and McCrae, 1987). The measurement of the Big Five Personality Traits (abbreviated as OCEAN) includes the six categories of the traits and facets (sub-traits) which are: i) <u>Openness to experience</u> (imagination, artistic interests, depth of emotions, willingness to experiment, intellectual, curiosity, tolerance for diversity); ii) <u>Conscientiousness 'work ethic'</u> (sense of competence, orderliness, sense of responsibility, achievement striving, self-discipline and deliberateness); iii) Agreeableness (trust in others, sincerity, compliance, modesty, sympathy and altruism); iv) <u>Extraversion</u> (warmth, gregariousness/sociability, assertiveness, activity level, excitement-seeking, positive emotions) and v) Neuroticism-anxiety (angry/hostility, moodiness/contentment, self-consciousness, self-indulgence, sensitivity to stress).

Research Community and Organisational Development Associates (RECODA) has been implementing projects using the Rural Initiatives for Participatory Agricultural Transformation (RIPAT) approach, which uses LFs in bridging agricultural technology gaps and improving farmers' capacities (Ringo *et al.,* 2014). Discussion of common personalities of group members including LFs have been, to some extent, considered under projects applying the RIPAT approach whereby Vesterager *et al.* (2017) expanded the understanding citing Carter's (2003) through use of experience of applying various animal personalities to discuss human characters fit in group's dynamics and LFs' facilitation skills (Carter, 2003, cited by Vesterager *et al.,* 2017).

The low uptake of agricultural innovations by the smallholder farmers in sub-Saharan African countries, according to Meijer *et al.* (2015), can be attributed to inadequate studies on intrinsic factors of facilitators and the adopters. Hence, the study from which this manuscript emanates focused on how the performance of LFs can be influenced by their personalities. The objective was to explore the needed personalities fit for LFs' career and the way they can be improved. To achieve this, the manuscript attempts to answer the following questions: i) what are the most needed personalities for LFs? ii) What is the contribution of one's personalities to the performance of LFs? iii) How can improvement of LFs personalities be ensured?

4.3   Methodology

4.3.1   Study area

The study on which the manuscript is based was conducted in Karatu and Singida Districts in Arusha and Singida Regions respectively. Geographically, Karatu and Singida are found in the northern and central parts of Tanzania respectively. The selection of the study areas was based on the fact that the projects applying the RIPAT approach have been implemented in the two districts, where the contribution of LFs to the projects can be assessed (Lilleør and Sørensen, 2013). Normally, projects applying the RIPAT approach last for 2 to 4 years; the project in Karatu (Endabash Division) started in 2008, while the project in Singida (Ilongero Division) started in 2012.

Karatu District is located between latitudes 3º10' and 4º00' south of the Equator and longitudes 34º47' to 35º56' east of the Greenwich Meridian. The district is a traditional home to the "Iraqw ethnic group" with minor ethnic groups including Barbaig and Hadzabe who are among the last hunters and gatherers in the world. The district

experiences varied climatic conditions whereby in the Eyasi Basin, the annual rainfall is between 300 and 400 mm, while it ranges between 900 and 1000 mm per year in Karatu Town. Karatu has three agro-ecological zones namely: uplands, midlands and lowlands, with altitudes ranging from 1 000 to 1900 m above sea level (KDC, 2001; Meindertsma and Kessler, 1997). The principal crops grown in the highlands include wheat, barley, beans, maize, coffee, flowers, pigeon peas, sorghum, finger millet and sunflower while in the midlands and lowlands the main crops grown are maize, beans, pigeon peas, sorghum, millet and sunflower. Onion is a common irrigated crop in the lowlands of Lake Eyasi, especially in Mang'ola Ward.

Singida District lies between 3^0 and 7^0 latitudes south of the Equator and 34^0 and 35^0 Longitudes east of Greenwich. The district has a semi-arid climatic condition with two seasons: the dry season which is the longer (April to November) and the rainy season from December to March. The average annual rainfall is about 590 mm ranging from 350 mm to 750 mm per year while the average minimum temperature is 15°C to 30°C. The distinct land physical features are dominated by lowlands and plains with some highland of plateaus. The principal crops grown include maize, sunflower, groundnuts, sorghum, millets, onions and sweet potatoes. The district is traditionally home to the Nyaturu ethnic group by 90% and according to Tanzania's 2012 population and housing census report (NBS and OCGS, 2013).

4.3.2 Research design, sampling and sample size

The study adopted a cross-sectional research design. This design has been recommended by several scholars, including Babbie (1990), Bailey (1998) and Delice (2010), due to its cost and time effectiveness in data collection.

The target population (N) was the 1 800 households that had benefited from the RIPAT projects in Karatu and Singida Districts. The sample size (n) was 384 households; the number was determined using Cochran's formula (Cochran, 1977 as cited by Bartlett *et al.* 2001) whereby:

$$n = \frac{z^2 p(1 - p)}{e^2}$$

$$n = \frac{z^2(pq)}{e^2}$$

where:

n = sample size;

z = a value on the abscissa of a standard normal distribution (from an assumption that the sample elements are normally distributed), which is 1.96 or approximately 2.0 and corresponds to 95% confidence interval;

p = estimated variance in a population from which the sample is drawn, which is normally 0.5.

Using a Z-value of 1.96, a p-value of 0.5, a q-value of 0.5, and a d-value of 0.5% (which is equivalent to 0.05), the sample size (n) was determined to be 384 households, as shown below:

$$= 1.96^2 (0.50 \times 0.50)/0.05^2 = 384.$$

The study used multistage sampling where simple random sampling and purposive sampling methods were employed including a stratified proportionate sampling technique in order to ensure that more respondents are obtained from Karatu District which had more participants in the projects applying the RIPAT approach compared to Singida District. The strata were districts, wards and types of farmers (LFs and non-LFs). Male and female representatives of households were selected through systematic sampling. The population comprised two sub-populations of lead farmers and non-lead farmers. Both sub-

populations were obtained from RIPAT project officers/managers who had complete lists of RIPAT beneficiaries in the research areas. The first one was selected randomly using random numbers created in MS Excel using the "=RAND ( )" command, which generated random numbers. This was done at the ward level where a sampling interval for a relevant sub-population was obtained by dividing the sub-population N by the sub-sample size (n) to obtain the sampling interval k, i.e. N/n = k. Then, after the first respondent was selected, every k^{th} person was selected until the sub-population was exhausted.

Besides the LFs and non-LFs, 20 key informants (KIs) were selected purposively. KIs included people who were considered to be knowledgeable about the RIPAT approach, including Extension Officers (EOs), District Project Coordinators (DPCs), Village government leaders and Programme Leaders/Managers from RECODA who are the implementers of the projects using the RIPAT approach. Moreover, focus group discussion (FGD) participants (men and women) were selected from groups applying the RIPAT approach in each ward.

4.3.3   Data collection and analysis

The data that were collected using the household questionnaire were coded and analysed using the Statistical Package for Social Sciences (SPSS) computer software version 20 whereby descriptive statistics (i.e. frequencies, percentages, averages, minimum and maximum values of variables), multiple responses and non-parametric tests were determined. The qualitative data, which were collected through key informant interviews (KIIs) and focus group discussion, were analysed through content analysis. Transcription of the KIIs was done followed by thematic analysis (Braun and Clarke, 2006) whereby, the many words of text transcribed from recorded information were compressed into fewer content categories resulting into synthesized meaning based on study objectives.

Preferred personalities fit for LFs' performance as group leaders and facilitators of uptake of technologies were rated at an index scale ranging from 1 to 5, i.e. strongly disagree (1 point), disagree (2 points), neutral (3 points), agree (4 points) and strongly agree (5 points). The Friedman test which is a non-parametric statistical test was used to test ways of improving personalities of LFs.

4.4 Results and Discussion

4.4.1 Personalities of the lead farmers

An exploration of the RECODA Academy[4] programme revealed that apart from LFs being trained on new technologies (hard skills) at group plots, they were also trained and mentored on topics related to personalities for effective leadership and group facilitation. When asked about personalities that are important to them, the LFs' responses showed that LFs understanding was based on the various soft skills, offered to them by the project implementing organization, and correlated personalities. As demonstrated in Table 4.1, about a half (49.7%) mentioned having good reputation to the community (integrity) while 28.9% and 27.7% of the respondents mentioned monitoring ability and creativity respectively. Volunteerism and accountability (hardworking) was scored by less than a quarter of the respondents each.

Table 4.1: Understanding on the required personalities of LFs (n=76)

Required Personalities of LFs	Male LFs (%)	Female LFs (%)	Total (%)
Integrity and good reputation	16.4	33.3	49.7
Monitoring	14.6	14.3	28.9
Creativity	18.2	9.5	27.7
Volunteerism	7.2	14.2	21.5
Accountability (hardworking)	16.4	4.8	21.2
Courageous	1.8	14.3	16.1
A visionary person	7.3	4.8	12.1
Good in monitoring	10.9	0.0	10.9

[4]RECODA Academy is for: -
  i. Capacity building to various rural development actors on the application of the RIPAT approach, and
  ii. Capacity building for community based experts (extension officers, local institutions and lead farmers) in facilitating adoption, up-scaling and sustainability of the project activities (Vesterager*et al.*, 2017).

Time keeper	3.6	4.8	8.4
A progressive farmer.	3.6	0.0	3.6

Note that the total is based on multiple responses.

Integrity was highly ranked by women as the most needed personality to LFs while for men being creative was ranked highest. Both men and women more or less agreed (14.6% and 14.3% respectively) that monitoring was among the important LFs personalities. Through the FGDs, it was revealed that women ranked integrity highly because lack of trust cost them in the previous projects as leaders indulged in swindling Village Savings and Loan Association (VSLA) funds and misuse of project resources. Integrity, according to Costa and McCrae (1987) in the Big Five Personality Trait model assessment, is among the facets (sub-traits) under the big category of consciousness (work-ethics) while creativity and volunteerism are under openness and agreeableness (sympathy and altruism) respectively. A Key Informant Interview (KII) with Karatu Project staff showed that LFs are given authority and are entrusted with resources to ensure their fellow farmers reach the set project objectives. Therefore, their integrity is highly needed.

LFs, as leaders, are required to have upright behaviours as communities tend to follow a leader of good integrity as they are trustworthy. This concurs with Kolzow (2014) that leaders need to model the behaviour they expect of others, which means they must demonstrate and communicate clear values for both themselves and their organization and be ethical in all their dealings. Giuliani (2002) adds that *"you cannot ask those who work for you to do something you're unwilling to do yourself."* LFs also need to understand the agricultural challenges leading to low yields and limiting uptake of agricultural technologies and then, with sympathy and dedication, solve the identified problems. Commenting on the volunteerism spirit, a district staff from Singida appreciated the way

hardworking LFs with empathy can do a lot to the community's development while not being adequately compensated.

The study findings indicate that, from the training offered to LFs, the LFs were required to demonstrate personalities with sound moral and ethical values in their relationships with fellow LFs, other farmers, village government leaders, staff from the project implementing organization, extension officers and other stakeholders. Through secondary information from LFs training guide, about ten personalities were emphasized under the RIPAT approach. The ten personalities are visionary leadership, interpersonal skills, integrity and being honest, courageous and confident, volunteerism, creative and innovative, being organized and systematic, ability to mobilize and inspire, competence, and social entrepreneurship. The above mentioned personalities are presented in Table 4.2.

Table 4.2: Important personalities trained to LFs under the RIPAT approach

Personality	Some explanations and importance
1. Visionary leadership	One of the important elements in the projects applying the RIPAT approach is the target beneficiaries and LFs to bear in their mind a development vision which, through an empowered World View approach, are used to help farmers to discover their value, creativity, potential, power, responsibility, accountability and purpose.
2. Competence	LFs are required to be competent in the implementation of their expected roles quite efficiently and independently. They start on the technical LFs so that they can learn and become competent on various technologies; that is to be known that they are competent in ABCD and not just a generalist. LFs acquire competence mainly from various teaching, training (coaching) and mentoring; and also were required to have a knowledge seeking behaviour (cognitive).
3. Creativity and innovation	Projects offer a wide range of technologies in the basket of options at the same time hence, the LFs are required to think out of the box and come out with different innovative ways of ensuring the uptake of technologies and project sustainability.
4. Courage and confidence	Mobilizing small-scale farmers into groups and ensuring adoption of technologies under rain fed agriculture entails a lot of challenges which need LFs to be courageous in facilitating project interventions. This skill is important because LFs have to facilitate agricultural projects to farmers who have witnessed the failure of many projects.
5. Inter-personal skills	This refers to behaviours and tactics a lead farmer uses in interacting and working well with various stakeholders which include staff from RECODA (project implementing organization), extension officers, fellow farmers and agro-inputs dealers. On interpersonal skills, LFs are exposed to a range of skills including communication and listening to attitude and manner.
6. Being organized and systematic (Consistence)	LFs were required to be organized and systematic in various aspects including laying out of experiential learning at group plots and at the same time implementing various activities based on the set format of gathering data/information and timely write up of report based on the provided format.
7. Integrity and being honesty	Integrity for LFs is highly needed since they are given autonomy, trust and authority in the formation of new groups and facilitating project activities. LFs are expected to ensure timely availability of agro-inputs, gather the right information and report correctly so as to get reality of the project performances.
8. Volunteerism	This personality trait is important since among the main challenges facing extension services is inadequate extension officers and funds, so willing LFs are required to be ready to facilitate project activities without a salary.
9. Mobilization and inspirational	RIPAT being a group based approach LFs were required to have the culture of mobilizing scattered small scale farmers into groups and build their capacity to adopt project interventions for improved livelihoods. LFs are expected to remain inspired and inspire their fellows throughout the project lifespan and even beyond to dream, learn, act and become successful LFs.
10. Social entrepreneurs	LFs-based sensitization on volunteerism spirit and capacity building on various technologies received from the project are expected to be able to identify various opportunities and take some risks of mobilizing resources so as to get profit.

Source: RECODA (2015) - RECODA Academy training guide

FGDs based on Table 4.2 revealed that while vision helped LFs to remain focused and help

their fellows to do the same, competence and courage helped them to set implementable

strategies. However, it was further noted through the FGDs that all soft skills are required

in enhancing the performance of LFs. The personalities of the LFs play a major role in community mobilization and retaining farmers' group members, and win new ones through improved facilitation skills and networking ability. Hence, personalities help in the development of strong farmer groups which, according to the evaluation of projects applying the RIPAT approach, good performance of project is mainly a result of strong farmers' groups which help to change the mind-set of farmers from weak to strong-willed farmers (Lilleør and Sørensen, 2013).

Interpersonal skills entails communication listening attitude where the application of information and communication and technologies (ICT) are required to be considered in relation to LFs performance. Generally, LFs need to be creative and informed with information related to marketing, weather, agro-input, outbreak of pest and diseases etc. According to Kee *et al.* (2012), information management skills and entrepreneurship skills are key soft skills for job seeking individuals because most of the recent work places are facing serious competition in business and the application of science and technology is no longer optional. As far as this study is concerned and in this era of science and technology, LFs require information and management skills to effectively perform their roles. Therefore, this needs to be considered during training of LFs. Moreover, well-informed LFs will be able to make informed decisions on marketing and weather forecasting related issues.

One of the Singida District staff was of the opinion that a strong group is almost equal to a good performing project and that this was enhanced with good interpersonal skills in group formation and development as shown in the quote below:

> *"... it requires proper communication to communicate the project messages during the village meetings of selecting group members as per the set criteria of the RIPAT*

approach. At various stages of group development there are lots of group dynamics which call for various interpersonal skills related to negotiations, problem solving and teamwork, especially during the storming stage which is associated with conflicts" (Singida District staff, August 2018).

4.4.2   Contribution of personalities to the performance of lead farmers

Through KIIs with a RECODA Management staff, it was noted that personalities were expected to enhance the performance of LFs on their mandated roles of facilitating the uptake of technologies under projects applying the RIPAT approach through enhancement of leadership and facilitation skills. The overall response to the study question on the importance of personalities to LFs revealed that over one-third of the respondents agreed that personalities enable LFs to become role models (39%), while 21.5% and 14.9% agreed that they improved integrity and enhanced their ability to bring harmony to the group respectively (Table 4. 3).

Table 4.3: The contribution of personalities to the LFs (n = 76)

Role of personalities	Male		Female		Total	
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**
Enable one to become a role model	66	28.9	23	10.1	89	39.0
Promote integrity and being honest	36	15.8	13	5.7	49	21.5
Enhances LF's ability to bring harmony to the groups	23	10.1	11	4.8	34	14.9
Makes one known in the community	17	7.5	3	1.3	20	8.8
Creates self-confidence	11	4.8	8	3.5	19	8.3
Increase ability to train others	12	5.3	5	2.2	17	7.5

N.B: Freq. refers to Frequency

LFs were required as leaders to be role models in living the project dreams/goals by working hard and inspiring other farmers to do the same so as to meet the set objectives. The importance of being a role model is in line with Kiptot and Franzel (2015) observation that a farmer claimed he would only adopt the livestock feed innovations if he saw the

trainers (LFs) taking at least 10 litres of milk to the cooperative. Many small-scale farmers face many challenges in agricultural production; therefore, seeing is believing. That is why learning by doing leads to better results and seeing the way LFs are at the forefront (role model) in adopting the project interventions is among the best ways of persuading uptake of agricultural technologies, which in turn contributes significantly in LFs performance.

4.4.3   Personality Development

It was revealed from the FGDs with LFs and non-LFs (NLFs), and KII with DAICO for Karatu District that before the introduction of the projects applying the RIPAT approach, teaching on personalities was not as valued as teaching the hard skills. LFs' personalities were not valued because most of the project implementing organization staff and extension officers were not aware about the importance of such skills and/or having a clear match between the soft skills and the hard skills to complement each other in improving the performance of LFs. The above is confirmed by the quote below;

> *"...we used to receive hard skills training and given notes on various agricultural technologies related to good agricultural practices (GAP), but it was very rare to learn about soft skills and the ways they complement the hard skills"*. Karatu DAICO - August 2017.

It was further pointed out that sensitization and training are among the important means of instilling the needed personalities to LFs. Generally, sensitization brings awareness of the required personalities (soft skills) while training brings an understanding of the importance in complementing the hard skills (technical knowhow). Mostly, the trainings offered to agricultural project facilitators including extension officers have not been exposed and capacitated to possess important soft skills which they could impart to the LFs. According to Singmaster (2013), soft skills in the workplace are important in relation to understanding

how to best equip students with relevant soft skills (personalities) in consideration of how to match talent (supply) with employer needs (demand). However, CCHRA (2014) uphold that personalities were less valued till when the trend in employer needs in a work place was influenced to include it in their competency frameworks.

The study findings (Table 4.4) indicate that the best ways to improve personalities is through awareness creation and training on the importance of personalities (20.7%), goal setting (20.7%) and instilling entrepreneurship attitude (17.3%) and practical training (16.7%). To educate community and networking with other stakeholders were least important, scoring 14% and 10.7% respectively. Chi-square test results show the association was significant at p = 0.000 between the mentioned items on how to improve LFs personalities.

Table 4.4: Ways to improve personalities (n = 76)

How to improve LFs personalities	Male		Female		All	
	nm	%	nf	%	n	%
Organized training on the importance of personalities to LFs	18	12.0	13	8.7	31	20.7
Setting goals - selecting criteria and developing good relationship with others (being a person of integrity)	19	12.7	12	8	31	20.7
Instilling entrepreneurship attitude	21	14.0	5	3.3	26	17.3
Practical training coaching)	18	12.0	7	4.7	25	16.7
Mentorship and monitoring	11	7.3	10	6.7	21	14.0
Networking with other stakeholders	12	8.0	4	2.7	16	10.7

Non parametric chi square, descriptive statistics sig at 0.000 for all the five variables.

nm = number of male; nf = number of female, n = total number

The following sub-section expounds the quantitative findings in Table 4.4 to get an insight on how training, goal setting, entrepreneurship attitude, practical training and monitoring improve the personalities of LFs.

4.4.3.1   The importance of organized training on LFs personalities

Secondary information from the project progress reports, mainly quarterly reports, showed that the personalities' improvement was mainly done through training of LFs under the RECODA Academy. A KII with the RECODA Programme Leader (PL) revealed that the improvement of interpersonal skills of LFs had been effected through describing important skills such as verbal and non-verbal communication, listening skills, negotiations, problem-solving, decision-making skills and assertiveness. The Programme leader had this to say;

> *"The first step in the development of LFs' soft skills is by letting them know the importance of the same in complementing the hard skills. This is normally done by listing and explaining the important soft skills fit for LFs under projects applying the RIPAT approach. Therefore, training emphasised on areas with major weaknesses. The planned training topics are aligned with other normal project activities, i.e. group visits, quarterly meetings, RECODA Academy training sessions etc.* (RECODA Programme Leader, August 2017).

It was found that teaching is mainly done in-house through seminars focusing on theory with some few discussions. LFs are trained based on the needed personalities identified during the training needs assessment, mainly covering definitions/meanings, their importance in the improvement of the performance of LFs and the ways they can be improved. However, Environics Research Group (2014) and Bountrogianni (2015) argue that employers generally hire a candidate who possesses personalities and who is a good fit, providing training for the specifics of the job rather than continuing a long search for someone who possesses both technical skills and soft skills (personalities). This means that the importance of training in the development of LFs' personalities cannot be underrated.

Furthermore, Cukier *et al*. (2015) suggest that soft skills need to be an important part of learning and ought to be developed at every stage of curricula and beyond.

The contribution of personalities in LFs performance was examined based on the perceptions of LFs on the importance of personalities being taught together with other project interventions (hard skills). As illustrated in Table 4.5, the three statements ranked using five alternative answers ranged from strongly disagree (1) to strongly agree (5) revealed that all the statements were equally important. However, 15.8% (13.2 + 2.6) of the respondents were not satisfied (disagreed and strongly disagreed) with the emphasis put on the training of personalities. The findings suggest that there is a need for more emphasis on personalities training to LFs. From the FGDs with LFs it was learned that apart from being trained by the project facilitators, they wanted some individuals to share some testimonies on how they have improved their personalities.

Table 4.5: LFs perception on the importance of personalities teaching (n = 76)

Statement	Perceptions in %				
	SA	A	N	D	SD
The importance of including the personalities in the training is known	14.5	78.9	1.3	2.6	2.6
Enough emphasis of personalities is put in the training	3.9	78.9	1.3	13.2	2.6
Personally I understand the importance of personalities and my personality has improved	47.4	50	2.6	0	0

N.B: SA = strongly agree, A = Agree, N = Neutral, D = Disagree, SD - Strongly Disagree

Table 4.6 presents the results on soft skills that LFs still needed further training. The results indicate that the first three skills namely facilitation/training techniques (19%), courage and confidence (13.7%) and integrity (13.3%) are still highly desired by the LFs in the study area.

Table 4.6: LFs areas of further personalities training (n = 76)

Soft skills for personality improvement	Percent	Rank
Facilitation/training techniques	19.0	1
Courage and confidence	13.7	2
Integrity and being honesty (trustworthy)	13.3	3
Interpersonal skills i.e. listening and communication skills	11.8	4
Being a visionary leader	11.4	5
Entrepreneurship	11.0	6
Creativity	10.3	7
Consistence	9.5	8

Theoretical and practical trainings accompanied with testimonies of the positive project results on food security and income from projects applying the RIPAT approach gave LFs competences and courage in performing their roles of facilitating the uptake of agricultural technologies. However, Schimmack *et al.* (2002) argue that there is a relationship between culture and personalities whereby certain communities are relatively better-off with the needed personalities fit for LFs than other communities. Diener and Lucas (2019) add that personality traits are not just a useful ways to describe people you know; they actually help psychologists predict how good a worker will be, how long he or she will live, developed, and the types of jobs and activities the person will enjoy. A KII with the Extension Officer from Karatu pointed out that communities around the small towns were more forthcoming in the adoption of new technologies compared to those in more remote areas. This implies that training of soft skills for the improvement of certain personalities should not be generalized; rather, as much as possible, they should be tailor-made to reflect the reality of the communities in question.

4.4.3.2 Setting a goal - selection criteria and setting personalities goal

It was learned from the FGDs that, it was very important to set a goal of selecting the right LFs based on some personalities which include being an active group member (with good attendance, performing group activities well and abiding by a group's constitution), ability to pass on knowledge to others (good facilitators and leadership behaviours) and good

reputation among the group members and community (integrity). The study's observation is in line with Ciroka (2014) who suggests the use of personality traits to match the right job with the right person. Also, the study is in line with Liao *et al.* (2008) who argue that personality traits can be used to explain people's attitudes and behaviour, and they are often used to predict outcome variables, such as work attitude and job satisfaction. LFs were required to focus on the goal (vision) illustrated in a farm/household picture and has a set of system components which upon implementation of the project's basket of technologies will ensure increase in agricultural production and productivity. The goal helps LFs to remain focused and help their fellows to do the same.

As a set of goals, during the selection of high performing LFs under projects applying the RIPAT approach, LFs are expected to be skilled, self-motivated, and able to work in difficult conditions under minimum supervision (Vesterager *et al.,* 2017). This implies that a wrong selection (not considering personalities) of LFs can result into a big challenge in the improvement of the personalities fit for LFs.

4.4.3.3 Practical training (coaching)

The practical training sessions tend to be on leadership and facilitation based on the principles of adult learning. As detailed in the LFs' RECODA Academy training notes used by the project implementation organization, the study revealed that some practical sessions were conducted whereby LFs acted as trainers facilitating project activities at group level. Each LF was urged to set a target of improving some of the personalities which they thought were underdeveloped. Self-motivation and discipline to reach the set target were emphasized which is in line with Ahamed *et al.* (2018) who argues that the best way to develop most of the personalities is to practise them regularly and to be an architect of

one's own career. A lead farmer from Karatu when asked to comment on improvement of personalities through coaching and practising had the following to say:

> "... it was difficult to stand before fellow farmers to teach and organize the implementation of various activities timely but, through practising and under the guidance of RECODA staff I have improved in many ways including interpersonal skills, confidence, competence, being organized, being systematic, ..."
>
> (Lead farmer from Karatu, August 2018).

Learning by doing (coaching) by project implementing organization aiming at the improvement of the personalities of the LFs entails encouraging through appreciating the observed positive changes. However, improvement and consolidation of the required personalities is a continuous process taken as a normal practice mainstreamed in the daily project activities. This is in line with Lerman (2013) who argues that employees need to ensure they have all the skills needed in a working place and that it is important to undergo on the-job training on soft skills through refresher courses or learning by doing. This is in line with the saying that, 'practice makes perfection'. Therefore, as much as possible, learning by doing is important for instilling the desired personalities to the LFs and the project implementing organization should be keen on traits.

4.4.3.4 Instilling socio-entrepreneurship attitude

From the FGDs, it was revealed that LFs were empowered to have the attitude of socio-entrepreneurs which entails being proactive in identifying the opportunities in the community which are in line with the roles (uptake of technologies), organize resources to exploit the opportunities in such a way that the community will benefit as well as the LFs. LFs engaged in the production of agricultural planting materials such as banana suckers, vines of orange fleshed sweet potatoes (OFSP), pigeon peas under quality declared seed

(QDS) system which help to ensure up-scaling of the project activities as availability and accessibility of the planting material become easier but, at the same time LFs gets benefits or money which sustains them as LFs. They were strongly urged to adopt project interventions so as to become successful farmers in the definition of social entrepreneurs as defined under the RIPAT approach that, "LFs are people who have developed social entrepreneurship as agents for change and are among the more successful farmers among project participants" (Vesterager *et al.*, 2017).

4.4.3.5 Mentorship and monitoring (control measures)

The study found that LFs have been mentored by staff from the project implementation organization (RECODA) through following up the ways they are implementing activities in the spreading groups. Among the aspects used in monitoring the personalities of the LFs include timely reporting with reliable information of group members' attendance, distribution of project agro-inputs, training and reporting project performance at quarterly meetings. Using the saying that *"trust is good but control is better",* the expected personalities of LFs were tracked through designed monitoring tools and predetermined periodic checks. Information and communication technologies (ICT) were used in project monitoring and data collection through the use of the Open Data Kit (ODK) and Kobo Collect server. Transparency for LFs was facilitated through proper record keeping. LFs were required to abide by the core values of the implementing organization (RECODA) which are Transparency, Accountability, Creativity and Teamwork (TACT). It is important for the LFs to know the required personalities; the core values adopted from the implementing organization become their personal identity, so they have to gauge on how they are progressing.

The monitoring of the LFs' personalities improvement based on action and reflection help in ensuring consistence and focus to the set goals. Cukier *et al.* (2015) add that a wide range of initiatives may have been identified to improve personalities but, there is always a need for consistence, maintained over time and evaluated. This implies that personality improvement is a process which needs to be well organized with follow-ups.

4.5   Conclusions and Recommendations

Based on the study's findings, it can be concluded that personalities are very important when it comes to performance of LFs. The most needed personalities for LFs are integrity, being courageous, volunteerism and interpersonal skills related to leadership and facilitation skills to farmer groups in the uptake of technologies. It is also concluded that personalities contribute to the performance of LFs through enabling them to become role models, improving individual LFs' integrity and honesty, and enhancing their ability to bring harmony to the groups. It is further concluded that training, setting goals for developing good relationship with others (being a person of integrity), instilling socio-entrepreneurship attitude and practical training (coaching) are the most important ways to improve personalities of the LFs.

Based on the study's findings and the above conclusions, the following recommendations are made:

i.   Development actors, being from government or the civil society (Non-Government Organizations) sector, should put equal emphasis on soft skills as they do on hard skills in the capacity building of the LFs.

ii.   Project implementing organizations need to prioritize personalities that enhance LFs' integrity and honesty thus, enabling them to become role models and bring harmony to farmers group.

iii.   Further studies are required on how soft skills can be incorporated in curricula undertaken by agricultural and community development students/personnel so as to improve their overall performance and interaction with communities.

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CHAPTER FIVE

**5.0   INFLUENCE   OF   INSTITUTIONS   ON   LEAD   FARMERS'
PERFORMANCE IN PROJECTS APPLYING THE RURAL INITIATIVES
FOR PARTICIPATORY AGRICULTURAL TRANSFORMATION (RIPAT)
APPROACH**

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5.1   Abstract

The use of lead farmers (LFs) in facilitating the uptake of agricultural technologies has
been recognized as among the solutions to the declining capacity of government
agricultural extension services. However, the performance of LFs depends very much on
the institutional eco-system in place during and after the project. This paper examines how
various institutions influence the performance of LFs. Using a cross-sectional research
design, a sample of 384 farmers was selected randomly from a population of 1800 farmers
in Karatu and Singida. Data were collected through a questionnaire, focus group
discussions and key informant interviews. Qualitative data were analysed through both
content analysis and SPSS was used for quantitative data. The findings show eleven
institutions that influence the performance of LFs, and these can be grouped into four
categories: local   government   authority,   research   institutions,   non-governmental
organizations and the community. Based on Friedman test, perceptions of the respondents

regarding the importance of institutions in enhancing the performance of LFs showed significant difference (p = 0.000). Also, comparisons among the institutions showed significant difference (p = 0.00) except that there was no significant difference (p = 0.104) between Ward Development Committees and Village Assemblies. It is concluded that institutions do influence the performance of LFs through creating a conducive environment and providing moral incentive for the LFs to execute their roles during and beyond the project life thus, enabling them to act as community change agents and social entrepreneurs. Based on the good performance of LFs in ensuring uptake of technologies by fellow farmers due to the presence of institutions, it is recommended that LFs and farmer groups as an institution should be integrated in the government extension system.

Key words: *Institutions, lead farmers, performance, RIPAT approach*

5.2   Introduction

Increasing agricultural productivity is a key to economic growth for many developing countries especially in Sub-Saharan Africa (SSA). In SSA, agriculture contributes quite substantially to employment, Gross Domestic Product (GDP), export earnings and food security (AGRA, 2014; Larsen and Lilleø, 2014). However, low agricultural productivity has been an endemic problem due to, among other reasons, underperformance of public extension services in offering technical agricultural advice to farmers and assuring them of the necessary inputs and services. To address these limitations, community based extension approaches have become important in filling the gap through making use of the farmer to farmer extension (F2FE) approach (Lukuyu *et al.,* 2012). The approach employs lead farmers (LFs) in the facilitation of project activities including uptake of agricultural technologies. LFs are those individual farmers who have been selected by other farmers to perform technology-specific farmer-to-farmer extension (F2FE), after being trained in the use of the technology in question (Scarbourough *et al.,* 1997). In simple terms, Karuhanga

et al. (2012) define LFs as selected famers trained by experts and who, in turn, share their

knowledge and skills with other farmers in the community.

The effectiveness of LFs in responding to the extension service delivery needs is based on

voluntary adoption and expansion of their services to various organizations in the absence

of any direct external promotion (Simpson *et al.,* 2015). Projects applying the Rural

Initiatives for Participatory Agricultural Transformation (RIPAT) approach have been using

LFs in implementation of improved agricultural technologies aiming at development of

small-scale farmers. The study on which this paper is based was inspired by the definition

of LFs adopted under the RIPAT approach, that is, LFs are people who have developed

social entrepreneurship as agents for change and are among more successful farmers

among project participants (Vesterager *et al.*, 2017).

Among the roles played by LFs is self-adoption of the technology in question which makes

them become role models, teachers and trainers of other farmers, facilitators of adoption

and monitors of the same (Vesterager *et al.,* 2017). LFs as agents of change tend to narrow

the farmer-extension ratio and facilitate the uptake of technologies at reduced costs since

they are from within the community and work as volunteers with no salaries or allowances.

Feder *et al*. (2004) maintain that farmers learn best from fellow farmers implying that LFs

sometimes facilitate better the project activities compared to extension officers. From the

definitions of LFs, their roles are expected to go beyond simple message delivery to

making them principal agents of change in their own communies (Lukuyu *et al.*, 2012)

and social entrepreneurs (Vesterager *et al.,* 2017). According to Thompson *et al.* (2000),

social entrepreneurs are people who can realize where there is an opportunity to satisfy

some unmet needs that the welfare state will not or cannot meet, and who gather together

the necessary resources and use them to make a difference. Therefore, LFs as agents of

change and social entrepreneurs are expected to perform their roles beyond the project lifespan.

Performance of LFs and sustainability of their roles beyond the projects' lifespan are affected by several factors varying from socio-economic, institutional and their personality traits. Institutions are among the key aspects in the development and sustainability of community development efforts. This is because institutions influence the actors' behaviour so, they are very important in ensuring the performance of LFs during and after the project lifespan. Huntington (2015) defines institutions as stable, valued, recurring patterns of behaviour. That is, institutions are mechanisms which govern the behaviour of a set of individuals within a given community. According to Hindriks and Guala (2014), an institution refers to integrated systems of rules that structure social interactions. Similarly, Haro-Marti *et al.* (2013) looks at institutions as rules and procedures that are created, communicated, and enforced through channels widely accepted as official. Institutions can be either informal (customs or behaviour patterns important to a society) or formal (institutions created by entities such as the government and public services). According to Vatn (2005), institutions influence individuals and their motivations thus, they can influence the performance of LFs as well. Furthermore, according to Uphoff and Buck (2006), although rural institutions can represent diverse patterns of behaviour, they can also function as organizations or structures of recognized and accepted roles that serve a purpose.

This study adopt institutional theory which generally considers the processes by which structures, including schemas, rules, norms, and routines become established as authoritative guidelines for social behaviour. According to Scott (2008), institutional theory is widely accepted theoretical posture that emphasizes rational myths, isomorphism and

legitimacy. Scott (1995) further indicates that, in order to survive, organizations must conform into the rules and belief systems prevailing in the environment. Scott and Meyer (1983) emphasizes that institutional theory seeks to explain the elaboration of rules and requirements to which organizations must conform if they are to receive support and legitimacy.

This study use the institution and organization interchangeably based on North (1990) that if, institutions are the rules of the game, organizations are the players who play the game according to the rule. The study combines the definitions from various scholars to consider an institution as a social structure with a purpose in which people cooperate and influence their behaviour and because it has rules and can enforce them, institutions influence the way people live. While it is known that institutions influence human actions, it is not yet known clearly how exactly they influence LFs' actions hence, their performance. Therefore, the study on which the manuscript is based endeavoured to answer three research questions:1) Which institutions facilitate the performance of LFs, 2) What is the contribution of the institutions on the performance of LFs, and 3) What is the effect of collaboration (interplay) among the institutions in facilitating the performance of LFs.

5.3   Research Methodology

5.3.1   Description of the study

The study was conducted in Karatu and Singida Districts in Arusha and Singida Regions respectively (see figure 5.1 for details). Geographically, Singida and Karatu are found in the central and northern parts of Tanzania, respectively. Karatu District experiences varied climatic conditions whereby in the Eyasi Basin, the annual rainfall is between 300 and 400 mm, while it ranges between 900 and 1 000 mm per year in Karatu Town. Karatu has three agro-ecological zones namely: uplands, midlands and lowlands, with altitudes ranging

from 1 000 to 1 900m above sea level (KDC, 2001; Meindertsma and Kessler, 1997). The principal crops grown in the highlands include wheat, barley, beans, maize, coffee, flowers, pigeon peas, sorghum, finger millet and sunflower while in the midlands and lowlands the main crops grown are maize, beans, pigeon peas, sorghum, millet and sunflower (URT, n. d.). Onion is a common irrigated crop in the lowlands of Lake Eyasi, especially in Mang'ola Ward.

According to URT (2013), the climatic condition of Singida District is generally a semi-arid with an average annual rainfall of about 590 mm ranging from 350 mm to 750 mm per year. The district's land physical features are dominated by lowlands and plains with some highland of plateaus. The principal crops grown include maize, sunflower, groundnuts, sorghum, millets, onions and sweet potatoes. Both districts were faced with shortage of extension officers (URT, 2013 and URT, n.d.).

The selection of the study areas (Fig. 5.1) was based on the fact that the projects applying RIPAT approach have been implemented in the two districts for four years, where the contribution of LFs to the projects can be assessed (Lilleør and Sørensen, 2013). Normally, projects applying the RIPAT approach last for 2 to 4 years; the project in Karatu (Endabash division) started in 2008 and ended 2012, while that in Singida (Ilongero division) started in 2012 and ended 2015.

5.3.2   Research design, sampling and sample size

The study adopted a cross-sectional research design which has been recommended by several scholars, such as (Babbie, 1990; Bailey, 1998; Delice, 2010) due to its cost and time effectiveness in data collection. The design entails collection of data on more than one case at a single point in time. Through the design one collects a body of quantitative and

qualitative data on two or more variables which can then be examined to detect patterns of association (Bryman, 2012). According to Babbie (1990), the design is also useful for descriptive purposes as well as for determination of relationships between variables at the time of the study. Moreover, the design allows the use of other methods of data collection such as observation and use of official records.
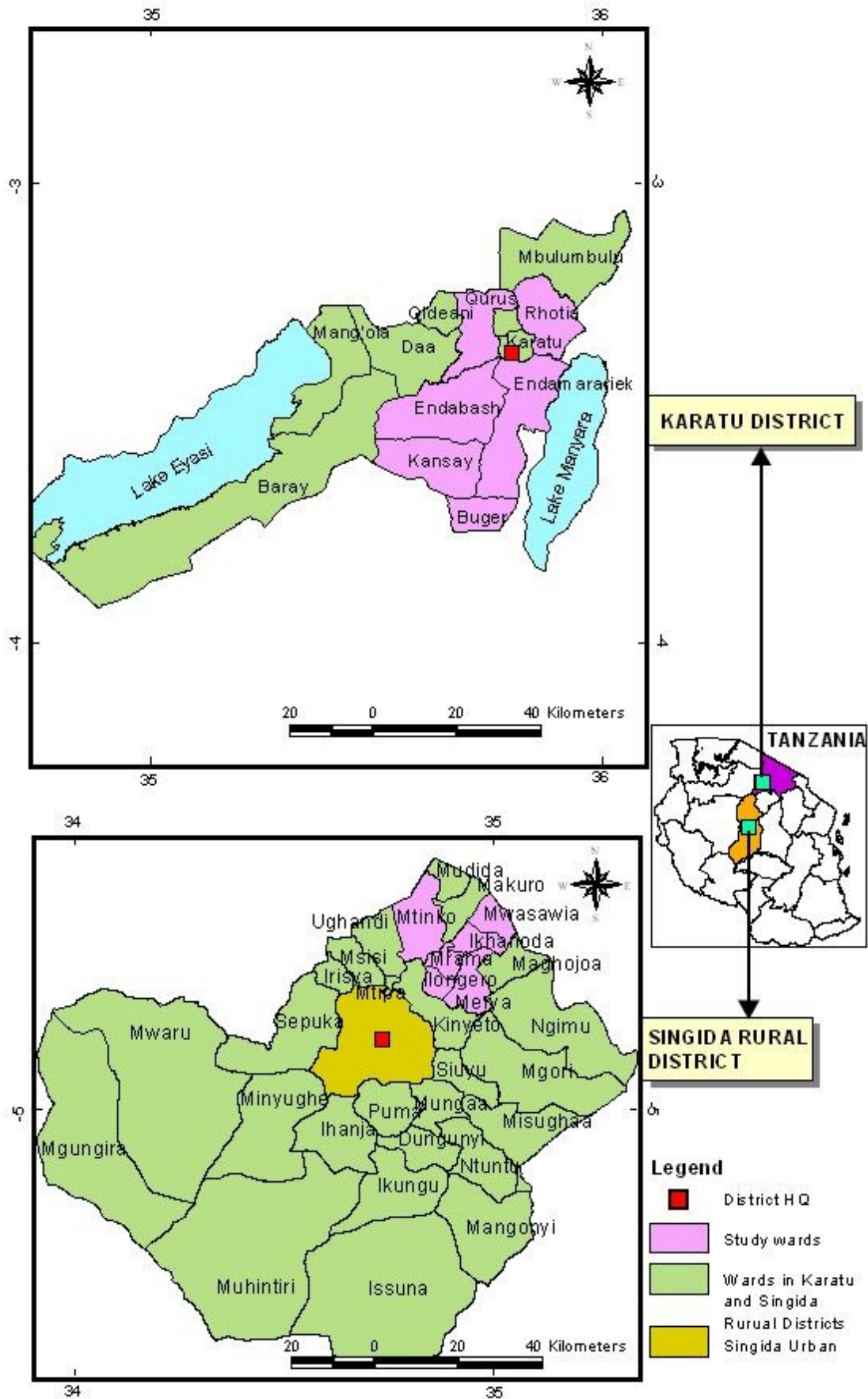
Figure 5.1: Maps showing the study area

The study population (N) included the 1800 households that had benefited from the RIPAT projects in Karatu and Singida Districts. The sample size (n) was 384 households; the number was determined using Cochran's formula (Cochran, 1977; cited by Bartlett *et al.*2001) whereby:

n = $\underline{z^2 p(1 - p)}$
$\quad\quad$ e^2

$$n = \frac{z^2(pq)}{e^2}$$

where:

n = sample size;

z = a value on the abscissa of a standard normal distribution (from an assumption that the sample elements are normally distributed), which is 1.96 or approximately 2.0 and corresponds to 95% confidence interval;

p = estimated variance in a population from which the sample is drawn, which is normally 0.5.

Using a Z-value of 1.96, a p-value of 0.5, a q-value of 0.5, and a d-value of 0.5% (which is equivalent to 0.05), the sample size (n) was determined to be 384 households, as shown below:

= 1.96^2 (0.50 x 0.50)/0.05^2 = 384.

The study used multistage sampling where simple random sampling and purposive sampling methods were employed. In addition, including a stratified proportionate sampling technique was used in order to ensure that more respondents were obtained from Karatu District which had more participants in the projects applying the RIPAT approach compared to Singida District. The strata were districts, wards and types of farmers (LFs and non-LFs). Male and female representatives of households were selected through

systematic sampling. The population comprised two sub-populations of lead farmers and non-lead farmers. Both sub-populations were obtained from RIPAT project officers/managers who had complete lists of RIPAT beneficiaries in the research areas. The first one was selected randomly using random numbers created in MS Excel using the "=RAND ( )" command, which generated random numbers. This was done at the ward level where a sampling interval for a relevant sub-population was obtained by dividing the sub-population N by the sub-sample size (n) to obtain the sampling interval k, i.e. $N/n = k$. Then, after the first respondent was selected, every k^{th} person was selected until the sub-population was exhausted.

Besides the LFs and non-LFs, 20 key informants (KIs) were selected purposively. KIs included people who were considered to be knowledgeable about the RIPAT approach, including Extension Officers (EOs), District Project Coordinators (DPCs), Village government leaders and Programme Leaders/Managers from RECODA who are the implementers of the projects using the RIPAT approach. Moreover, focus group discussion (FGD) participants (men and women) were selected from members of groups of the projects applying the RIPAT approach in each ward. There were men groups separated from women.

Institutions linked with the performance of LFs were identified through Participatory Rural Appraisal (PRA). Specifically, the institutional analysis tool was applied. FGDs with LFs and secondary information gathered from project reports such as project coordination meetings and evaluations categorized the institutions into two categories i.e. institutions within and outside the project area.

5.3.3 Data collection

Both primary and secondary data were collected for complementarily reasons. Primary data were collected through a survey using a pre-structured questionnaire. Moreover, FGDs and key informant interviews (KIIs) using an FGD guide and a checklist respectively were used. In addition, Participatory Rural Approach (PRA) was used to facilitate institutional analysis exercise. While the questionnaire was administered to respondents to capture their perceptions regarding the importance of institutions in enhancing the performance of LFs, KIIs were meant to gather in-depth information regarding the identified institutions in relation to the performance of LFs. The FGDs coupled with the use of a PRA tool namely Venn diagram, focused on institutional analysis. With the use of Venn diagram, the relative importance and interactions of each institution in terms of influence on LFs was depicted and discussion on how each institution influences LFs was conducted.

Secondary data were collected from district profile reports, Research, Community Organisational Development Associates (RECODA - implementing organization) publications and project quarterly reports explaining among other things the activities undertaken by LFs. Therefore, in each of the six wards involved in the study, 3 FGDs were organized making a total of 18 FGDs, with a total of 116 participants. In addition to facilitating the acquisition of in-depth information regarding the institutions *vis-à-vis* LFs performance, KIIs and FGDs were conducted so as to allow triangulation.

5.3.4 Data analysis

Qualitative data from the PRA, FGDs and KIIs were analysed using content analysis, whereby codes and themes were developed for the various arguments. Some data collected through PRA were analysed in the field directly with the help of the PRA teams. In this regard, the PRA teams drew Venn diagrams indicating the importance and interaction of

existing institutions as far as the performance of LFs is concerned. Quantitative data were processed and analysed using the Statistical Package for Social Sciences (SPSS) version 20 whereby descriptive statistics (i.e. frequencies, standard deviation, means, minimum and maximum values of variables) were determined to indicate the degree of institutional importance as per respondents' scoring. Performance of LFs was considered as execution of their designated duties, including implementation of selected technologies promoted in their duty area, training and conducting follow-ups to farmers on agricultural technologies being promoted, and facilitating the formation of farmer groups. Respondents assigned scores to each of the seven institutions, identified through the FGDs, reflecting their judgement of the influence of the institutions on LFs performance. Findings from the survey were compared with the FGD findings in order to check for validity.

5.4   Results and Discussion

5.4.1   Identification of institutions influencing the performance of LFs

Data from the institutional analysis, FGDs with LFs and Non-LFs (NLFs) and secondary information indicate that there were different institutions within and outside the project areas as discussed below.

5.4.2   Institutions within the project areas

Institutions within the project areas were well known to both LFs and Non-LFs; so, through the FGDs (LFs and Non-LFs) and KIIs with RECODA programme leader and local government officials, eight institutions were identified within the project areas which include: i) RECODA as the implementing organization (IO), ii) District Councils (DCs), iii) Ward Development Committees (WDCs), iv) Ward Agricultural Resource Centres (WARCs), v) Ward and Village Agricultural Extension Officers (WVAEOs) office, vi)

Village Councils (VCs), vii) Village Assemblies (VAs) and viii) Farmer groups (FGs). The

institutions and their roles related to the performance of LFs are summarized in Table 5.1.

Table 5.1: Institutions influencing the performance of LFs and their roles

Institution	Roles in influencing the performance of LFs.
i). RECODA as the Implementing organization (IO)	- Facilitates the selection of LFs using the set criteria under the RIPAT approach. - Describes the roles of LFs and builds their capacity accordingly in areas related to facilitation skills, agricultural technologies and soft skills (personalities). - Ensures good collaboration and coordination with local government. - Guides the acquisition of quality agro-inputs and engage in the production of planting materials. - Guides the use of the RIPAT Manual. - Introduces LFs to the community as social entrepreneurs and community agents of change. - Supports the project kick-off (community sensitization and mobilization) and conducts quality control and certification during project implementation.
ii). District Councils (DCs)	- Collaborate with LFs through working with extension officers who are supervised by the District Project Coordinators (DPCs) based on the set Memorandum of Understanding (MoU) between DC and the IO. - Introduce LFs to other projects implemented in the districts. - DPCs facilitate the introduction of projects and LFs at ward and village level. - Monitor the work of LFs especially in quarterly meetings and as deemed necessary.
iii). Ward Development Committees (WDCs)	- Decision makers on the project spreading villages which LFs and EOs will work in. - Discuss the performance of projects and that of the LFs from various villages. - Introduce the project and LFs to new villages and institutions in the ward. - Help in recommending villages to be targeted by the intended project.
iv). Ward Agricultural Resource Centres (WARCs)	- Centres for LFs' to meet with extension officers and among themselves. - Places for setting groups and/or demo plots for various agricultural technologies transfer. - Centres of information and sources of various reading materials and audio-visuals such as videos (Digital Video Discs - DVDs).
v). Ward and Village Agricultural Extension Officers (WVAEOs)	- EOs collaborate with LFs in project spreading to neighbouring villages. - EOs introduce LFs to the community as their assistants so that they can gain credibility - EOs report the performance of project and LFs in the formalized meetings e.g. WDCs, District Management Teams (DMTs). - EOs link LFs with other projects/organizations.
vi). Village Councils (VCs)	- Discuss the new projects including the roles of LFs before meetings with community members. - Plan and convene Village Assemblies (VAs) to introduce the projects and /or LFs. - Encourage the group to abide by the by-laws in the VAs and emphasize the need for enforcement.
vii). Village Assembly (VAs)	- Selection of group members some of whom become LFs. - Introduce LFs as social entrepreneurs and community change agents.
viii). Farmer groups (FGs)	- Select LFs. - A place where LFs get training; first as technical LFs and later as spreading LFs. - A platform for LFs to practice what they have been trained on.

Source: Survey data.

Generally, observation from the study shows that, a farmers group begins as an informal[5] institution but, within the project lifespan they become formal after being registered under local government regulations; so in this study farmer groups are treated as formal institutions. The influence of institutions on the performance of LFs begins when participating farmers (group members) are selected at the village assembly (VA) based on a set criterion where some of the members are later selected to become LFs (Vesterager *et al.,* 2017). The implementing organization (IO) trains LFs together with EOs to become community based experts responsible for enhancing adoption and spreading project interventions. It was learned from the programme leader (PL) of the IO that while selection of LFs is based on the criteria set by the RIPAT approach, the introduction of the LFs at the VA and their working with EOs follows the local government structure i.e. District Council, ward and village together with related institutions at various levels including District Project Coordinator (DPC), Ward Development Committee, Village Council, and Village Assembly. The project manager from Karatu revealed that the main role of the IO is to facilitate the implementation of projects based on the RIPAT approach where the use of LFs is mandatory hence, is required to build LFs' capacities accordingly.

However, even though Ward Agricultural Resource Centres (WARCs) were found within the project areas, they were less known and were considered to be less important because they were few with inadequate facilities that were not fully utilized (URT, 2016a). The study learned from district's staff that in Singida, there were only two out of the 21 WARCs needed, while in Karatu District there was only one out of the 14 WARCs needed.

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[5]Informal institutions are socially shared rules, usually unwritten, that are created, communicated and enforced outside officially sanctioned channels while formal institutions are defined as rules and procedures that are created, communicated and enforced through channels widely accepted as official.

5.4.3   Institutions outside the project area

Institutions outside the project area were mostly known to LFs' because of the extra training received from various experts and study visits they made to institutions within and outside the project area. Through the LFs' FGDs and KIIs with programme leader and extension officers, institutions outside the project areas were identified. These include: i) Tanzania Agricultural Research Institute (TARI) Centres; ii) Farm Africa; and iii) Sokoine University of Agriculture (SUA). It was learned through the IO Programme Leader (PL) that the main roles of these institutions were to act as a source of technologies (planting materials and crop management) and technical backstopping. The PL said:

> *We received improved banana varieties and pigeon peas from TARI - Tengeru and Selian respectively, while orange fleshed sweet potatoes (OFSP) were obtained from SUA. We had to get an instructor from SUA to train the RECODA staff who in turn trained EOs and LFs on the crop management and post-harvest handling so as to take advantage of the nutritional value of the OFSP. In addition, LFs visited SUA and TARI exhibitions to see and discuss about various improved agricultural technologies.* (KII - PL from RECODA, August 2017).

LFs have been visiting research stations as these are sources of technologies and experts who can give details of the performance of the technologies as well as boost the understanding and confidence of the LFs and consequently influence their performance in the uptake of agricultural technologies. According to Swiergiel (2007), famers study visits, especially LFs, are very important because they offer an opportunity to see things of direct use on their farms. Hence, institutions which are found outside the project have a direct influence to the performance of LFs. Sometimes experts from the research institutions train the staff from implementing organization who in turn trains LFs. Direct connection of LFs with various institutions not only enhances the performance of LFs but, ensures

sustainability in the execution of their intended roles. A Lead Farmer from Karatu had this to share:

> *As a Lead Farmer, I visited agricultural exhibitions at TARI - Selian and later on the researchers from Selian nominated me to be among the pigeon peas seed producers under the quality declared seed (QDS) programme. Since then I have been producing seeds for TARI - Selian and for myself. However, when I train my fellow farmers, I sell seeds to them and get good income. Moreover, they visit me as a Lead Farmer and I can call them for technical advice not only on pigeon peas but, also on other crops* (A Lead Farmer, Karatu District; August, 2017).

Connecting LFs to institutions widens their scope of sourcing knowledge and support thus, enhancing their performance during the project lifespan and beyond. LFs have well prepared local platforms (farmer groups), have formalized collaboration with extension officers (EOs), are well known in the community therefore, being connected with right institutions is very important in the execution of their roles. This is in line with findings of Kiptot and Frienzel (2019) that strong producer associations and farmers groups, coupled with extension of an informal, multi-institutional networks that supported the creation of knowledge and learning process are among the key components contributing to the sustainability of the LFs programme.

5.4.4   Relative importance of institutions in influencing the performance of LFs

The study inquired from the project participants (LFs and Non-LFs) about their perception of the relative importance of the seven institutions known to them in influencing the performance of LFs. Descriptive statistics, i.e. frequencies, standard deviation, means, minimum and maximum values, were used to determine the degree of institutional importance as per respondents' scoring. The implementing organization had the highest

mean score followed by farmer groups (FGs) and then Ward and Village Agricultural Extension Officers (WVAEOs). Village assembly (VA) had the lowest mean score (Table 5.2). Although WARCs were found within the project area they were not included in the analysis because they were hardly known to Non-LFs.

Based on the Friedman test, perceptions of respondents regarding the importance of institutions showed significant difference (p=0.000). Further analysis that involved comparing one institution to another, showed significant difference (p=0.00) for all institutions except that there was no significant difference (p=0.104) between Ward Development Committee (WDC) and Village Assembly (VA).

Table 5.2: Degree of institutional importance to LFs as assessed by LFs and NLFs (n = 384)

Institution	Mean	Std. Deviation	Minim.	Maxim.
1. Implementing organization (IO - RECODA).	4.12	.409	3	5
2. Farmer groups (FG)	3.84	.453	3	5
3. Ward and Village Agricultural Extension Officers (WVAEOs)	3.05	.493	2	5
4. Village council (VC)	2.93	.488	2	5
5. District Council (District Project Coordinator -DPC)	2.32	.529	2	4
6. Ward Development Committee (WDC)	2.17	.425	2	4
7. Village Assembly (VA)	2.13	.337	2	3

The highest score for IO can be explained by findings from the FGDs and KIIs. Based on the FGDs with LFs and Non-LFs, IO pioneered the projects and had been facilitating the implementation and monitoring of the project activities. On the same note, the programme leader from the IO said:

> "When IO manages to instil the required capacity to the LFs and facilitate well the
>
> development of farmer groups, the groups go beyond project lifespan and become

local institutions with the LFs working as social entrepreneurs and community change agents" (IO Programme Leader, September 2017).

These findings are in line with the observations by Lukuyu *et al.* (2012) and Vesterager *et al.* (2017) that the roles of LFs ought to go beyond the simple message delivery to make them principal agents of change in their own communities and social entrepreneurs. Regarding the influence of IO on the performance of LFs, it was learned from the FGDs and KIIs that the IO trained LFs on various agricultural technologies mainly through learning by doing at farmer field school (FFS)/group plots. Tailor-made courses under RECODA Academy[6] were organized for special technologies and skills such as para-vets (animal health auxiliaries in service to small-scale farmers), skills on community sensitization and mobilization, and group formation and facilitation.

It was also learned from some FGDs that farmer groups enabled farmers to work together and ease the channelling of all project interventions especially through group plots where learning by doing was practiced. This explains why farmer groups ranked second (Table 5. 2) in terms of importance to LFs. A study by Lilleør and Sørensen (2013) showed that among the reasons behind the good performance of the projects applying the RIPAT approach is the formation of strong farmer groups which help the farmers to transform from weak to strong-willed farmers. Farmer groups influence the performance of LFs through weekly meetings at farmers field school (FFS)/group plots which create a platform for LFs to learn and in turn to practice what they have learnt.

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[6](RECODA Academy)
  i. Capacity building to various rural development actors on the application of RIPAT Approach,
  ii. Offering tailor-made courses to final year students and graduates from courses related to agricultural and community development on how best they can engage with community economic development projects;
  iii. Capacity building for community based experts (extension officers, local institutions and Lead Farmers) in facilitating the adoption, up-scaling and sustainability of the project activities (Vesterager *et al.,* 2017).

5.4.5   Effects of Interaction (Interplay) among Institutions in Influencing LFs'

       Performance

Selected FGDs with LFs and KIIs with DPC, PL and EOs were used in discussing the importance and interaction of institutions influencing the performance of LFs.

5.4.5.1   Importance and relationship of institutions in a Venn diagram

The identified institutions (both within and outside the project areas) with potential to influence the performance of LFs were listed and their importance discussed, based on the roles played. Using one of the PRA tools during the FGDs with LFs and Non-LFs, different sized circles were drawn (Fig. 5.2) to indicate the importance each institution had on LFs' performance. In this regard, big circles represent highly important and decision makers while small circles represent little importance. The size of the circle reflects the importance of the institution; the distance between the circles indicates the degree of interaction between the institutions; where a large overlap means high interaction; and no overlap indicates lack of interaction.

The list of the institutions were given number 1 to 11 as follows: 1) District council (District Project Coordinator - DPC), 2) Ward Development Committee (WDC), 3) Ward Agricultural Resource Centre (WARC), 4) (Ward and Village Agricultural Extension offices - EOs), 5) Village Council (VC), 6) Village Assembly (VA), 7) Implementing Organization (IO), 8) Farmer groups (FG), 9) Tanzania Agricultural Research Institute (TARI), 10) Sokoine University of Agriculture (SUA) and 11) Farm Africa (FA).

The results of the instituonal analysis show that IO, DC, FG and EOs have larger circles than the rest resembling the findings in Table 5.2 which were also ranked higher in terms of importance. TARI and SUA were among the important institutions found at the

periphery and outside the project areas respectively. The rate of importance given to each institution was based on their roles in influencing the performance of LFs as stipulated in Table 5.2 and in Section 5.6.3. The findings show that the institutions outside the project area were of equal importance to the ones found inside the project area.

Contrary to the scores from the survey, whereby the village assembly (VA) was ranked low (Table 5.2) meaning a less important institution. It was noted during the FGDs that the institution was equally important (Fig. 5.2). Through KIIs with DPC it was revealed that the importance of VA was based on its uniquiness as an important forum for giving a final decision on whether groups should be formed or not. On this, the DPC said:

> *"… it is the village assembly which approves or disapproves the formation of farmer groups. Moreover, the village assembly is an important platform for introducing LFs to the community and establishing and/or enforcing by-laws which create a conducive environment for good performance of LFs" (*Karatu DPC, September 2017).

Village assembly consists of every person who is a resident in the village and who has attained the apparent age of eighteen years. So what is proposed as a by-law at the ward committee or village council receives its final endorsement in such a forum (URT, 2016b).

Nevertheless, failure of some village authorities to convene VAs regularly could have influenced the survey respondents to perceive the institution as of low importance to the performance of LFs. This is implied in the quote below:

> *"The village assembly would have been very instrumental in enhancing the performance of LFs in our village. However, such meetings are rarely convened by the village leaders."* (A male representative from Karatu District, September 2017).

From the institutional analysis, the participants scored the VA higher probably because they were imagining of a situation where the VAs are regularly convened.

Figure 5.2: Venn diag...   ...ir relationships in influencing

Key: Representation of the cycles

		Less important	Important	More important
1.	Importance			
2.	Relationship	High interaction	No interaction	
3.	Big outer circle	Project area		
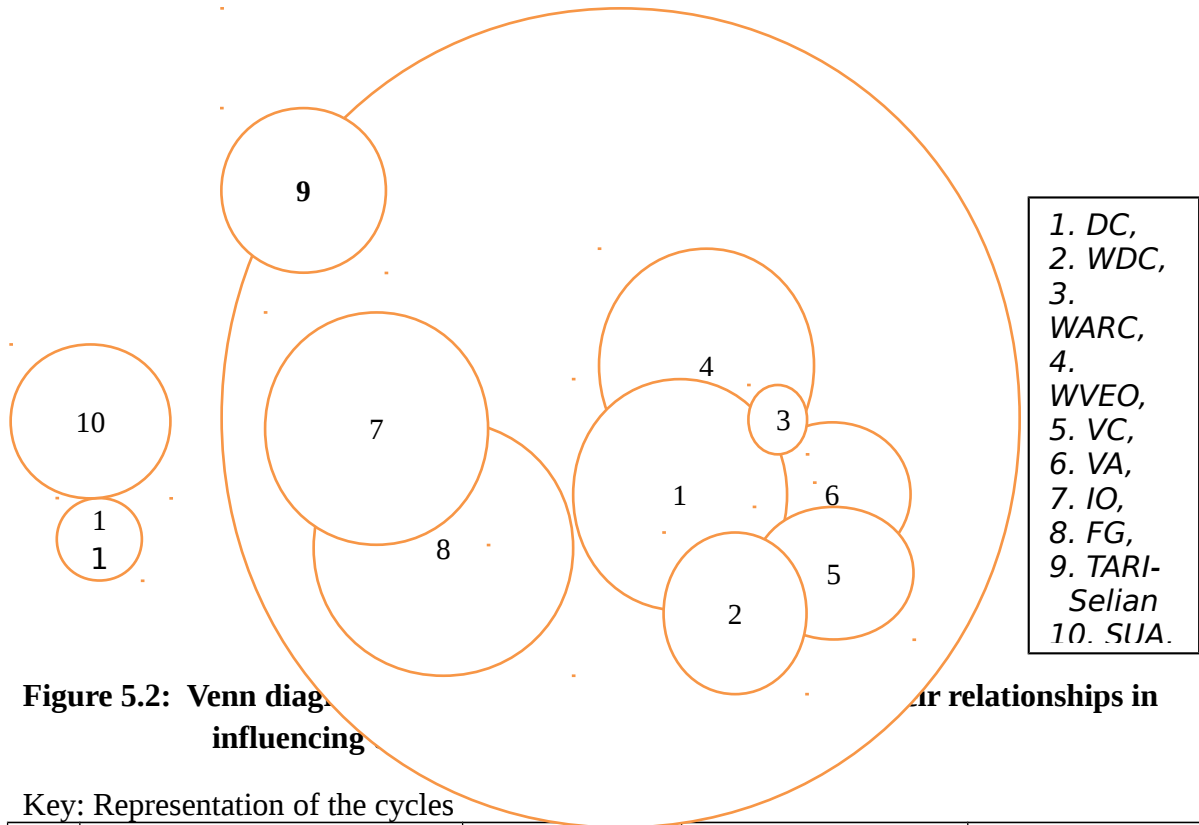
Although the WARC can play a very important role in facilitation of improved farmers' access to technical and economic information as stipulated under the Agricultural Sector Development Programme (ASDP) - II (URT, 2016a), the Agricultural Extension Block Grants (EBG) which were meant for, among other things, establishment and development of WARCs were not released, a thing which made them non-functional. SUA and TARI

were rated as more important institutions because of being the sources of many improved agricultural technologies used in the project areas and at the same time availing technical backstopping. Farm Africa was rated less important because of being the main reliable source of dairy goats; nonetheless, the goats could also be obtained from elsewhere.

The above-mentioned institutions can be categorised into four groups, i.e. i) those falling under local government authorities (DC, WDC, WARC, EOs, VC and VA), ii) research institutions (SUA and TARI), iii) NGOs (RECODA and Farm Africa) and iv) community (farmer groups). However, the interaction of the institutions did not follow that pattern except for the institutions under the local government authority (LGA). Some of the TARI centres have research activities in the project area but, the modes of collaboration including MoUs signed with the IO differed from one to another. For the case of LGA, only one MoU was signed to cater for all the institutions under their jurisdiction. It was found further that there was a strong interaction between IO and farmer groups, especially during the of RIPAT 'start phase[7]' but in the RIPAT 'spreading' phase the strong interaction (interplay) of the groups shifted to EOs as it becomes mandatory for the EOs to collaborate with LFs.

The institutions under LGAs, at various levels and based on their areas of operations, were responsible for setting community development plans and conditions conducive for the LFs to operate including by-laws establishment and enforcement. Hence, LGAs availed an important interaction (interplay) of LFs and EOs to work together in spreading the project interventions and ensuring its sustainability.

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[7]*Projects applying the RIPAT approach are divided into two phases. The 1st phase is RIPAT 'Start' dealing with building the capacity of LFs and EOs who become responsible for the 2nd phase of RIPAT 'Spreading' (Vesterager et al., 2017).*

5.4.5.2 Formalized collaboration between IO and LGA

The use of LFs for the development of small-scale farming is not officially recognized (formalized) under the government extension system and LGAs. It was learned from PL of the IO that formalizing the collaboration between IO and LGA is one the first things that need to be put into place in the projects applying the RIPAT approach. According to Vesterager *et al*. (2017), meetings with district officials are conducted so as to inform the district about the funded project and to agree on the procedures for collaboration by stipulating roles and responsibilities in a written MoU. The study revealed that, from the beginning of the project, the DPC is nominated together with a list of the villages to be covered in the RIPAT Start phase and additional villages to be targeted in the subsequent RIPAT Spreading phase using LFs and EOs. The DPC from Singida emphasized on the efforts made by district officials and IO to operationalize the MoU through attending project quarterly meetings, joint trainings between EOs and LFs, joint planning of field days, and sharing of various project reports.

The functional MoU under the RIPAT approach makes the use of LFs to become mainstreamed into the government extension approach hence, all the institutions under the LGA comply with the stipulated roles of the LFs. Singida District Agriculture, Irrigation and Cooperative Officer (DAICO) acknowledged how the shortage of extension officers was alleviated through the use of LFs and that it was impossible for them to reach all the famers without the support from LFs. One of the LGA officers said:

> *"In this case, when EOs feel that LFs are of help to them, they will recognize them publically and assign them specific roles to play so as to reap the expected outcomes".* (LGA officer for Singida District, September 2017).

The study observed that the average extension-farmers ratios for Singida and Karatu were 1:2,195 and 1:825 respectively, which are much higher than the 1:600 ratio recommended for Tanzania (ASHC, 2015). Hence, the interaction (interplay) of LFs and EOs helps in narrowing the extension-farmers ratio so as to enable the majority of the farmers to access new agricultural technologies and capacity to turn the knowledge into actual development.

5.4.6 Advocacy for local institutions to support LFs

Through key informant interviews with DPCs from Karatu and Singida, it was learned that the use of LFs is not a new thing to many projects and development actors but, what is not common is the extensive use of LFs in collaborating with EOs. They explained the way institutions under LGAs are flexible to comply with different extension approaches including the use of LFs especially when properly advocated by the IO.

The study noted the existence of the functional farmer groups[8] after five years since the end of the project's lifespan. The evaluation of projects applying the RIPAT approach by Aben *et al.* (2013) identified the need for the development of sustainable institutional structures to support the approach through building links with government institutions, and to influence local agricultural policy and practices. Generally, such links bridge the 'institutional gap'. Key informant interview with the IO Programme Leader revealed that the RIPAT Manual was revised to incorporate the idea of facilitating the evolution of farmer groups into local institutions so as to fill the observed institutional gap. Vesterager *et al.* (2017) explained the systematic way of forming local institutions under projects applying the RIPAT approach which begins with the formation of farmer producer groups that graduate to farmer producer association and then market association. This is similar to

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[8]Functional farmer groups under projects applying the RIPAT approach refers to a group with above 20 members, meeting as per their constitution with an average attendance of about 70% and the leaders are elected democratically.

what Pors (2018) refers to as local institutions and their development indicators. That is, the RIPAT approach facilitates formation of democratic rural organizations (DROs) through community mobilization of farmer (producer) and savings groups which later form producer and marketing associations. Malisa (2016) has also reported on the importance of such local institutions (farmer groups and associations) in influencing decision making of households, and of decision makers.

Development of local institutions based on the implemented project can influence the performance of LFs to work as social entrepreneurs and agents of change to the community through creating a conducive environment (policy) and providing moral incentive. Mkomagi *et al.* (2015) support the idea of creating strong and sustainable local institutions upon ending of donor support as one of the exit strategies in development interventions. Such local institutions will not only ensure sustainability of project interventions and the roles of LFs but, also enable LFs to work as community agents of change and social entrepreneurs.

5.5   Conclusions and Recommendations

Based on the findings of the study, it is concluded that institutions which influence the performance of LFs can be grouped into four categories: i) local government authority (DC, WDC, WARC, WVAEOs, VC and VA), ii) research institutions (e.g. SUA and TARI) and iii) NGOs (RECODA and Farm Africa) and iv) community (farmer groups). It is also concluded that institutions levels of importance in terms of influence on LFs performance differs from one institution to another but, each of the mentioned institutions is important in enhancing the performance of LFs. The most important institution is RECODA as the implementing organization (IO), followed by farmer groups and Ward and Village Agricultural Extension Offices (WVAEOs). It is further concluded that institutions' main

contribution relate to the creation of a conducive environment (local organizational structure and policies), and moral incentive for LFs to execute their roles during and beyond the lifespan of the project when they act as community change agents and socio-entrepreneurs. Lastly, it is concluded that interaction (interplay) among institutions enhances the performance of LFs as demonstrated by the collaboration between LFs and WVAEOs in the study areas.

The study, therefore, recommends that:

i) Since farmer groups are among the important institutions influencing the performance of LFs, there is a need for the government to devise a way through which all EOs in the government extension system to work through farmer groups.

ii) Owing to the close interaction (interplay) between LFs and EOs in ensuring uptake of technologies and sustainability, the use of LFs should be institutionalized in the government extension system.

iii) Further studies should be conducted to establish how the interaction among the different institutions can be deepened for enhancement of the performance of LFs and community development in general.

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CHAPTER SIX

6.0 SUMMARY OF MAJOR FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents summaries of major findings, conclusions and recommendations made with regard to the relationship between personality traits and performance of Lead Farmers in the farmer-to-farmer extension approach as used in the RIPAT approach. Several key findings are highlighted that have policy implications in relation to improvement of the public extension services through use of Lead Farmers.

6.1 Summary of Major Findings

The study on which the thesis is based aimed at exploring the relationship between personality traits and performance of Lead Farmers in the farmer-to-farmer extension approach as used in the Rural Initiatives for Participatory Agricultural Transformation (RIPAT) approach. The specific issues addressed were determining factors considered in the selection of LFs with a personality traits lens, assessing the performance of LFs based on their roles under the RIPAT approach, determining the influence of personalities on performance of LFs and assessing the role of institutions in the performance of LFs.

To address the issues narrated above, the process of selecting high performing LFs based on the commonly used socio-economic characteristics, but with a personality traits lens was considered. Variables related with socio-economic characteristics of LFs and Non-Lead Farmers (NLFs) were compared and showed significant differences in household labour and size of the land cultivated between LFs and NLFs. The socio-economic characteristics that LFs possessed over NLFs included age (in the sense of maturity and experience), literacy (ability to read and write, which goes together with trainability and

confidence), ability to take a loan to invest in agriculture, and ownership of land. Sex and marital status were not considered as important factors to be a Lead Farmer unless there is a need for gender balancing.

The assessment of the roles that LFs play in the uptake of agricultural technologies and how they fill the gap of inadequate extension staff was also done. It was found that there was existence of a wide extension agent: farmers ratio in the study areas, contrary to the proposed 1: 600 ratio for Tanzania or at least one extension officer per village. The wide extension ratio limited access to new agricultural technologies and capacity to turn knowledge into actual development. The findings show that the use of LFs had narrowed extension agent: farmers ratio by 10-fold at the village level and facilitated the uptake of technologies at reduced costs since LFs were from within the community and were not necessarily paid for. This implies that LFs play an important role in bridging agricultural technology gaps.

The influence of personalities on the performance of LFs was explored based on the needed personalities fit for LFs' career and the ways they could be improved. It was observed that the most needed personalities to LFs included integrity (58.6%), courage (54.3%) and volunteerism (37.2%), traits related to leadership and facilitation skills to farmer groups and the uptake of technologies. The contribution of personalities to the performance of LFs includes helping them to become role models, increasing their reliability in the community and enabling them in bringing group harmony. These findings imply that improvement of LFs' personalities can be achieved through organized training, setting goals for developing good relationship with others, and mentorship and coaching.

The influence of institutions on LFs' performance in projects applying the RIPAT approach was examined based on the identification of institutions which facilitate the performance of LFs, institution contribution to the performance of LFs and the effect of collaboration (interplay) among the institutions in facilitating the performance of LFs. It was found that eleven institutions had influence on the performance of LFs, and these institutions were grouped into four categories namely: local government authorities, research institutions, non-governmental organizations and the community. Based on the Friedman test, perceptions of the respondents regarding the importance of institutions in enhancing the performance of LFs showed significant difference (p=0.000).

6.2   Conclusions

Based on the assessment of personality traits fits for high performing LFs using the Big Five Personality Trait Model and Friedman test, the study concludes that high performing LFs are individuals with personality traits related to openness (curious, wide range of interests and independent) and consciousness (hardworking, dependable and organized), followed by agreeableness (voluntarism spirit).

For the roles of LFs and extension officers in facilitating uptake of agricultural technologies in projects applying the RIPAT approach, the study concludes that LFs play an important role in narrowing the extension farmers ratio leading to farmers being reached by advisory services, hence facilitating bridging of the agricultural technology gaps.

In addition, for the *personalities and performance of lead farmers in projects applying the RIPAT approach, the study concludes that* most important personalities for LFs are integrity, courage, volunteerism and interpersonal skills, which are related to leadership and facilitation skills to farmer groups and in the uptake of technologies.

Lastly, for the *influence of institutions on LFs' performance in projects applying the RIPAT approach, the study* conclude that institutions influence the performance of LFs through creating a conducive environment and providing moral incentives for the LFs to execute their roles during and beyond the project, in which period they act as community change agents and social entrepreneurs.

6.3   Recommendations

i. Based on the assessment of Big Five Personality Trait Model and Friedman test, the selection of high performing LFs should consider personalities related to openness (being curious, wide range of interests and independent) and consciousness (hardworking, dependable and organized). From the policy perspective, specifically to Ministries of Agricultural, Livestock and PO-RALG (Local Government) formalizing the use of LFs in the government extension services, and factoring in personality traits in the selection criteria of LFs should be considered.

ii. Since the use of LFs has enabled reduction of the extension-farmers ratio in the study area hence improve access to extension services it is thus, recommended that, the use of LFs should be formalized under the government extension system in order to reach needy farmers in the current situation of having few extension staff.

iii. For improvement of personalities, soft skills should complement hard skills in building the capacity of LFs through organized training goal setting, mentoring and coaching. For improvement of performance of LFs, the government and Non-Governmental Organisations should put emphasis on the soft skills, i.e. training and emphasising on identifying and building the personalities of LFs as they do for hard skills (technical knowhow).

iv. Since farmer groups are among the important institutions influencing the performance of LFs, it should be made mandatory for all EOs in the government extension system to work through farmer groups.

6.4   Recommendations for further research

The use of LFs is not yet formalized under government extension system. Thus, there is a need for government to pilot-test projects applying the RIPAT approach so as to popularize the use of LFs in the community and at the same time study how the approach could work efficiently and effectively under the government extension system.

Currently, consideration of personalities in selection of employees and at working place is at an increase in the world and in all disciplines. So, there is a need for research on how soft skills (training on personalities) can be incorporated in curricula for various institutions dealing with the training of extension officers.

6.5   Major Contribution of this Study to the Body of Knowledge

The current study contributes to the body of knowledge with regard to the application of personality traits in the selection of high performing LFs, and improvement of the personality is quite new under farmer to farmer extension approach. Thus, the study sheds light on enhancement of the roles that LFs play as group leaders in facilitating the uptake of technologies.

Another contribution of the study to the body of knowledge is on the way institutional interactions (interplay) between project implementing organization and ward and village extension offices play important roles in the enhancement of the performance of LFs. The LFs at the beginning of the project collaborate mainly with the implementing organizations

for capacity building but, later collaborate more with extension offices in ensuring up-scaling of the project interventions and sustainability. Nonetheless, studies should be conducted to establish how the interaction among different institutions can be deepened to enhance the performance of LFs and community development in general.

Lastly, the study has potential information to be used by different researchers to widen the understanding of the improvement of Tanzanian's extension policy and services in generating agenda of enhancing agricultural growth through informing the policy making process on practical ways to address the problem of extension-farmers ratio gaps and inadequate government funds.

6.6   Theoretical Links with the Study

The Five factor personality theory provided different personality traits (PTs) to be studied in order to come up with those which influence the performance of LFS. The theory conforms well with the objective of this study which was to assess how PTs can complement socio-economic factors in influencing the selection and performance of LFs.

Among the main roles used in determining the performance of LFs was facilitation of the adoption and diffusion of technologies. Diffusion theory by Rogers (1995) with four unified theories of diffusion; the part of perceived attributes was relevant to the RIPAT approach based on how the innovations at group fields are moulded to be compatible with the local conditions without complexity and prove its comparative advantages when compared to other technologies.

The institutional theory generally considers the processes by which structures; including schemas, rules, norms, and routines; become established as authoritative guidelines for

social behaviour, and it inquires about how these elements are created, diffused, adopted, and adapted over space and time, and how they fall into decline and disuse. In projects applying the RIPAT approach, the institutional theory helps in developing strong organization/institutions which support the performance of LFs, starting with formation of farmer/producer groups and then producer and marketing associations. Hence, the theory supports groups' development to become legitimate (registered) local institutions facilitating the sustainability of the project interventions by setting a platform and coordination centres for LFs who, after project phasing out, become community change agents and social entrepreneurs.

APPENDICES

Appendix 1: Household Questionnaire

Interviewer's introduction

Dear respondent,

I am …………………………..a PhD student from Sokoine University of Agriculture (SUA), College of Social Sciences and Humanities, Department of Development Studies. I am conducting a study on personality traits of performing lead farmers in Farmer-to-Farmer extension. I would like to assure you that confidentiality will be maintained throughout the study (No identification such as participant's name that will appear in this study) and your honest answers to questions that will be asked are important for the results of this study. I request for your kind cooperation in responding to the questions in this questionnaire for the completion of this study. For more information please contact me through the following contacts: **Email address:** ed@recoda.or.tz; **Mobile:** +225 (0) 768 224 052

Questionnaire for household number _____

District _____ward_____ Village _____

Name of the interviewer _____ Date_____

Questionnaire 1: To be answered by LFs and Non-LFs.

Circle the right answer or fill the blank provided

PART 1: DEMOGRAPHIC INFORMATION OF HOUSEHOLDS
 1.   Sex of household head
     1. Male
     2. Female

2.   Age....... (years) or year of birth ......

3. Level of your education
    1. No formal education
    2. Primary Education
    3. Non-formal Education
    4. Form four
    5. Form six
    6. Post-secondary

4.   Marital status
    1. Single
    2. Married
    3. Divorced
    4. Widowed

5.   Head of the Household
    1.   Male (Adult)
    2.   Male (Child)
    3.   Female (Adult)
    4.   Female (Child)

6. (a) How many members are you in your household? ....
    (b) Number of household members aged
       0.14years .....
       15 – 64 years ....
       65 and more years ......

7.   Your ethnic group _____

8.   Your religion is
     Christian
     Muslim
     Other (specify)………………….

PART 2: INFORMATION ABOUT THE CURRENT STATUS OF ASSETS AND RESOURCES

9.   Are you among LFs under project applying the RIPAT approach?
    1. Yes
    2. No

10.   How much land do you and your household members own? ……………(acres)
    1.   <0.5 acre
    2.   0.5 – 1.0acre
    3.   1.0 – 2 acres
    4.   2.0 – 4acres
    5.   >4acres

11.   Tick the main source of your income in your household?
    1. Sale of livestock
    2. Sale of agricultural crops
    3. Salary
    4. 1&2
    5. 2&3
    6. 1,2&3
    7. Other (specify) ....

12.   Tick the main source of food in your household?

1. From my own livestock- meat, eggs, milk
2. Crops from my own farm
3. Buying
4. 1&2
5. 2&3
6. 1,2&3
7. Others (Specify_____

PART 3: ADOPTION AND DIFFUSION OF THE INNOVATION

13.   Projects applying RIPAT approach introduced a basket of technologies listed below; rank what you have adopted at the rate of 1 (very low) to 5 (very high) with reason/s.

N.B: 1=no adoption, 2=Only with what has been supplied by the project for a test, 3= has adopted at least two items from the BO (basket of options) supplied for a test; 4=has adopted at least four items from BO supplied by the project, trained and supply planting materials to at least three non-project participants; and 5=have adopted more than four items/technologies, trained more than three non-project participants and establish at least one new farmers' group.

S.N	Technologies	Ranking	Reasons
1.	Improved banana varieties		
2.	Conservation Agriculture (intercropping of maize and pigeon peas		
3.	Orange Fleshed sweet potatoes (OFSP)		
4.	Livestock – Pigs		
5.	Livestock – Milking goats		
6.	Livestock – improved local chicken		
7.	Village saving and loans associations (VSLA).		

14.   Do you have access to credit?
   1.   Yes
   2.   No

15.   If is yes for question 17; have you ever obtained a loan?
   1. Yes
   2. No

16.   If yes, what was the loan used for; and if not what were the reasons?

i)

ii)

17. Rank the ways you know the performance of four LFs that you know best, at the scale of 1 to 5 based on the given roles: (Note 1 is poorest ; 2 is poor; 3 is average; 4 is strong; while 5 is strongest). (Will be answered by non-LFs).

Name of LFs	Rating based on the Roles							Total
	Report writing	Teach & training	Communications	Self-adoption of the technologies	Timely availability of agro-inputs	Facilitate adoption of new technologies	Project monitoring	
1								
2								
3								
4								

18. For each item, select the answer that best represents the personality characteristics of the Lead Farmer that you know best; use the following scale of 1 – 5 to record your responses:

1	2	3	4	5
Strongly Disagree	Slightly Disagree	Neutral or cannot decide	Slightly agree	Strongly agree

_____ 1. He/she gets upset easily

_____ 2. He/she enjoys being part of a group

_____ 3. He/she likes to solve complex problems

_____ 4. He/she belives that others have good intentions

_____ 5. He/she is always prepared -

_____ 6. He/she has a low opinion of myself

_____ 7. He/she has a natural talent for inluencing people

_____ 8. He/she enjoys the beauty of nature

_____ 9. He/she tries to anticipate the needs of others

_____ 10 He/she can be trusted to keep promises

_____ 11 He/she gets irritated easily

_____ 12 He/she has a lot of fun

_____ 13 He/she likes to visit new places

_____ 14 He/she loves to help others

_____ 15 He/she sets high standards for myself and others

Appendix 2: Part 5: specific questions to be answered by lead farmers (LFs) only

19.   Mention three important topics in RECODA Academy which were covered during training and which you think have helped you to be an effective LF.

Topics	Reasons
1.	
2.	
3.	

20.   What factors have motivated you to continue with offering services as a LF even after the lifespan of the project?

i).

ii).

iii).

21.   Can you mention three advantages of having LFs in your community?

i).

ii).

iii).

22.   Mention challenges you are facing in offering services as a LF?

i).

ii).

iii).

23.   Suggest measures to be taken to improve the performance of LFs

i).

ii).

iii).

24.   According to your experience, based on a basket of options/technologies introduced by the project applying RIPAT approach, rank which technologies that have been relatively easy to transfer (Note 5 is very easy to transfer while 1 is very difficult to transfer) and give reasons.

S.N	Technologies	Ranking	Reasons
1.	Improved banana varieties		
2.	Conservation Agriculture (intercropping of maize and pigeon peas		
3.	Orange Fleshed sweet potatoes (OFSP)		
4.	Livestock – Pigs		
5.	Livestock – Milking goats		
6.	Livestock – improved local chicken		
7.	Village saving and loans associations (VSLA).		

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25.   Based on your experience as a lead farmer, rank the importance of the following stakeholders to you with reasons as shown in the table below. (5 denotes the most important stakeholder while 1 is the least important)

Stakeholder	Ranking	Reasons
1. RECODA (implementing organization)		
2. Government extension office		
3. Farmer group		
4. Village government		
5. Community		

26.   What are the contribution of personalities to the LFs?

27.   How do you perceive the importance of personalities teaching?

28.   What do you think can be the areas for further personalities training?

29.   Please read each statement carefully and mark the appropriate response using the following scale to record your response below.

1	2	3	4	5
Strongly Disagree	Slightly disagree	Neutral or cannot decide	Slightly Agree	Strongly agree

_____ 1.   I get upset easily

_____ 2.   I enjoy being part of a group

_____ 3.   I like to solve complex problems

_____ 4.   I belive that others have good intentions

_____ 5.   I am always prepared

_____ 6.   I have a low opinion of myself

_____ 7.   I have a natural talent for inluencing people

_____ 8.   I enjoy the beauty of nature

_____ 9.   I try to anticipate the needs of others

_____ 10.   I can be trusted to keep my promises

_____ 11.   I get irritated easily

_____ 12.   I have a lot of fun

_____ 13.   I like to visit new places

_____ 14.   I love to help others

_____ 15.   I set high standards for myself and others

Appendix 3: A Checklist of Items for Key Informants Interviews

1. District project coordinator (DPC) and/or extension officers (EO).
    1. Describe the situation of extension services in your area (village, ward and district); and with respect to the ratio of extension agent to farmers; what is the gender composition? Explain your answers.
    2. Discuss factors influencing performance of LFs in your area during the project lifespan and beyond.
    3. Explain your roles and responsibility in the LFs programme and how were you involved in their selection.
    4. What training sessions have you received from the project, and how have they enabled you to perform better your roles in relation to the improvement of the performance of LFs?
    5. Do you feel LFs as your competitors or collaborators? Explain?
    6. What behaviour of a high performing LFs should possess?
    7. What is your role in community mobilization and creating conducive environment for LFs to execute their work?
    8. What is the community's perception on LFs' roles when the roles seem to resemble yours?
    9. What challenges are LFs facing? If there is any, how can they be solved?
    10. Give your recommendations on how to improve the performance of LFs in your area.

2. RECODA (Project Manager, Programme Leader)
    1. Do you have strategies for ensuring good performance and sustainability of LFs' services?
    2. How can you explain the collaboration of LFs and other stakeholders, esp. local government?
    3. Did you have set goals for the LFs' programme, and have they been achieved? To what extent?
    4. What challenges have you been experiencing in working with LFs? How have you solved them?
    5. Do you think the community now has a different attitude because of the performance of LFs? Explain
    6. What strategies do you have for further developing/maintenance of the LFs programme after the phasing out of the project? Any refresher training courses?
    7. What do you think is the major achievement of the LFs services?
    8. Do you think the potential of LFs has been utilized fully? Explain your answer.
    9. What do you feel about gender balance in the community in terms of:
        - Selection of the LFs,
        - Ratio between female and male LFs,
        - Roles and responsibilities,
        - Reaching out female farmers,
        - Availability and faithfulness, etc.

3. Dropouts from being a Lead Farmer
1. How long have you served as a lead Farmer?
2. How can you tell about the project applying RIPAT project and services offered by LFs?
3. Why have you dropped from being a lead farmer?
4. Do you think the services offered by LFs are beneficial to community? Explain your answer.
5. Can you recommend the ways of improving the performance of LFs during and after the project has phased out?
6. Will you accept an offer to become a lead farmer again? Explain your answer.

4. Village government Leader
1. What is your role and responsibility in the project applying RIPAT approaches?
2. How were you involved in the selection of LFs and the services offered to them in your area?
3. What is your role in community mobilization and sensitization?
4. How have you participated in each of the project interventions applying RIPAT approaches, especially those related with LFs?
5. What is the community's perception about the use of LFs?
6. Do you think LFs have achieved the intended objectives? What measures should be taken to improve the performance of LFs?

Appendix 4: A Guide for Focus Group Discussions

1. a)Women, b)Men and c)youth groups
1. What facilitation have you received from the LFs?
2. Can you tell the difference between women, youths and men LFs in executing their roles?
3. How do you feel when facilitated by a lead farmer who is a woman/man or youth?
4. What problems have you been facing in working with LFs or being facilitated by them?
5. What specific roles do you think female farmers would prefer to be facilitated by female LFs? Or men facilitated by men and youth being facilitated by youth LFs?
6. Explain if there is any specific challenges you are facing as women/men/youths in being facilitated by LFs
7. From a basket of options, which technologies you have preferred as women/youths/men? Give explanation.
8. Give explanation and/or discuss the following:
   - Selection of the LFs
   - Success of LFs programme
   - Challenges which LFs are facing
   - Solution to the challenges mentioned above
   - Any recommendation/way forward for the improvement the services offered by LFs.
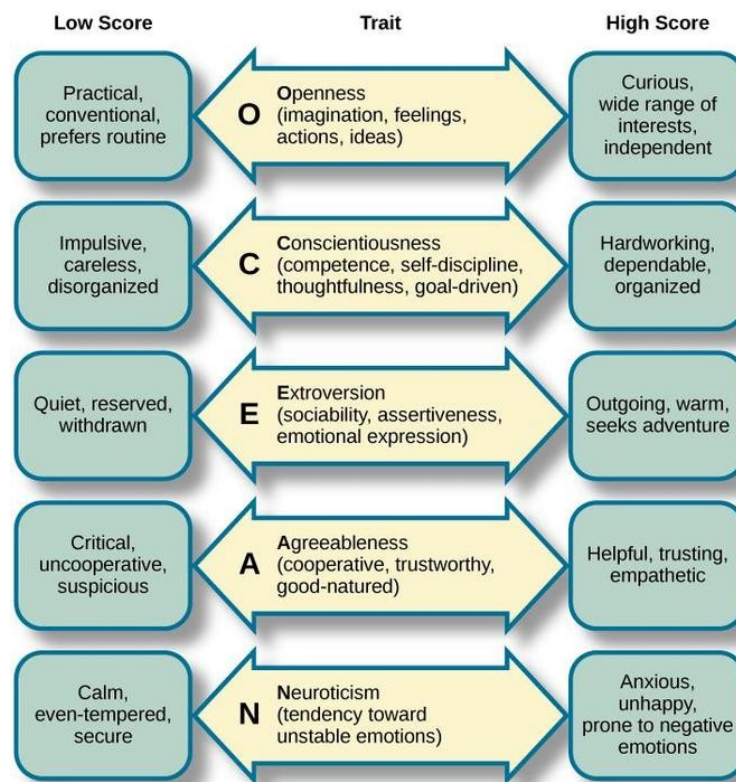
3. Group of LFs
1. What training did you receive from RECODA and/or LGAs (Extension services)?
2. What other material/tools support did you receive?
3. Has the training received helped you to increase your performance? Explain?
4. Are you aware with any phasing out strategies put in place to ensure sustainability of LFs' services? What factors motivate you to be an LF? Do they pay you?
5. What is the peoples' attitude towards the use of LFs?
6. What have been the major LFs' challenges, and what are solutions?
7. Yourself, what strategies do you have to sustain the quality of your services after the project phases out?
8. How has the community been involved in the improvement of the program of LFs?
9. What has been achieved through the efforts of LFs?
   a. Number of New groups formed
   b. Number of new farmers/adopters reached
   c. Number of technologies introduced

Interpretetion for question 18 i.e.what is the meaning of the scores? (Not part of the questionnaire).

N.B: The following items will be sum up the to get the score on five general personality traits as the numbers below indicates which questions correspend to each trait and a high score indicates a stronger of the trait:

1,6&11 - Neurotic
2,7&12 - Extraversion
3,8&13 - Openness/Intellect
4,9&14 - Agreableness
5,10&15 - Consciousness

Low Score		Trait	High Score
Practical, Conventional, Prefer routine	**O**	**Openness** (imagination, feelings, actions, ideas)	Curious, Wide range of interests, Independent
Impulse, Careless Disorganized	**C**	**Conscientiousness** (competence, self-discipline, thought-fullness, goal driven	Hardworking, dependable, organized
Quiet, reserved. withdraw	**E**	**Extroversion** (sociability, assertiveness, emotional expression)	Outgoing, warm, seeking adventure
Critical, Uncooperative Suspicious	**A**	**Agreeableness** (cooperative, trustworthy, good-natured)	Helpful, trusting, empathetic
Calm, even-tempered	**N**	**Neuroticism** (tendency towards unstable emotions)	Anxious, unhappy, prone to negative emotions

N.B: The measurement of the big five personality traits (Abbreviated OCEAN) includes the six facets (sub-traits) within each category of the trait, i.e. i) <u>openness to experience</u> (imagination, artistic interests, depth of emotions, willingness to experiment, intellectual curiosity, tolerance for diversity); ii) <u>conscientiousness 'work ethic'</u> (sense of competence, orderliness, sense of responsibility, achievement striving, self-discipline and deliberateness); iii) <u>extraversion</u> (warmth, sociability, assertiveness, activity level, excitement-seeking, positive emotions); iv) agreeableness (trust in others, sincerity, compliance, modesty, sympathy and altruism) and v) **neuroticism '**anxiety' (angry, moodiness, self-consciousness, self-indulgence, sensitivity to stress).