

**SYSTEM DESIGN AND SCALABILITY OF FARMER FIELD SCHOOLS AND
RAINFOREST ALLIANCE CERTIFICATION OF SMALLHOLDER TEA
PRODUCERS EAST AND WEST OF KENYA'S RIFT VALLEY**

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**A Thesis Submitted to the Graduate School in Fulfilment for the Requirements of the
award of Doctor of Philosophy Degree in Agricultural Extension of Egerton University**

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DEDICATION

Dedicated to my dear wife Imelda, my daughter Rita, and to my sons, Mark and Emmanuel.

ACKNOWLEDGEMENT

I would like to pass my sincere gratitude to staff at ETC-East Africa and the Dutch Embassy in Kenya; lecturers at the Department of Agricultural Education and Extension, the Dean of the Faculty of Education and Community Studies; and the Director of Graduate School of Egerton University for their support and awarding me this opportunity to benefit from the research funds that enabled me carry out this research. I also want to specifically acknowledge the guidance of our two supervisors, Professor John Gowland Mwangi of Egerton University and Dr. Dave Boselie of IDH/Wageningen University for their support, guidance and valuable input. They were the driving force behind this work and I am very grateful to them for their encouragement, suggestions, comments, editing and valuable advice. Special acknowledgements also go to Imelda Apiri, Rita Wangui, Mark Maina, Emmanuel Apiri, Betty Buses, and everybody else who provided comments and assisted me in this study.

ABSTRACT

The Kenya Tea Development Agency (KTDA), through its extension workers has been educating small-scale tea producers on good agricultural practices using Farmer Field Schools (FFS) and Rainforest Alliance (RA) certification but the roll out to all the 560,000 growers remains a big challenge. The tea value chain players had limited understanding of how to design an information system, how to develop an up-scaling model, the training cost and benefits of running a tea-based FFS and RA certification. The procedure for monitoring and evaluation of FFSs' and RA certification activities was also unclear. The study provided this missing information that could assist tea stakeholders' to mobilize enough training resources for the up-scaling process and achieve sustainable tea production. The study used a Cross-Sectional research design to collect data from 514 small-scale tea growers drawn randomly from KTDA factories. A semi-structured questionnaire was used to collect data. Validity was ascertained by a panel of extension experts while a pilot test involving 30 farmers in Nandi County indicated the questionnaire's reliability coefficient of 0.92α which was above the threshold for acceptable reliability of 0.70α , with the significance level set a priori at 0.05α . Face-to-Face interviews, document analysis, record reviews, site visits, observations, living the system and a stakeholders' workshop were carried out to ensure triangulation. Data were analyzed using Chi-square at 0.05 set a priori calculated using SPSS. The results provided a KTDA business model, a context diagram, identified leverage points and developed a model for up-scaling FFSs and RA certification in five phases. Training a farmer in a tea-based FFS in a year costs \$71. The FFS-trained farmers benefited from increased tea yields, improved tea husbandry and farmer empowerment. The cost of obtaining the RA certificate per farmer was \$43. The RA certified farms benefited from good and efficient management, better utilization of resources and sustainable tea production. Some farmers were trained as trainers to assist in RA certification trainings. The researcher concluded that up-scaling of FFS and RA certification could be achieved by having an up-scaling process business model, a context diagram, a conceptual framework and focusing on the leverage points. The use of FFS graduates reduced costs while linking FFSs to financial institutions and other stakeholders enhanced their sustainability. Tea farmers trained in FFS and RA certification benefited from improved tea yields, increased empowerment, enhanced leadership skills, better sanitation, health and safety. KTDA had a monitoring and evaluation plan for up-scaling FFS and RA certification was already developed. The researcher recommended that KTDA and other tea stakeholders should use the KTDA business model, a context diagram, an up-scaling model and should focus on the leverage points in the up-scaling of FFS and RA certification. The KTDA should use FFS graduates to lead FFSs and should link them to financial institutions and other stakeholders. Tea stakeholders should continue promoting the up-scaling of FFS and RA certification to enable all tea producers benefit from improved tea yields, increased empowerment, enhanced leadership skills, better sanitation, health and safety. Stakeholders should implement the monitoring and evaluation plan for up-scaling FFS and RA certification. Further research should be done on the cost-benefit analysis of the various certification schemes among smallholder tea producers.

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ABBREVIATIONS AND ACRONYMS

AESA	Agro-Ecosystem Analysis
CPI	Continuous Process Improvement
DFD	Data Flow Diagram
DFID	Department for International Development
ETP	Ethical Tea Partnership
T&V	Training and Visit
FAO	Food and Agriculture Organization of the United Nations
FFS	Farmer Field School
FFSs	Farmer Field Schools
FGD	Focus Group Discussion
FGDs	Focus Group Discussions
GAP	Good Agricultural Practice
GAPs	Good Agricultural Practices
GDP	Gross Domestic Product
IDH	The sustainable trade initiative
IPM	Integrated Pest Management
ICTSD	International Centre for Trade and Sustainable Development
IS	Information System
ISO	International Standard Organization
ITC	International Trade Centre
KARI	Kenya Agricultural Research Institute
KTDA	Kenya Tea Development Agency
MATF	Maendeleo Agricultural Technology Fund
M&E	Monitoring and Evaluation
MNC	Major Non-Conformity
NCST	National Council for Science and Technology
NGO	Non-Governmental Organization
NGOs	Non-Governmental Organizations
PM&E	Participatory Monitoring and Evaluation

PPE	Personal Protective Equipment's
PTD	Participatory Technology Development
RA	Rainforest Alliance
R&D	Research and Development
SACCO	Savings and Credit Co-operative Society
SAN	Sustainable Agricultural Network
SANs	Sustainable Agricultural Networks
SCSKASC	Steering Committee of the State-of-Knowledge Assessment of Standards and Certification
SFC	Sustainable Farm Certification
SPSS	Statistical Package for Social Sciences
SDLC	Systems Development Life Cycle
TESA	Tea Extension Assistant
TESAs	Tea Extension Assistants
TOFT	Training of Farmer Trainers
TOTs	Training of Trainers
UNEP	United Nations Environment Programme
\$	United State of America Dollar

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Agriculture is the backbone of Kenya's economy contributing twenty six per cent directly and another twenty five per cent indirectly of the Gross Domestic Product (GDP), accounting for sixty five per cent of Kenya's total exports and provides more than eighteen per cent of formal employment (Government of Kenya, 2010). Institutional failures, market constraints, limited education and knowledge transfer and adoption by farmers of improved technologies are largely responsible for reduced farm productivity and farmers' inability to generate income (Kilimo Trust, 2010) - leading to unnecessary poverty and food insecurity. Tea is an important crop in East Africa, and is a source of income for countless smallholder farmers (Kenya Tea Board, 2012; Rainforest Alliance, 2011).

Kenya has 104 tea factories, 639,521 registered tea growers and 181,855 hectares planted with tea (Kariuki, 2012). Tea production for the year 2011 reached 378 Million kilograms (Kenya Tea Board, 2012). Tea is also a key foreign exchange earner and in 2011 earned Kshs 109 (\$1.3) Billion from 421 Million kilograms exported (Kariuki, 2012; Kenya Tea Board, 2012). Kenya is the World's third largest tea producer and the world's largest exporter of black tea (Government of Kenya, 2011; Mugambi, 2010; Odhiambo, 2010). Kenyan tea - world famous for its brightness, attractive color, brisk, flavor and texture (Mutai, 2011) face challenges of fluctuating global tea prices, fluctuating exchange rates, rising costs of production, intensifying competition locally and globally, numerous levies and taxes (Kenya Tea Board, 2012). Kenyan tea also face challenges of increased consumer and market requirements (certification), inadequate affordable drought-tolerant clones and credit for buying essential farm inputs (Kariuki, 2012; Kenya Tea Board, 2012; Maina, Mwangi & Boselie, 2012).

Kenya Tea Development Agency (KTDA) is the second largest exporter of black tea in the world and is responsible for sixty two per cent of all tea produced in Kenya (Braga, Lonescu-Somer, Seifert, 2011).

Since 2006, KTDA extension workers have been using Farmer Field Schools (FFSs) to educate its smallholder tea producers in soft and technical skills (Campbell, 2010; Maina *et al.*, 2012b; Odhiambo, 2010). Braga, Lonescu-Somer and Seifert (2011), Hiller, Onduru, and Jager (2009) have indicated that in 2006-2008, Kenya Tea Development Agency (KTDA) in cooperation with Lipton under the KTDA/Lipton Sustainable Agriculture Project launched four pilot FFSs spread equally over four KTDA factories under the Department for International Development (DFID) funding. The conventional method of extension according to De Jager, Onduru, Hiller and Van den Bosch (2009) has proved to be slow and thus, FFSs were used to successfully train smallholder tea producers on sustainable tea production practices, which constitute Good Agricultural Practices (GAPs). The chain actors in the project expressed the need to roll-out the FFS approach to reach 560,000 tea producers using this methodology (Braga, Lonescu-Somer & Seifert, 2011; Hiller, Onduru & Jager, 2009).

The FFS popularly known as “informal” or “school without walls” is a community-based, capacity building, learning by doing extension model or system that uses adult education principles in farmers’ groups (Akinngbe & Ajayi, 2010). This group-based experiential learning encourages farmers (normally in groups of 20-30) to learn improved technologies and farming practices through observation (Hartl, 2009; Mwangi, Oloo & Maina 2010). The experiential learning approach and empowerment - that refers to the development of skills so that individuals can make informed choices in their lives - make FFS a popular training method for farmers and provides an up-scaling model for knowledge empowerment (Maina, Mwangi & Boselie, 2012; Stigter, 2010). The FFS can be an effective methodology for building trainers’ capacity and changing their attitudes (Maina *et al.*, 2012a). By participating in the FFS, which is a learning-by-doing approach, farmers develop skills that enable them to identify and analyze their problems, opportunities, feasibility of different options, and to adapt to changing circumstances (Maina, Mwangi & Boselie, 2012). This flexible, participant-led learning facilitates their demand for knowledge and enables them to choose, test and adapt useful technologies based on their needs (Mwangi, Oloo & Maina, 2010). The FFS provides a forum for participant-led learning, flexible interactions and integration of different types of knowledge.

Different certification schemes, quality assurance and certification initiatives such as Ethical Tea Partnership (ETP), Rainforest Alliance (RA), Fair Trade (FLO and IFAT) and Organic (IFOAM) have been started in the tea sector to guarantee quality to consumers and to take corporate social responsibility (De Jager *et al.*, 2009). These initiatives, according to De Jager *et al.* (2009) have set standards and product labels assuring consumers that the products they purchase are produced, processed, and certified to be consistent with the set standards. During the pilot phase, Hiller *et al.* (2009) report that the need to attain Rainforest Alliance (RA) certification became apparent with LIPTON, the main buyer of KTDA tea, seeking to buy tea produced from sustainable sources. Rainforest Alliance promotes sustainable production through standards set by the Sustainable Agriculture Network (SAN) (Rainforest Alliance, 2012a). Rainforest Alliance (RA) certification - built on the three pillars of sustainability (environmental protection, social equity, and economic viability) - promotes and guarantees sustainable use of agricultural and forestry resources.

The successful attainment of RA certification by the four factories according to Maina, Mwangi, Boselie, Onduru and Buses (2012a), in the pilot phase created interest in other KTDA factories to be RA certified, and since LIPTON wanted to buy tea from sustainable sources, a need arose to prepare other KTDA factories for RA certification (Van Tilburg *et al.*, 2009). Hiller *et al.* (2009) have further indicated that in 2009, key partners (KTDA, RA, Unilever/Lipton, Wageningen University Research Centre-LEI, Africa Now (now Partner Africa), and ETC East Africa) initiated a second phase aimed at up-scaling FFS activities and RA certification work through the Scalability of Sustainable Tea Value Chain in Kenya. In 2009, Rainforest Alliance certification was granted to the first group of farmers, which according to Boselie, Hiller and Onduru (2010) allowed them to get better prices and market access in addition to higher yields and an improved environment. KTDA wish to upscale, embed and improve sustainable tea production; upscale FFS and deepen extension services; maintain and improve certification; show impacts and get better knowledge on costs and benefits.

1.2 Statement of the Problem

The Kenya Tea Development Agency (KTDA) extension workers have been training small-scale tea producers through various extension methodologies to adopt good agricultural practices (GAPs). The KTDA extension workers from the year 2006 started educating tea producers on good agricultural practices using the FFS approach and RA certification to produce sustainable high quality tea in Kenya. But the Rainforest Alliance and other members of the Sustainable Agriculture Network (SAN) had little experience with tea. Tea growers' adoption of GAPs through the conventional method of extension and up-scaling of SAN standards in Kenya has been slow and remain a big challenge because of the large base of 560,000 smallholder farmers organized around KTDA to be reached. The tea value chain players have limited understanding of how to design an information system for up-scaling FFS and RA certification in KTDA factories and developing a KTDA model for up-scaling FFS. Information on the cost and benefits of running a tea - based FFS and RA certification and on how KTDA factories attained RA certification were not readily available in Kenya. The existing procedures for monitoring and evaluation of FFSs and RA certification used in the current project framework have not been documented. This study provided this missing information that could assist tea stakeholders' to mobilize enough training resources for the up-scaling of FFSs and RA certification to achieve sustainable tea production among smallholder tea producers in KTDA factories in Kenya.

1.3 Purpose of the Study

The purpose of this study was to provide information that could improve tea stakeholders' understanding of system design and scalability of FFSs and RA Certification among smallholder tea producers who deliver tea to KTDA factories East and West of Kenya's Rift Valley.

1.4 Objectives of the Study

The study was guided by five objectives. These objectives were to:

- i. Design the FFS system for training farmers on tea production.
- ii. Develop a mechanism for up-scaling the FFS methodology and RA certification in KTDA factories from the current four in the pilot phase to over 51 in order to gradually cover over 560,000 tea growers.

- iii. Determine and describe the costs, benefits and opportunity costs of FFSs and RA certification to participating tea farmers.
- iv. Determine, explain and document how KTDA factories attain RA certification.
- v. Determine and describe existing procedures for monitoring and evaluation of FFSs and RA certification used in the current project framework.

1.5 Research Questions

The study was guided by the following research questions:

- i. How should an FFS system to train farmers on tea production be designed?
- ii. How can up-scaling of the FFS methodology and RA certification be done in KTDA factories from the current four in the pilot phase to over 51 in order to gradually cover over 500,000 tea growers?
- iii. What are the costs, benefits, opportunities and cost-effectiveness of FFSs and RA certification to participating tea farmers?
- iv. How do KTDA factories attain RA certification?
- v. What are the existing procedures for monitoring and evaluation of FFSs and RA certification in the project frame work?

1.6 Significance of the Study

The study findings explained how existing models of scaling-up of FFS and RA certification may be utilized to benefit small-scale tea producers while helping consumers to access safe tea of high quality. They are also likely to inform KTDA management, extension providers, researchers and other stakeholders on how successful FFS pilot-based projects on locally successful innovations can be up-scaled to a wider stakeholder group. The results of the study could also provide information on how Rainforest Alliance certification works to enhance sustainable agriculture, conservation of biodiversity and provision of sustainable livelihoods via the transformation of land use practices. This research work is also hoped to further expand learning, leading to better use of certification and more sustainable production and consumption of tea.

learning, leading to better use of certification and more sustainable production and consumption of tea.

1.7 Scope of the Study

The study was limited to system design and scalability of FFSs and RA certification involving tea producers delivering tea to KTDA factories East and West of Rift Valley in Kenya. Factories East of Rift Valley are situated in Kisii, Nyamira, Bomet, Vihiga, Mt Elgon, Kericho and Nandi counties while factories west of Rift Valley are in Meru, Nyeri, Kirinyaga, Murang'a, Kiambu, and Embu counties.

1.8 Limitations of the Study

Literacy level of some respondents in understanding and interpreting items in the questionnaire which were written in English was a limitation, which the researchers addressed by engaging use of translators where necessary. The period set aside for data collection within the TOR was a limitation in some factories because FFS and RA certification trainings had not been done. To overcome this challenge, the researchers had to delay data collection to allow completion of the trainings. This affected timely completion of the study.

1.9 Assumptions of the Study

The tea growers had implemented sustainable agricultural practices taught during FFS and RA certification trainings. During FFS up-scaling process all/every tea farmer will voluntarily accept to be a member of an FFS; TESAs will be motivated enough to introduce/form more FFSs in all KTDA factories and that FFS groups will form voluntarily and randomly and remain united as a training group. The same social, political, policy and economic environment prevailed for all farmers East and West of Rift Valley during the study period.

1.10 Definitions of Terms

Actor: Anything that needs to interact with the system to exchange information result (Whitten & Bentley, 2007). It was operationalized in this study to also refer to different stakeholders in tea value chain.

A system: A system is an orderly grouping of interdependent and interrelated components that function or are linked together to achieve a specific objective or a desired result (Whitten & Bentley, 2007).

Annual Audit: Audit that evaluates the progress with respect to the correction of nonconformities detected in previous audits and the continuous compliance with the respective valid SAN standards & policy documents (Sustainable Agriculture Network SAN Group, 2011).

Audit: A systematic, independent and documented process for obtaining evidence and evaluating it objectively to determine the level of compliance with established requirements.

Auditor: A person appointed by a certification or inspection body and approved by SAN to perform an external audit (Sustainable Agriculture Network, 2012).

Data refers to raw facts about people, places, events, and things that are of importance in an organization (Whitten & Bentley, 2007).

Farm: A primary production unit – can be composed of several neighboring or geographically separate production plots - subject to certification or audits: a plantation, estate or smallholder farm (Sustainable Agriculture Network, 2011).

Group Administrator: This is the entity that signs the certification contract with the SAN approved certification body and takes responsibility for the development, execution and maintenance of the internal management system and for verification of farm compliance with Sustainable Agriculture Network standard and policy documents (Sustainable Agriculture Network SAN Group, 2011).

Group Certification: Certification of an organized group of producers with similar production systems, where certification applies to the group as a whole (Sustainable Agriculture Network & Rainforest Alliance, 2012).

Information: Refers to data that has been processed or reorganized into a more meaningful form for someone. Information is formed from combinations of data that hopefully have meaning to the recipient (Whitten & Bentley, 2007).

Information system (IS): An arrangement of people, data, processes, and information technology that interact to collect, process, store, and provide as output the information needed to support an organization (Whitten & Bentley, 2007).

Logical system model: Refers to a nontechnical pictorial representation that depicts what a system is or does. In this study, it also had the meaning of a context diagram, conceptual model or a business model.

Model: Refers to a pictorial representation of reality (Whitten & Bentley, 2007).

Rainforest Alliance is an international NGO that works to conserve biodiversity and ensure sustainable livelihoods via the transformation of land use practices, business practices and consumer behaviour. Rainforest Alliance is the owner of the “Rainforest Alliance Certified™” seal (Rainforest Alliance, 2011a).

Scaling-up or up-scaling refers to the diffusion and dissemination of locally successful innovations to a wider stakeholder group while scalability of the FFS system may involve creating awareness of the FFSs among potential users and spreading their acceptance, adoption and sustainable application in problem-solving by increasingly more users in a geographical area or among members of a community, or members of different communities (Answers.com, 2011; Gordijn, 2005). The terms scalability, up-scaling and scaling-up will be used interchangeably in this study to mean the diffusion and dissemination of locally successful innovations to a wider stakeholder group; or to mean creating awareness of FFS and RA certification among potential users and spreading their acceptance, adoption and sustainable application in problem-solving by increasingly more users in a geographical area or among members of a community, or members of different communities.

System design in the FFSs’ context is the description of the FFS-extension system, its components and an explanation of the role of each component in the system’s overall function.

Use case: It refer to a behaviorally related sequence of steps (a scenario), both automated and manual, for the purpose of completing a single business task (Whitten & Bentley, 2007).

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter covers topics on importance of agricultural extension in information and knowledge systems, tea production in Kenya, systems analysis and design, designing an up-scaling model for FFS and RA certification using the business model canvas, determining leverage points in system design, scalability of the Farmer Field School and Rainforest Alliance certification. It also covers the Farmer Field School extension system; quality assurance, voluntary standards and certification systems, Rainforest Alliance Certification and Sustainable Agriculture Network, training cost and benefits of running a tea-based Farmer Field School, costs and benefits of achieving Rainforest Alliance Certification, monitoring and evaluation of the up-scaling of FFS and RA certification process, theoretical framework and conceptual framework.

2.2 Importance of Agricultural Extension in Information and Knowledge Systems

Agriculture is key to Kenya's economy contributing twenty six per cent directly and another twenty five per cent indirectly of the GDP, accounting for sixty five per cent of Kenya's total exports and provides more than eighteen per cent of formal employment (Government of Kenya, 2010; 2011). But, limited education, knowledge transfer and adoption by farmers of improved technologies are largely responsible for reduced farm productivity, farmers' inability to generate income, poverty and food insecurity (Kilimo Trust, 2010; Maina, *et al.*, 2012a). Agricultural development, welfare of farmers and other people living in rural areas can be improved by providing agricultural extension and advisory services (Akinagbe & Ajayi, 2010). The term extension was first used to describe adult education programs organized by Oxford and Cambridge universities in England in 1867 that helped extend the work of universities beyond the campus and into the neighboring communities (Swanson & Rajalahti, 2010).

Akinagbe and Ajayi (2010), Glendenning *et al.* (2010) and Swanson (2008), defined agricultural extension as the entire set of organizations that support and facilitate people engaged in agricultural production to solve problems and to obtain information, skills and technologies to improve their livelihoods and well-being. Agricultural education, extension, and advisory services says Davis *et al.* (2010) are a critical means of addressing rural poverty, through

technology transfer, supporting learning, assisting farmers in problem solving, and enabling farmers to become more actively embedded in the agricultural knowledge and information system.

2.3 Tea Production in Kenya

Tea is one of the most important agricultural crops in East Africa, and is a source of income for countless smallholder farmers (Maina, Mwangi & Boselie, 2012; Rainforest Alliance, 2011b). Kenya is the World's third largest tea producer and the world's largest exporter of black tea (Breit, 2010; Gesimba, Langat, Liu, Wolukau, 2005; Obulutsa, 2010; Ombok, 2010) that is world famous for its brightness, attractive color, brisk, flavor and texture (Mutai, 2011). Kenya has 104 tea factories, 639,521 registered tea growers and 181,855 hectares planted with tea (Kariuki, 2012). Tea production for the year 2011 reached 378 Million kilograms (Kenya Tea Board, 2012). Tea was the leading Foreign Exchange earner in 2011 earning Kshs 109 (\$1.3) Billion from 421 Million kilograms exported (Kariuki, 2012; Kenya Tea Board, 2012). Out of the total production, the smallholder sub-sector contributed sixty six per cent while the Plantation sub-sector contributed thirty four per cent (Kariuki, 2012). The volume of Kenya tea consumed locally was 20 Million kilograms valued at Kenya shillings 11 billion while the average Auction price for Kenyan tea was \$ 2.99 per Kilogram (Kenya Tea Board, 2012). In 2008, Kenya and Sri Lanka produced approximately sixty five per cent of global black tea production (Braga, Lonescu-Somer & Seifert, 2010). In 2009 the value of tea exports was Ksh 69 (\$0.86) billion (Mugambi, 2010; Odhiambo, 2010). Kenya Tea Development Agency (KTDA) is the second largest exporter of black tea in the world and is responsible for sixty two per cent of all tea produced in Kenya (Braga, Lonescu-Somer & Seifert, 2011).

2.4 Systems Analysis and Design

A system is an orderly grouping of interdependent and interrelated components that function or are linked together according to a plan to achieve a specific objective or a desired result (Bender, 2003; Whitten & Bentley, 2007). The product of system analysis and design is an information system (IS) which according to Whitten and Bentley (2007) refers to an arrangement of people, data, processes, and information technology that interact to collect, process, store, and provide as

output the information needed to support an organization. Information systems (IS) in organizations capture and manage data to produce useful information that supports an organization and its employees, customers, suppliers, and partners.

The systems development life cycle (SDLC) is the process of understanding how an information system (IS) can support business needs, designing a system, building it, and delivering it to users. This involved analyzing the business situation, identifying opportunities for improvements, and designing an information system to implement them. The primary goal is to create value for the organization, which for most companies means increasing profits (Whitten & Bentley, 2007) or to clearly understanding how the system would support the organization's goals, current business processes, and other information systems to provide value. This enables an organization to perform work better to earn greater profits or serve its customers more effectively (Bender, 2003). First, to help build the information system, you must identify the stakeholders involved in this system. Whitten and Bentley (2007) broadly classified stakeholders for information systems into five groups namely system analyst, System owners, System users, System designers, and System builders. In agricultural extension therefore, the KTDA FFS and RA certification up-scaling may be considered as a system because it has a well-organized structure with clearly defined operational procedures.

Systems analysis - the examination of a problem and the creation of its solution - is most effective when all sides of the problem are reviewed and more than one solution proposed (Bender, 2003, Whitten and Bentley, 2007). The benefits of system analysis and design include (A) improving system performance by identifying where improvements are necessary and how to improve and regain lost system performance; (B) it helps customers to gain a detailed understanding of how their users use the system; (C) it has potential for users to learn future concerns; and (D) it helps establish a baseline performance level against which benefits can be compared and changes to the system predicted or foreseen (Whitten & Bentley 2007). Systems analysis can be defined as the study and analysis of problems of existing systems or the problem that the organization is trying to solve with an information system. It can also be defined as the

identification of requirements for problems solutions showing how it's technical and organizational components fit together.

The requirement analysis phase defines, prioritizes, identify and express system requirements also called business requirements that specify what the information system must do or what property or quality the system must have. During requirements analysis, a 'use case' is created to capture the interactions between a user and the system. A use-case represents a single goal of the system and describes a sequence of activities and user interactions in trying to accomplish the goal (Whitten & Bentley, 2007). During design, the use cases are refined to model how the users will actually use the system with regard to any interface and system constraints. Since a use case describes how a real-world actor interacts with the system, an excellent technique for finding business requirements use cases according to Whitten and Bentley (2007), is to examine actors and how they will use the system . What are the main tasks of the actors? What information does the actor need from the system? What information does the actor provide to the system? Does the system need to inform the actor of any changes or events that have occurred? Does the actor need to inform the system of any changes or events that have occurred? (Whitten & Bentley, 2007; Wiegers, 2003). Once the use case actors have been identified, a use-case model diagram (context diagram) can be used to graphically depict the system scope and boundaries. The business Requirements Use-case Narratives which describe the events the organization must process and respond to are then documented. The Use-case narrative refers to -a textual description of the business event and how the user will interact with the system to accomplish the task.

Systems design is the specification or construction of a technical, computer based solution for the business requirements identified in a systems analysis and it details how a system will meet or fulfill the information requirements as determined by the systems analysis. The logical system design arrived at as a result of systems analysis is converted into physical system design. Normally, the design proceeds in two stages. In the preliminary or general design, the features of the new system are specified. The costs of implementing these features and the benefits to be derived are estimated. If the project is still considered to be feasible, we move to the detailed

design stage where, computer oriented work begins in earnest. At this stage, the design of the system becomes more structured.

Structure design is a blue print of a computer system solution to a given problem having the same components and inter-relationships among the same components as the original problem. Input, output, databases, forms, codification schemes and processing specifications are drawn up in detail. In the design stage, the programming language and the hardware and software platform in which the new system will run are also decided. There are several tools and techniques used for describing the system design of the system. These tools and techniques are flowchart, data flow diagram (DFD), data dictionary, structured English, decision table and decision tree. The system design involves defining precisely the required system output, determining the data requirement for producing the output, determining the medium and format of files and databases, devising processing methods and use of software to produce output, determine the methods of data capture and data input, designing input forms, designing codification schemes, detailed manual procedures and documenting the design.

Once a technical solution is chosen and approved, the system design phase develops the technical blueprints and specifications required to implement the final solution. These blueprints and specifications will be used to implement required databases, programs, user interfaces, and networks for the information systems. System design produces a technical blueprint and specifications for a solution that fulfills the business requirements. It reassembles a systems component pieces back into a complete system-hopefully, an improved system. This may involve adding, deleting, and changing pieces relative to the original system. Although most of the strategic decisions about the system are made in the development of the system concept during the analysis phase, the steps in the design phase determine exactly how the system will operate.

The design phase has four steps:

- A. The design strategy must be developed. This clarifies whether the system will be developed by the company's own programmers, whether it will be outsourced to another firm (usually a consulting firm), or whether the company will buy an existing software package;

- B. This leads to the development of the basic architecture design for the system that describes the hardware, software, and network infrastructure that will be used. In most cases, the system will add or change the infrastructure that already exists in the organization. The interface design specifies how the users will move through the system and the forms and reports that the system will use;
- C. The database and file specifications are developed. These define exactly what data will be stored and where they will be stored;
- D. The analyst team develops the program design, which defines the programs that need to be written and exactly what each program will do (Bender, 2003).

2.5 Designing an Up-Scaling Model for FFS and RA Certification Using the Business Model Canvas

Describing a business model should be the starting point for every planning and implementation of strategic changes in business because it “*describes the rationale of how an organization creates, delivers, and captures value*” (Osterwalder & Pigneur, 2010). Many different business conceptualizations exist but the Business Model Canvas is a strategic management template for developing new or documenting existing business models. It is a hands-on tool that fosters understanding, discussion, creativity, and analysis. It is a visual chart with elements describing a firm's value proposition, infrastructure, customers, and finances. It assists firms in aligning their activities by illustrating potential trade-offs. With this business model design template, an enterprise can easily describe their business model (Fritscher & Pigneur, 2010; Osterwalder & Pigneur, 2010).

A business model describes the rationale of how an organization creates, delivers, and captures value” (Osterwalder & Pigneur, 2010) that allow managers to articulate the value of new technologies. Mäkelä and Pirhonen (2012), defined a business model as ‘a conceptual tool containing a set of objects, concepts and their relationships with the objective to express the business logic of a specific firm’. Chanal (2011) describe it as a set of activities an organization does to make money and how a company creates value and distribute it between the actors

involved. As a tool, it enables strategy makers and stakeholders to compare a chosen strategy with those of the other players in its sector (Mäkelä & Pirhonen, 2012).

Zott, Amit and Massa (2010) defined business model as a new unit of analysis, offering a systemic perspective on how to do business, encompassing organizational activities (performed by a local firm or others), and as a source of value creation. They noted that the business model has been referred to as a statement, a description, a representation, an architecture, a conceptual tool or model, a structural template, a method, a framework, a pattern and as a set. The Business Model Canvas consists of nine components (“building blocks”) arranged in a particular way says Osterwalder and Pigneur (2010), that is symbolic of Porter’s model of a value chain. At the core of a business model is the value proposition, which links the use of key resources and the performance of key activities by key partners to build customer relationships through channels operated to reach customer segments. The stream of revenues generated by these components is held against the cost structure associated with them (Osterwalder & Pigneur, 2010). Osterwalder and Pigneur (2010) created a Business Model Canvas as a tool for analyzing a business model which is also applicable to the designing of the up-scaling of FFS and RA certification model.

The Business model canvas by Osterwalder & Pigneur (2010) is used as a framework to describe issues related to business operations, from daily activities to longer term strategies (Mäkelä & Pirhonen, 2012) and could offer managers in the up-scaling of FFS and RA certification a coherent way to consider their options in uncertain and fast-moving environments. Business Model Canvas has nine key inter-locking pieces – or building blocks – that, taken together, can describe any business model. These nine building blocks are:

- A. Value propositions is the collection or the bundle of products and services a business offers to meet the needs of its customers, or create value for a specific Customer Segment;
- B. Customer segments are groups of people or organizations an enterprise aims to reach and serve” or the segment(s) of clients that are addressed by the value proposition. To build an effective business model, a company must identify which customers it tries to serve. Various set of customers can be segmented based on the different needs and attributes to ensure

- appropriate implementation of corporate strategy meets the characteristics of selected group of clients;
- C. The communication and distribution channels to reach clients and offer them the value proposition. The channels are how a company communicates with and reaches its Customer Segments to deliver a Value Proposition. A company can deliver its value proposition to its targeted customers through different channels while effective channels will distribute a company's value proposition in ways that are fast, efficient and cost effective;
- D. Customer relationships represent the types of relationships established with clients or with specific Customer Segments”;
- E. The key resources needed to make the business model possible and it answer the question of what resources do we need to create value for the customer? These resources could be human, financial, physical and intellectual;
- F. The key activities necessary to implement the business model. They describe most important activities in executing a company's value proposition and what a company must do to make its business model work;
- G. The key partners and their motivations to participate in the business model. They represent the network of suppliers and partners that make the business model work;
- H. The revenue streams generated by the business model (constituting the revenue model). Revenue Streams are the representation of the cash a company generates from each customer segment. It answer the question of where will the income come from? Social and environmental benefits;
- I. The cost structure resulting from the business model. Cost Structures cover all costs incurred to operate a business model”.

There exist an information gap towards better understanding and documenting the business case for sustainability standards and more sustainable practices like RA certification (Steering Committee of the State-of-Knowledge Assessment of Standards and Certification (SCSKASC), 2012).

2.6 Determining Leverage Points in System Design

Soderquist (2010) and Meadows (1999) identified places within a system which are called leverage points where according to World Economic Forum (2011), a small shift in one thing can produce big changes in everything. These points are also called points of power and in system design, one must learn where the leverage points are and how they can be changed. Leverage is found during system analysis. In an effort to improve a business process; Continuous Process Improvement (CPI) - a continuous monitoring of business processes to effect small but measurable improvements in cost reductions, improved efficiencies, or increased value and profit, examines a business process to implement a series of small changes for improvement (Whitten & Bentley, 2007). Meadows (1999) considered the power to transcend paradigms and the mindset out of which the systems' goals, structure, rules, delays, parameters arises as the most important and the highest intervention point to change system performance.

Paradigms are the sources of systems and from them come goals, information flows, feedbacks, stocks and flows. Kuhn (1970) defines paradigms as sets of experiences, beliefs and values that affect the way an individual perceives reality and responds to that perception. He also defined the process of changing a paradigm and named it "paradigm shift". A paradigm shift is when a significant change happens - usually from one fundamental view to a different view. Focus and attitude play a part in peoples' paradigms and determines what you will pay attention to and notice from all of the possibilities in your environment. This concept is very appropriate in the up-scaling of FFS and RA certification in KTDA tea factories in Kenya. The focus and attitude of the implementers of the up-scaling of FFS and RA certification program in KTDA tea factories require a paradigm shift.

There exists an information gap in determining the leverage points in the up-scaling of FFS and RA certification in KTDA tea factories in Kenya. Information on where these leverage points are and how they can be changed in the up-scaling process is also inadequate. System analysis of the up-scaling of FFS and RA certification process to identify a series of small changes for improvement has not been done yet it could lead to small but measurable improvements in cost reductions, improved efficiencies, increased value and profit.

2.7 Scalability of the Farmer Field School and Rainforest Alliance Certification

To increase sustainable productivity, KTDA with its development partners have used Farmer Field Schools (FFSs) since 2006 and aim to train 560,000 tea producers to improve production and sustainable farm management practices (Braga, Lonescu-Somer & Seifert, 2011; Hiller, Onduru & Jager, 2009). This flexible, participant-led learning facilitates their demand for knowledge and enables them to choose, test and adapt useful technologies based on their needs (Mwangi, Oloo & Maina, 2010). The FFS provides a forum for participant-led learning, flexible interactions and integration of different types of knowledge (Maina, Mwangi & Boselie, 2012). Training in FFS enhanced smallholder tea producers' capacity in soft and technical skills (Odhiambo, 2010). Campbell (2010) notes that FFS provides a scalable model for knowledge empowerment and can increase the potential scalability of sustainable technologies such as RA certification and any other program taught through FFS.

Up-scaling or Scalability or Scaling-up refers to the diffusion and dissemination of locally successful innovations to a wider stakeholder group (Gordijn, 2005) and according to Sustainable Agriculture and Rural Development (2007), leads to "more quality benefits to more people over a wider geographic area more quickly, more equitably and more lastingly". With respect to the FFS, up-scaling requires mobilization of adequate human and material resources to replicate the model and also additional organization and finance to facilitate, channel and control the flow of information, goods and services efficiently and effectively (Davis, 2006). Scaling-out refers to horizontal spread while scaling-up and out implies adaptation, modification and improvement - not just replication - of particular technologies and techniques but more importantly of principles and processes. Scaling-down involves replication of whole programs not just technologies or principles or processes by breaking them down into smaller programs or projects to facilitate planning, implementation and accountability at lower levels (Eicher, 2007).

Potential scalability says Campbell (2010), exists through the transfer of knowledge as empowerment and the corresponding passion for learning. The emergence and expansion of FFSs' networks has been attributed to the "foci model" that was used to establish FFSs in East Africa, in which successive FFSs are established as a cluster in the immediate neighborhood of

existing ones. This enhances frequency of interaction, experience sharing and horizontal flow of information among the different groups and reduces cost of implementing collective activities because the different FFSs are able to procure inputs and to market their produce in bulk (Braun & Duveskog, 2010).

2.8 The Farmer Field School Extension System

Akinagbe and Ajayi (2010) indicate that the Farmer Field School popularly known as “informal” or “school without walls” is a community-based, capacity building, learning by doing extension model or system that uses adult education principles in farmers’ groups. The FFS system was first introduced in Indonesia in 1989 to counter overuse of insecticides in irrigated rice fields during the Green Revolution (Campbell, 2010, Braun *et al.*, 2006, Gallagher *et al.*, 2006) and began in East Africa in 1995 (Davis *et al.*, 2010). The experiential learning approach and empowerment - that refers to the development of skills so that individuals can make informed choices in their lives - make FFS a popular training method for farmers and provides an up-scaling model for knowledge empowerment (Maina, Mwangi & Boselie, 2012). The FFS encourages farmers (normally in groups of 20-30) to learn improved technologies and farming practices through observation (Hartl, 2009; Mwangi, Oloo & Maina, 2010). This system, Mwangi *et al.* (2010) add, has effectively been used in Kenya to teach farmers how to minimize problems of land degradation.

Studies involving over 610 FFSs’ projects in Sri Lanka show FFS to be an attractive model for learning (Tripp, Wijeratne & Piyadasa, 2005). The FFS-trained farmers in the study sites reduced the number of insecticide applications by eighty one per cent as a result of using the FFS system, which is practical, widely applicable, follows a well-defined curriculum and can capacitate smallholders to become experts in applying farm technologies through practical, field-based learning (Van den Berg & Jiggins 2007). Van den Berg and Jiggins (2007) indicate that most FFS impact studies concentrate on measuring immediate impacts such as the effects of insecticide use on crop yields but not on estimating medium- and long-term impacts such as developing social capital to build producer organizations.

In countries where extension policy favours group training, smallholder farming predominates and literacy levels are low, the FFS is suitable for training farmers and up-scaling agricultural technologies because of its adult education principles and its focus on group training (Davis, Nkonya, Mekonnen, Odedo, Miiro & Nkuba, 2010). Acquisition of knowledge, better attitudes and skills for problem-solving empower FFS-participating farmers. Professionally-trained facilitators make farmers feel confident to share their knowledge, skills and experiences while getting an opportunity to be trained as farmers' facilitators (Davis, *et al.*, 2010). The training, says Stigter (2010), empowers the farmers to gain self-confidence and as they start to work together to solve community problems, they become local change agents and community leaders. Once they are convinced that they can learn faster and more effectively through the FFS, their passion for learning becomes addictive.

Research has shown that FFS graduates want to continue the dynamics generated by the FFS process because they recognize the need to build local institutions to ensure continuation of farmer-led FFS, for which there is a high demand among communities. Through the FFS, information sharing and networking, which lead to knowledge and skills' empowerment and the ability to solve problems, are promoted when farmers hear success stories from other places (Braun & Duveskog, 2010). Although the success of a Farmer Field School depends largely on the motivation and dedication of its participants, studies done in East Africa show that FFSs are particularly beneficial to women, people with low literacy levels, and farmers with medium-size land holdings (Eicher, 2007). Participation in the FFS, according to these studies, increased income by sixty one per cent within Kenya, Uganda and Tanzania and improved income and productivity overall, but differences were seen at the country level. Participation in the FFS led to increased production, productivity, and income in nearly all cases for Kenya and Tanzania and at the project level for all the three countries combined. In Kenya, crop yield increased by eighty per cent while in Tanzania agricultural income increased by over a hundred per cent. In Uganda, female-headed households benefited more than male-headed households significantly. However, some farmers did not join FFSs for lack of time and information.

2.9 Voluntary Standards and Certification Systems

Voluntary standards and certification systems have emerged as a promising means for addressing sustainability and corporate responsibility in today's complex global marketplace (SCSKASC, 2012). According to them, businesspeople, NGO representatives, and philanthropic foundations have viewed the standards and certification systems as a promising means for promoting sustainability practices in supply chains and transforming markets. Consumer demand for information on social and environmental practices in production, processing and trading of products continues to drive the development of sustainability standards (UNEP, ITC & ICTSD, 2012). The principles of sustainable agriculture and the supporting standard were developed for the first time by a process that involved key stakeholders in Latin America from 1991 to 1993 (Sustainable Agriculture Network, 2010).

Standards refer to a defined set of social, environmental, and/or economic criteria while certification refer to a means of providing assurance that products purchased by consumers complies with agreed-upon sustainability criteria (SCSKASC, 2012). Certification is a market-based tool that provides the capacity to the customers to select the commodities based on their social and environmental concerns (Yadal, Kotwal, & Menaria, 2007). Certification is when a formal decision on compliance is made based on the results of an auditor's report (SCSKASC, 2012). Sustainability standards are predefined rules, procedures, and methods to systematically assess, measure, audit and/or communicate the social and environmental behaviour and/or performance of firms." (UNEP, ITC & ICTSD, 2012).

Tea customers are increasingly looking for high-quality products while tea manufacturers and suppliers are also seeking ways to prove that their products meet high-quality production and safety standards as a way to stay ahead of the competition. Product certification build, enhance the consumer confidence. Certifications are among the most useful indicators that customers can use to ensure the products they buy support the claims on the labels (Rainforest Alliance (2012a). A number of quality assurance and certification initiatives exist which apply or have been started in the tea sector to guarantee quality to consumers and to take corporate social responsibility (De Jager *et al.*, 2009). They includes UTZ Certified, Rainforest Alliance, ISO 9001:2008, ISO

14001:2004, ISO 26000, Ethical Tea Partnership (ETP), International Organic Accreditation Service (IOAS) and Fair trade among others.

Certification is a market-based tool that provides the capacity to the customers to select the commodities based on their social and environmental concerns (Yadal, Kotwal, & Menaria, 2007). These initiatives, according to De Jager *et al.*, (2009), have set standards and product labels assuring consumers that the products they purchase are produced, processed, and certified to be consistent with the set standards. Companies, NGOs, governments, and foundations have invested hundreds of millions of dollars in the past two decades to support the creation and implementation of standards and certification systems but concrete, consolidated information about the cost, benefits, environmental and social impacts, potential of these systems and whether certification is achieving its stated goals has been somewhat scant (SCSKASC, 2012).

2.10 Rainforest Alliance Certification and Sustainable Agriculture Network

The Rainforest Alliance (RA) is a member of the Sustainable Agriculture Network (SAN) and is the owner of the “Rainforest Alliance Certified” trademarks, including the phrase and green frog seal (Rainforest Alliance, 2012c). The RA started developing sustainable agriculture standards in 1990 in Central America, a process that initiated the formation of the Sustainable Agriculture Network (SAN) (Rainforest Alliance, 2012b). The SAN is a coalition of independent nonprofit conservation organizations that promote the social and environmental sustainability of agricultural activities by developing standards (Sustainable Agriculture Network & Rainforest Alliance, 2012; Wren, 2013). It fosters best practices from the farm to the marketplace, delivering on-farm benefits to producers through the certification process, and providing a mechanism for traders, brands, and consumers to promote and assure sustainability across the value chain (Rainforest Alliance, 2012c). It also manages the Rainforest Alliance Certified standard for agriculture and audits farms around the world to ensure compliance in bananas, citrus, coffee, cocoa, flowers, fruit, sugarcane, tea and others (Rainforest Alliance, 2012b). To earn RA certification, a farm must meet the standards of the Sustainable Agriculture Network (SAN) that guide farmers toward sustainable farm management and give independent auditors a

concrete measure by which to evaluate social and environmental improvements (Rainforest Alliance, 2012d).

The RA is an international nonprofit organization that works to conserve biodiversity and ensure sustainable livelihoods by transforming land use practices, business practices and consumer behavior (Rainforest Alliance, 2012e). According to Hirt (2011), RA works with farmers and other agricultural producers to conserve biodiversity and promote sustainability. Ethical coffee (2011) defined the Rainforest Alliance as “a non-profit, tax-exempt organization based in New York with a mission to conserve biodiversity by promoting sustainability in agriculture, forestry, tourism and other businesses”. Rainforest Alliance (RA) holds the Standards and Policy Secretariat for the Sustainable Agriculture Network and coordinates the development of standards and related policies for Sustainable Agriculture Network (Volkman, 2008). Rainforest Alliance Certified farms meet the comprehensive standards of the Sustainable Agriculture Network (SAN) (Rainforest Alliance, 2012c).

Farms that meet the standards are awarded the Rainforest Alliance Certified seal of approval, a prestigious badge that can be used to market products (Rainforest Alliance, 2012f). To achieve RA certification strict health and safety principles such as working hours, rest periods, provision of safety equipment and sanitary facilities must be adhered to (Sustainable Agriculture Network, 2010). The RA certification requires farmers to protect the natural forests within their jurisdiction and to plant indigenous trees to boost forest cover. It obligates farmers and factories to produce tea ethically by avoiding child labor and protecting the health of farm workers at farm and factory levels (Braga, Lonescu-Somer & Seifert, 2010; Sustainable Agriculture Network, 2011). Up-scaling sustainable tea practices such as those promoted under SAN standards (used in RA certification) leads to more quality benefits to more people over a wider geographical area more quickly, more equitable and more lastingly (Van Tilburg *et al.*, 2009). However, there lack a suitable mechanism for designing a tea-specific RA certification up-scaling system in Kenya.

2.1.1 Training Cost and Benefits of Running a Tea-Based Farmer Field School

Barbut (2011) indicated the costs of establishing a new FFS to be \$800 and that of training a new FFS facilitator as \$1350. Van den Berg and Jiggins (2007) estimated the costs of running a FFS in Indonesia and the Philippines as \$62 and \$48 per participant, respectively. According to Gallagher (2003), the cost of conducting a season-long field school for 25 farmers range from \$150 to \$1,000 depending on the country and the organization. Braun, Thiele and Fernández (2000) gave the average cost of a field school facilitated by a professional extension worker as \$532. According to Braun and Duveskog (2010), FFSs can be expensive or low-cost depending on implementer and how they are conducted but costs per FFS decline as activities become routine, prices become lower due to bulk purchase of materials, and trainer and facilitator skills and experience increase. The results contradict the findings of Rusike *et al.*, (2004), and that of Swanson and Rajalahti (2010) who considered FFSs as more costly to implement, labor-intensive extension model that reaches a small number of interested farmers.

Most tea-based FFS got financial support from KTDA tea factories but were expected to be self-sustaining as the FFSs are up-scaled to reach 560,000 tea producers. However, information on the cost and benefits of running a tea - based FFS were not readily available (Maina, Mwangi & Boselie, 2012). It is possible to up-scale the FFS system to many farmers by deploying FFS-trained farmers to train other farmers (Bunyatta *et al.*, 2006). But the cost of training and compensating them for the time they spend in training tea-based FFS is not documented in Kenya. Maina, Mwangi and Boselie (2012) noted that tea smallholder farmers can also be trained on sustainable tea production through farm visits and demonstrations in field day that lasts for one to several days and normally attended by several hundred farmers. But, there exists an information gap on the costs of training smallholder tea farmers using farm visits and farmers field days. Field days' costs are related to the opportunity cost of the trainers' time, transportation of experts to the field day and participants' food, refreshments and time (Ricker-Gilbert, 2005). Other field day costs include those related to presentation stage (dais) and publicity banners (Ricker-Gilbert, 2005).

Tea farmers can also be trained through farm visits. A farm visit uses the training and visit (T&V) extension approach. The T&V system is a technology transfer extension model that was used in the mid -1970s to mid -1990s, by 70 countries in Asia and Sub-Saharan Africa (Swanson & Rajalahti, 2010; Wani, 2008). In the approach, tea extension agents (TESAs) living in KTDA factories and farmers' neighborhoods visited local tea farmers individually and passed "proven tea practices" (recommendations) from tea research centers to contact farmers (Maina *et al.*, 2012b; Swanson & Rajalahti, 2010; Wani, 2008). Farmers also incurred opportunity cost for time spent in training.

Farmers who joined FFS benefited from income generating activities, enjoyed benefits accruing from FFS activities, networking, social capital and facilitators' expertise (Wanyama, Mose, Mutoko, Wanyonyi, Nyambati, Wanjekeche & Rono, 2007). Participation in FFSs made farmers more efficient and self-reliant managers of their scarce agricultural resources. FFSs gave farmers practical knowledge and skills to work more effectively (Muller, Guenat & Fromm, 2010). Being an agricultural extension model (Maina, Mwangi & Boselie, 2012), the FFS plays a key role in raising farm productivity by being a means for offering technical advice, helping farmers identify problems and opportunities, sharing information and supporting group formation (Asian Productivity Organization, 2006). Using the FFS for training groups of farmers can lead to sustainability of the groups because it allows the groups to build sustainable human and social capital, which include collective marketing of produce, and lobbying through farmer networks and savings groups (Davis *et al.*, 2010). Acquisition of knowledge, better attitudes and skills for problem-solving empower FFS-participating farmers (Maina, Mwangi & Boselie, 2012) while professionally-trained facilitators make farmers feel confident to share their knowledge, skills and experiences (Davis *et al.*, 2010).

2.12 Costs and Benefits of Achieving Rainforest Alliance Certification

The costs of Rainforest Alliance certification, the benefits resulting from certification and how these costs and benefits compare remain undocumented in Kenya and limits production of high value tea that can fetch higher, profitable prices. While calculating the cost of RA certification, Victor *et al.* (2010) lament that a major limitation of not estimating all the costs and even benefits

associated with RA certification. Smallholder tea farmers incur a lot of initial cost to comply with the SAN standards and RA certification requirements. These costs are incurred by tea growers at farm level to provide workers with potable water, establishing buffer areas, establishing soil and water conservation structures, digging waste water capture pit, purchasing personal protective equipments and managing solid waste from the farm (Maina *et al.*, 2012b). The KTDA factory companies also spend money to train tea growers and factory workers on SAN standards and Rainforest Alliance certification requirements, facilitating internal farmer audits internal, facilitating internal factory audits and paying external auditors, payment for factory compliance fees and field allowance to RA certification trainers (Maina *et al.*, 2012b).

According to these authors, the recurrent cost of Rainforest Alliance certification must also be calculated which include the cost of factory compliance, farmer compliance, external audit, internal factory audit, internal farmer audit, training at factory level and cost of training farmers. To achieve RA certification strict health and safety principles such as working hours, rest periods, provision of safety equipment and sanitary facilities must be adhered to, which is a cost to the tea farmer (Sustainable Agriculture Network, 2011). Farmers wishing to be certified must pay the minimum wage to their workers; comply with Kenyan labour laws and wage guidelines; prove that they have been trained in pesticide management on their farms including provision and use of personal protective equipment; and work to conserve and improve the biodiversity-value of their farms and the farmed landscape (Sustainable Agriculture Network, 2011; Unilever's, 2009).

Unilever estimates that tea with RA certification would cost ten per cent to fifteen per cent higher and that farmers would receive \$2.69 million more for their tea by 2010 and \$6.71 million more by 2015 (Unilever, 2009). In order to meet the rapidly growing interest in Rainforest Alliance Certified tea, other farms in Kenya, Tanzania, Indonesia, India and Argentina have started to implement the Sustainable Agriculture Network (SAN) Standards, which have the potential to improve the livelihoods of nearly one million tea workers in Africa and of up to two million people around the world (Rainforest Alliance, 2010). Certification enables a factory affiliated to KTDA to access niche market and or sell its processed tea to Lipton. Scaling up

sustainable tea practices such as those promoted under SAN standards (used in RA certification) leads to more quality benefits to more people over a wider geographical area more quickly, more equitable and more lastingly (Van Tilburg *et al.*, 2009).

One of the benefits of certification according to Victor *et al.* (2010) is the improved productivity as an impact of farmer training on the implementation of good agricultural practices in accordance with certification standards. According to them, cocoa farmers benefited from a twenty five per cent yield increase following RA certification training. According to Rainforest Alliance (2012a), RA certification leads to increased efficiency on farms by reducing the cost of farm inputs and improving overall farm management. The Workers also benefit from a cleaner, safer, more dignified workplace where their rights are respected while the farm owners benefit from increased quality of the farm products that could lead to a price premium because their farms are certified.

The KTDA factories that had attained RA certification, usually satisfy and meets the required consumer taste and standards. Maina *et al.* (2012), outlines the benefits derived from sustainable tea production as better market opportunities, better prices, more efficient and organized farmers, better cost control, happier, healthier, safer and more productive workers, less inputs, less waste, lower costs and better profit margin. The certification process enhances factory improvements in terms of improved safety, waste management, chemical storage and protective clothing.

2.13 Monitoring and Evaluation of the Up-scaling of FFS and RA Certification Process

Monitoring and evaluation (M&E) says Swanson and Rajalahti (2010), are integral tools for assessing the efficiency and effectiveness of investment operations. Monitoring and evaluation is a mechanism for building mutual accountability in the FFS process. Designing an M&E system must start early in project preparation and be put into effect at the beginning of project implementation. There is need to re-structure and enhance the existing monitoring and evaluation system of up-scaling FFS and RA certification. This can be done by putting more emphasis on monitoring the achievements of the activity targets, analyzing the inputs (timely acquisition and procurement, flow of funds, employment of personnel according to establishment posts,

deployment of inputs according to plan of operation, participation and contribution of beneficiaries); and outputs (to what extent are the physical outputs being realized in relation to the activity targets/milestones? The community evaluates the performance of the farmer-extension worker-researcher team and may decide to replace any member. The FFS team keeps records of the FFS activities, which belong to the community and are available to community members or to people authorized by the community to consult them. The farmer-extension-researcher team is responsible for the appropriate use of, and accounting for the FFS funds (Davis *et al.*, 2010). However, the M&E plan takes cognizance of project strategy, decisions about deployment and use of resources, project stakeholders' information needs at critical points in the project cycle and actions that have a bearing on stakeholders' interests. Thus different FFS initiatives have been using different tools and techniques in evaluating FFS (Muller *et al.*, 2010).

2.14 Theoretical Framework

In this study, a combination of theoretical frameworks, concepts and research work were found to be relevant and were applied including the Systems theory. Systems theory was proposed in the 1940's by the biologist Ludwig von Bertalanffy and furthered by Ross Ashby (Von Bertalanffy, 1968). Systems theory provides a knowledge base of systems concepts that include system-environment boundary, input, output, process, state, hierarchy, goal-directedness, and information. In this research, it provided a framework and the principles that apply to systems in general and also a basis for designing a system for up-scaling FFS and RA certification in KTDA factories. Von Bertalanffy emphasized that real systems are open to, and interact with, their environments, and that they can acquire qualitatively new properties through emergence, resulting in continual evolution (Von Bertalanffy, 1968). Whitten and Bentley (2007) furthered the work of Von Bertalanffy and introduced the systems development methodology concept. The relevance of the Whitten and Bentley (2007) work on systems development methodology is the process of understanding, learning to use and applying the system analysis and design methods. This work guided a detailed investigation and study of various operations performed by a KTDA system to finally develop a Context Diagram (logical system design) for up-scaling FFS and RA certification. Any subsequent system design and implementation of a new system depends on the quality of the preceding systems analysis. System analysis according to Bender (2003) and

Whitten & Bentley, 2007) is a problem solving technique that decomposes a system into its components pieces for the purposes of studying how well those components parts work and interact to accomplish their purpose. This study also borrowed from the work of Meadows (1999) on system design. Many authors of system design have built and strongly supported the work of Meadows (1999) on system design. According to this author, one must study a system in order to learn where it should be changed and to change it at intervention points, which are called leverage points. Soderquist (2010) and Meadows (1999) identified leverage points where according to World Economic Forum (2011), a small shift in one thing can produce big changes in everything. According to Meadows (1999), leverage is found during system analysis, and one must study the up-scaling system in order to learn where it should be changed and to change it at intervention points, which can produce faster, effective and sustainable up-scaling process.

Osterwalder, Pigneur and Smith's business model approach was also relevant in this study and was used in designing a KTDA business model for up-scaling FFS and RA certification. Many different business conceptualizations exist but the Business Model Canvas is a strategic management template for developing new or documenting existing business models. The Business Model Canvas is a tool for analyzing a business model derived from the business model ontology by Osterwalder and Pigneur (2010). The Business Model Canvas consists of nine components ("building blocks") arranged in a particular way says Osterwalder and Pigneur (2010), that is symbolic of Porter's model of a value chain. At the core of a business model is the *value proposition*, which links the use of *key resources* and the performance of *key activities* by *key partners* to build *customer relationships* through *channels* operated to reach *customer segments*. The *stream of revenues* generated by these components is held against the *cost structure* associated with them (Mäkelä, & Pirhonen, 2012; Osterwalder & Pigneur, 2010).

In this study, this model provided an understanding for discussion, analysis and designing a KTDA business model for up-scaling FFS and RA certification by describing a firm's value proposition, infrastructure, customers, and finances. The Business Model Canvas was initially proposed by Alexander Osterwalder based on his earlier work on Business Model Ontology. With this business model design template, an enterprise can easily describe their business model.

Even though Osterwalder, Pigneur and Smith's business model approach can be used to innovate parts of the business model or product, its critics lament that the business model approach is mostly built on the work of the other writers on competency development of the business model and balanced scorecard which can't be applied to a full business model framework (Mäkelä, & Pirhonen, 2012). It doesn't include corporate structure and responsibility, a representation of the main business goals and issues which a holistic business model approach should include (Mäkelä, & Pirhonen, 2012). It is based on the theory that between the activities that generate cost and activities that generate revenue is the value proposition. That view according to Mäkelä, and Pirhonen (2012), is too simplistic for one can't build a business model based on visible figures of cost and revenue alone, even though cost and revenue should be a part of a business model. The linkages among competences, measurements and results the author noted, is not explicit and it doesn't have a clear cause and effect linkage between the competencies, desired outcomes and measurements.

The issue of performance measurements, goal setting, and lack of enough emphasis on business model management, are not considered (Mäkelä, & Pirhonen, 2012). It can be concluded that while Osterwalder, Pigneur and Smith's business model approach can be used to design the FFS and RA up-scaling system, it is not a holistic business model approach but should be complemented to overcome the limitations of the model. Diffusion of Innovation theory by Rogers was also relevant and used in this study. The relevance of the Diffusion of Innovation theory for this research is the manner in which RA certification and the Sustainable Agricultural Network (SAN) standards moves from KTDA managers to smallholder tea farmers. Diffusion is the process by which an innovation is communicated to members of a social system (Arumapperuma, 2008).

The members' willingness and ability to adopt an innovation depend on their awareness, interest, evaluation and trial of the technology. According to Rogers (1995), modelling the spread of innovations through society takes the form of an "S" curve with early adopters selecting the technologies first, followed by the majority, until the technologies are common in the society. The Diffusion of Innovation Theory gives an analytical instrument for conducting an empirical

research in the adoption of RA certification requirements in tea farms and provided a framework for measuring the adoption level for various parameters in the FFS and RA certification up-scaling processes.

Several concepts drawn from non-formal adult education concepts are relevant to the FFS approach. The FFS learning approach is informed by a combination of concepts and theories (FAO, 2011). These theories include the Constructivist theory, Haberman's critical theory, Knowles concept of adult education, Kolbs learning cycle of experiential learning, Carl Rogers' work on learner-centered approaches, Action learning theory, Mezirow's transformative learning theory, Stimulus-response theory, Cognitive theory and Motivation and Personality theory. Transformative learning theory, which is based on the assumption that adult learners are active with significant life experience that can enable them construct meaning of what happens in their lives, is the most established theory of adult learning (De Jager *et al.*, 2009; Friis-Hansen, Duveskog, & Taylor, 2012).

Constructivist theories (Duveskog, 2006) suggest that through a process of accommodation and assimilation, individuals construct new knowledge out of their experiences. Most approaches that have grown from constructivism suggest that learning is accomplished best using hands-on techniques, where learners experiment rather than being told what will happen. Learners are left to make their own inferences, discoveries and conclusions, where new knowledge is integrated with old experiences. This approach to learning assumes that knowledge, behavior and social relations cannot be transmitted from one party to another, but must be uniquely created by the human agent as a consequence of critical thinking, experimentation and communicative action. The core feature is the ownership by the learner, of both the outcomes and the process. Interaction between the three domains is the crucial part, and is the process that facilitates empowerment (Duveskog, 2006).

The FFS approach also builds on the critical theoretical framework of Haberman's critical theory that presents three cognitive interests (work, interactions with others and power) that all humans share form the basis for human social existence and motivation for learning (Powell & Moody,

2003). Haberman presents the three cognitive interests that all humans share which form the basis for their interest in learning: the technical, the practical and the emancipating (FAO, 2011). These three cognitive interests grow out of three distinct areas of human social existence: work, interaction with others and power (Powell & Moody, 2003). Haberman's critical theory (FAO, 2010) suggests that learning only in the technical domain may not cause the desired change since the learner may not be able to apply the technical knowledge, unless the learner is also freed from constraining factors out of his or her control and without interactions and consensus with other humans (Duveskog, 2006; Powell & Moody, 2003). The critical theory framework provides a basis for thinking about the FFS approach.

Knowles thought and wrote about the education of adults (FAO, 2011) and distinguished pedagogy as the art of teaching children to "andragogy" the art of teaching adults. The FFS is an approach that exemplifies andragogy (FAO, 2011). Knowles developed the concept of adult education that focused attention on the importance of adults' experience in their learning and the value of reflecting on that experience as a pedagogical process. Adult educators view themselves as facilitators of learning, rather than teachers. The principles of adult education are highly relevant to FFS since extension clients are usually adult farmers, with a large spectrum of experiences gained through years of farming. Knowles used these principles to propose a program for the design, implementation and evaluation of adult learning but has since acknowledged that the principles he outlined did not apply solely to adult education (Conlan, Grabowski & Smith, 2003). The development of the theory simply illustrates that the designer "should involve learners in as many aspects of their education as possible and in the creation of a climate in which they can most fruitfully learn".

Through exercises such as the AESA, group session, practical exercises and the trial plots, the facilitator in FFS helps the group make use of actual real life situations, as opposed to simulated experiences (Duveskog, 2006). These exercises apply Kolbs learning cycle in the way that farmers use concrete observations to reflect on experiences and from there conceptualize the learning points on which actions are defined (Atherton, 2010). This concept builds on the initial learning theories of Dewey, Lewin and Piaget, which Kolb drew upon to develop a learning

model, commonly referred to as the Kolb's learning cycle which is also described as 'experiential learning' based on the central role that experience-Knowledge plays in the learning process (Atherton, 2010, Duveskog, 2006).

Experiential learning (Conlan, Grabowski & Smith, 2003) is a learning theory that is learner-centered and operates on the premise that individuals learn best through experience. A good way to describe this theory is "learning by doing". Experiential learning thus has the learner directly involved with the material being studied instead of just thinking and talking about that material. For Kolb, the learning process can be boiled down to four elements or stages (Concrete experience; Observation and reflection; Generalization and conceptualization; and Experimentation), which constitute a learning cycle. All FFS learning activities apply the learning cycle (FAO, 2011). Experiential learning theory is a holistic learning approach and is most effective when the learning has intrinsic motivation.

The learning approach in FFS, which is based on field experience and observation, according to Stigter (2010), encourages continued learning. However, this theory does not according to Conlan, Grabowski and Smith (2003), take into account differences in cultural experiences or conditions. It is less clear where elements of learning such as goals, purpose and intentions fit into experiential learning theory and it may not help us understand and explain change and new experiences. Although the process of experiential learning is seen as a process that links education, work and personal development and it provides a means to work with groups to find their own solutions to problems through testing and experimentation of ideas and practices (Duveskog, 2006). It assumes that learning is always rooted in prior experience and that any attempt to promote new learning must consider experience (Conlan, Grabowski & Smith, 2003). The FFS has been described as a learner-centred approach that builds on Rogers' work from a methodological perspective (FAO, 2011). Carl Rogers' work forms a theoretical basis for learner-centred approaches that emphasize self-directed learning and are commonly used with adults. These approaches put the trainer in the role of a facilitator. Rogers' work suggests that adult learners require learning to be relevant to their needs; activities that encourage self-direction; processes that foster independence, creativity, self-reliance, self-criticism and self-

evaluation; and facilitators not teachers (FAO, 2011). The fundamental principle of this approach is that adult learning can be optimized when the learner is put in control of his or her learning.

Action learning is defined as an approach to working with, and developing people, which uses work on a real project or problem as the way to learn. In this approach participants work in small groups or teams to take action to solve their problem, and learn how to learn from that action (Conlan, Grabowski & Smith, 2003). Action learning which is based on the notion that people learn most effectively when working on real-life problems occurring in their day-to-day work settings, as is the case in FFSs when farmers engage in action oriented group experimentation (Duveskog, 2006). It brings experiential learning a step further with its focus on actions as outcome of the learning process. Learning in FFS is transformative because of its impact characterized by increased problem solving skills, collective action, challenging of authority and direct confrontation with local problems (Duveskog, 2006).

Critical theory expands on the positivist view of adult education related to technical or skills-based knowledge. Mezirow's goal in his transformative learning theory according to Franz (2007) is learner empowerment through critical reflection whereby a triggering event catalyzes the transformative learning process. By thinking deeply the learners construct new meaning of their experience from the new context created by the triggering event and through conversation with others assess and justify their assumptions. This theory validates the role of the Extension worker as a helper and facilitator of learning rather than just a teacher of information learning (Franz, 2007).

However, Mezirow's original transformative learning theory did not address the variety of ways in which people learn since the sustainability of the transformed perspective requires continued support from others. Mezirow has since recognized that intuition, empathy, relationships, and other forms of learning are important for transformational learning (Franz, 2007). Adult education theories of transformative learning and critical reflection are especially applicable to FFS because they focus on developing more participatory learning. These theories suggest that Extension should create opportunities for learners to experience disorienting dilemmas, critically

reflect on their assumptions, and facilitate how to learn not just what to learn (Franz, 2007). Ideas from three other different theoretical branches of psychology contribute to the basic learning theory upon which the FFS is based: stimulus-response theory, cognitive theory and motivation and personality theory (FAO, 2011).

2.1.5 Conceptual Framework

This study has two independent variables (System design of up-scaling FFS and System design of up-scaling RA certification) and one dependent variable (Increased adoption of good agricultural practices by tea growers) as shown in Figure 1. A system is an orderly grouping of interdependent and interrelated components that function or are linked together according to a plan to achieve a specific objective or a desired result (Bender, 2003, Whitten & Bentley, 2007). The product of system analysis and design is an information system (IS) which according to Whitten and Bentley (2007) refers to an arrangement of people, data, processes, and information technology that interact to collect, process, store, and provide as output the information needed to support an organization. Three major components of a system namely input, process and output are connected to each other. In agricultural extension, the up-scaling of FFS and RA certification was considered to be a system because it had a specific objective of training tea farmers on sustainable tea production.

The system itself or process as shown in the box labeled B in the diagram means that some action or group of actions does take place. It also specifies how the users interact with the up-scaling of FFS and RA certification system. The boxes labeled A, C, D, E and F represent the actors (persons, organizations, and other information systems that could interact with the FFS and RA certification up-scaling system). The arrows ($\rightarrow$) pointing to the system indicate the inputs provided by actors to the system while the arrows ($\leftarrow$) pointing to the actors from the system (box labeled B) refer to the outputs created. The arrows also represent data flow (i.e., showing that information is being passed from or to a process). The boxes labeled D, E, and F indicate the conceptualization of the variables for this study and how they related to each other (direction of the arrow) in the framework of a system design (Box label A, B and C). The independent variables (System design for up-scaling FFS and system design for up-scaling RA

certification) in this study (Box labeled D) and the specific objectives of the system that described a sequence of activities and user interactions in trying to accomplish the goal of up-scaling were also considered as inputs (Box labeled A). The dependent variable (Increased adoption of good agricultural practices by tea growers) (Box labeled F) and the desired result of the up-scaling process were also considered the system output (Box labeled C) defining precisely the required system output and determining the data requirement for producing the output. Age, gender, and level of education (Box labeled E) was hypothesized to affect, interfere or influence the relationship between the independent variable and dependent variable.

A

B

C

INPUTS

- Training on sustainable tea farming
- Facilitate in FFS
- Train on RA certification
- Adopt GAPs
- Up-scale RA certification
- Increase the number of FFS
- Monitor and evaluate the up-scaling process
- Market RA-certified tea
- Up-scale FFS

PROCESS

- The up-scaling of FFS system
- The up-scaling of RA certification system

OUTPUT

- Increased knowledge on sustainable tea farming
- Increased farmers' skill
- Increased farmer educators
- Certification of all KTDA factories
- Increased contact with trainers
- Increased awareness of FFS and RA certification
- Adoption of FFS and RA certification
- Increased productivity at farm level
- Efficiency of FFS and RA certification up-scaling
- Increased adoption of GAPs
- Improved farm incomes

- System design for up-scaling Farmer Field Schools
- System design for up-scaling Rainforest Alliance Certification

- Age
- Gender
- Education

Increased adoption of good agricultural practices by tea growers

D

E

F

Independent variables

Moderator variables

Dependent variable

Figure 1. Conceptualization of the FFS and RA certification system design

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers the research design, location of the study, target population as well as sampling procedure and sample size. It also covers instrumentation, data collection procedure, and data analysis.

3.2 Research Design

A research design is a plan for obtaining the required information with sufficient precision or for testing hypotheses (Hoy, 2010). A Cross-Sectional Survey Design, which is the scientific method for collecting and analyzing data gathered from two or more samples at one point in time (Lichtman, 2013) was used to collect both qualitative and quantitative data from smallholder tea producers. This design is relatively faster and inexpensive compared to case and cohort studies and it allows for hypotheses testing while providing self-reported facts about respondents, their inner feelings, attitudes, opinions and habits (Kombo & Tromp, 2007; Kothari, 2008). Cross-sectional studies - used in all branches of science - take a 'slice' of their target group and base their overall findings on the views or behaviors of those targeted, assuming them to be typical of the target population. The Cross-sectional design makes it possible for researchers to study indirectly observable things such as people's attitude and beliefs and to describe the population, which would have been too large to observe directly (Kendall, 2007). Collecting data from a specific population at one point in time minimizes chances for attrition. To help ensure an accurate and comprehensive investigation, Face-to-face interviews, document analysis, record reviews, site visits, observation, living the system and a stakeholders' workshop were designed to be carried out.

3.3 Location of the Study

The study was undertaken in 25 KTDA factories located East and West of Kenya's Rift Valley, which divides the country right in the middle between East and West. Data was collected from KTDA factories in Embu, Meru, Kiambu, Murang'a, Kirinyaga and Nyeri counties in the East while those in the West are in Kericho, Bomet, Vihiga, Nandi, Nyamira and Kisii counties (see

Appendix E). Kenya has 104 tea factories located East and West of Kenya's Rift Valley, 639,521 registered tea growers and 181,855 hectares planted with tea (Kariuki, 2012). The main tea growing areas in Kenya are situated in and around the highland areas on both sides of the Great Rift Valley and astride the Equator within altitudes of between 1500 metres and 2700 metres above the sea level (Tea Board of Kenya, 2013). They have tropical, red volcanic soils, well distributed rainfall ranging between 1200mm to 1400mm per annum that alternates with long sunny days that make it easy for tea production to go on all the year round (Tea Board of Kenya, 2013). The small holder sector factories are managed by Kenya Tea Development Agency Ltd which is also responsible for sixty two per cent of all tea produced in Kenya (Braga, Lonescu-Samer, Seifert, 2011).

Embu, Meru, Kiambu, Murang'a, Kirinyaga, Nyeri, Kericho, Bomet, Vihiga, Nandi, Nyamira and Kisii counties were chosen because these areas have an ideal climate for tea and tea was a major economic activity. Most of the tea growers were small-scale farmers that delivered their tea to KTDA factories, Farmers Field School were being used as a training methodology, farmers had been trained in RA certification and the locations enabled the researcher to capture agro-ecological, ethnical, social-cultural diversity that characterized the tea growing areas in Kenya. These tea growing areas are characterized by a cool, wet climate with an average annual rainfall of 1000mm - 2200mm. The temperatures range from 14 °C to 20 °C, soils are deep volcanic or black cotton. The main clones of tea grown is *camellia sinensis* TN/14/3, 31/8, 51/10, SFS/150, 68, 303/577, BB35, 15/10 (Kenya Tea Development Agency, 2004). Tea value chain stakeholders attending a workshop at Heron Hotel-Nairobi in May 2012 developed a business model for up-scaling FFS and RA in KTDA factories.

3.4 Target Population

The target population for this study was all KTDA factory networks comprising 68 tea processing factories owned by 560,000 smallholder tea producers. The 560,000 tea growers are shareholders in 54 Factory Companies and supplies green leaf to their respective tea processing factories. The total production of green leaf by these Factory Companies in 2012/13 financial year was 1.1 billion kilogrammes that earned a gross revenue of Ksh 69 billion. The KTDA paid

tea growers about ksh 51.30 billion at an average rate of Ksh 45.65 per kg/green leaf in 2012/2013 financial year. On average, four (4) kilograms greenleaf was used to produce one kilogram of made tea (Kenya Tea Development Agency, 2013). The main peak season in these areas is mainly during the rainy season in March, June, October and December. The Kenyas' distinct and high quality teas are made from the upper two leaves and a bud. The young shoots are plucked in regular cycles ranging from seven to fourteen days (Tea Board of Kenya, 2013).

These smallholder tea producers who delivered green leaf tea to KTDA factories may or may not have participated in the FFS-pilot project that was implemented between 2006 and 2008 or in the up-scaling phase. The concept of FFS and RA certification was initiated at different times in the tea factories to promote good agricultural practices, good manufacturing practices and ensure a continuous production of high quality tea. The population of this study consisted of tea producers from different Counties, ethnicity, cultures, livelihoods, ecological zones, age, gender, education levels, economic wellbeing and factories. Tea producers within some KTDA factories had undergone RA certification but they had not been reached with FFS or were not members of FFS. Some factories were also undergoing RA certification but the FFS were recently started and were implementing their curriculum. The accessible population consisted of farmers trained in FFS and RA certification.

3.5 Sampling Procedure and Sample Size

There are several approaches to determining the sample size. These include using a census for small populations; deriving from previous studies, mentor recommendations or budgetary constraints; using published tables; and applying formulas to calculate a sample size. A combination of these methods was used in determining an appropriate sample size. A sample of 514 enabled to capture the characteristics that matched those of all the tea growers in KTDA factories which was critically important for sound research. Balian (1988) indicates that although the nature of a research study dictates the specific sample size, in quantitative research statistical tests require a minimum of 20 to 30 subjects per strata group for meaningful scientific comparisons. A two-stage random sampling technique based on factories and Farmers Field School was used to sample 514 tea growers. A random sample of 25 KTDA factories made up

the sampling frame (Appendix D). A total of 20 FFSs members per factory were randomly selected from purposively FFS groups. Another 15 FFS members were randomly selected from Kibirigo Tea Factory to cater for all categories of tea farmers delivering tea to KTDA. Purposive selection of FFS in the factories enabled the researcher to obtain information from respondents who were already in FFS. A two-stage random sampling provided greater precision, guard against an unrepresentative sample and is less costly (Kothari, 2008). Data was collected from all FFS's' experts, and KTDA extension agents in the target area, from randomly selected representatives of FFS participants and tea stakeholders. This number included FFS-trained farmers; non-FFS tea growers and farmers who were trained in RA certification; and at least five stakeholders purposely selected from the tea value chain based on their knowledge and experience with FFSs and RA certification. An effort was made to ensure gender parity among the respondents.

3.6 Instrumentation

A questionnaire (Appendix A) containing closed-ended and open-ended items and a check-list (Appendix B and C) developed by the researcher was used to collect data from FFS-trained tea growers, FFS facilitators, farmers delivering tea to the 25 selected factories and from stakeholders from KTDA, Rainforest Alliance, Partner Africa, ETC East Africa, Ministry of Agriculture, Egerton University and LEI, part of Wageningen UR. The closed-ended questionnaire was chosen because of its potential to facilitate consistency of responses across respondents.

3.6.1 Validity of the Data-Collection Instruments

For the questionnaire to accurately measure what it is supposed to measure, it must have face and content validity. Content validity refers to the extent to which the items of a test or procedure are in fact a representative sample of that which is to be measured or the degree to which the items within a research instrument or measurement tool represent the universe of content for the concept being measured. Face validity is the degree to which non-experts perceive the test to be relevant to what they believe is being measured by it or to what it superficially appears to measure. Content validity was ascertained by a panel of ten extension experts and scientists

drawn from ETC-East Africa as well as Egerton University and LEI, part of Wageningen UR. The panel ensured that items in the questionnaire adequately measured the degree to which the data collected adequately represented concepts that covered all relevant issues under investigation (Mugenda, 2008).

3.6.2 Reliability of the Data-Collection Instruments

Reliability measures the degree to which a research instrument yields consistent results or data after repeated trials (Kothari, 2008). The Cronbach's alpha reliability coefficient was used to measure the questionnaire's internal consistency. Ashcroft and Parker (2009) have indicated that reliability scores of less than 0.6 are generally problematic. A pilot test involving 30 farmers in Nandi County - which had smallholder tea producers with similar characteristics as those of tea producers in the target area indicated the questionnaire's reliability coefficient of 0.92 α which was well above the threshold for acceptable reliability of 0.70 α , with the significance level set *a priori* at 0.05 α . Pilot testing procedures was identical to those used during the actual data collection as recommended by Mugenda (2008).

3.7 Data Collection Procedure

A research permit was obtained from the Kenya National Council for Science and Technology. The researcher – through a preliminary survey identified experts in FFSs, RA certification and other stakeholders along the tea value chain with whom they worked out logistics for data collection. Face-to-face interviews in consultative meetings were used to collect data on stakeholders' views, opinions, experiences and recommendations relevant to the objectives of the study. Interviews were used to collect information from managers, employees, stakeholders who were generally current users of the existing system or potential users of the proposed system. Interviews provided opportunities for gathering information from respondents who had previous knowledge of the up-scaling of FFS and RA certification system to get their opinions, policies, and subjective descriptions of activities and problems. Interviews enabled the researchers to motivate the interviewee to respond freely and openly to questions and allowed the researcher to probe for more feedback. Interviews also allowed the researcher to discover areas of misunderstanding, unrealistic expectations, and even indications of resistance to the proposed

system. They also enabled the researchers to adapt or re-word questions for each individual, giving opportunities to obtain information by observing the interviewee's body movements and facial expressions as well as by listening to verbal replies to questions.

Document analysis was used to obtain useful information from existing documentation, forms, files, and organization charts. This helped to identify key chain players, individual managers and users, the reporting relationships, to trace history that led to the project, collected and reviewed documents that described the problem, documents that described the current implementation of FFS and RA certification; checked for documentation of previous FFS and RA certification studies and designs performed by former/other researchers and consultants. The researcher obtained information on the symptoms and causes of the problem; what persons in the organization had an understanding of the problem; the business functions that supports the present system; the type of data that needs to be collected and reported by the system; things in the documentation that the researcher does not understand and so needed to be covered in interviews. Because there were many documents or records to be studied, the researcher sampled and studied enough samples to identify all the possible processing conditions and exceptions. Literature review was used to research the problem domain by reading Journals, publication, and reference books that provided information on how others have solved similar problems.

Record reviews were used to collect data on SAN standards, RA certification procedures and operations. Record inspection of written policy manuals, regulations and standard operating procedures was performed to help understand the RA certification system. Site visits were made to KTDA factories, FFS groups, farmer's farm and work environment to observe people and activities and learn about the up-scaling of FFS and RA certification.

Through observation, the researchers obtained firsthand information about how activities are carried out, how documents are handled, and how processes are carried out. The researcher was also able to see exactly what was being done, identified tasks that have been missed or inaccurately described by other fact-finding techniques, obtained data describing the physical environment of the task (e.g., physical layout, evidence of RA compliance among others). A

large number of observations were conducted at random intervals. By counting the number of occurrences of each operation during observations, the researchers got a feel of the situation. The researchers also attended the FFS sessions and actively performed the role of the FFS Members and trainers for a short period of time. This helped them to learn about problems, challenges and requirements of the FFS and RA certification system, to appreciate what the user experiences and the activities involved to perform the job. This provided a first-hand education in the business process and functions, as well as the problems and challenges associated with them.

An analysis strategy of the current system and its problems, and then ways to design a new system was done through requirements gathering. The analyses, system concept, and models were combined into a document called the system proposal, which was presented to the project sponsor and other key decision makers. After understanding the current FFS and RA certification system's scope, problems, and opportunities, the researchers established system improvements objectives that define the business criteria on which the new system could be evaluated. The researchers worked closely with KTDA, ETC and tea stakeholders to identify needs and priorities through interviews, questionnaires, and facilitated meetings. Business requirements comprising the KTDA's business objectives and the ultimate vision of what the up-scaling of FFS and RA system will be and do was derived by working with the KTDA management. The Flowchart and Data flow diagram (DFD) were some of the tools and techniques used for describing the system design of the up-scaling of FFS and RA certification system. During the requirements analysis, the stakeholders agreed on the resulting system requirements through a negotiation process to agree on any modifications or simplifications to the system requirements. This led to the development of the business model canvas model printed out on a large surface.

3.8 Data Analysis

Based on the study objective the researchers analyzed the data at a confidence level, set *a priori*, of 0.05α . Qualitative methods were used to answer interpretive and explanatory questions of why, how and in which way while quantitative methods were used to answer objective questions of when, where, how many, at what time and to what extent. The quantitative data were computed using the Statistical Package for Social Sciences (SPSS) version 18. Qualitative data

categorized into appropriate themes, coded and checked for frequencies or percentages of responses to determine emerging trends. The first, second, and third objective were analyzed using Cross Tabulation and Chi-Square to determine association and relationships for categorical data. The qualitatively information in the five objectives were analyzed through document and content analysis, modeling, developing, designing and proposing options and mechanisms for up-scaling FFS and RA certification. The results from analyzed data were presented in charts, tables and an organization structure.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter covers topics on training smallholder tea farmers using Farmer Field Schools' and Rainforest Alliance certification, Kenya Tea Development Agency business model for up-scaling Farmer Field School and Rainforest Alliance certification; Kenya Tea Development Agency Business Model for up-scaling Farmer Field School and Rainforest Alliance certification; Modeling the up-scaling of Farmer Field School and Rainforest Alliance certification system using a context diagram; Examples of inputs, use case description, and participating stakeholders in the up-scaling system, and The leverage points in up-scaling Farmer Field School and Rainforest Alliance certification in Kenya Tea Development Agency factories. The chapter further cover topics such as the proposed Kenya Tea Development Agency Model for up-scaling Farmer Field School; A mechanism for up-scaling the Farmer Field Schools methodology and Rainforest Alliance certification in Kenya Tea Development Agency factories using various options; Estimated cost of conducting a tea-based Farmer Field School for 12 months in Kenya; Rainforest Alliance certification costs; Farmers' benefits of participating in Farmer Field School and Rainforest Alliance certification trainings; Farmers' observed changes in livelihood after training in a Farmer Field School and Rainforest Alliance certification; The process by which Kenya Tea Development Agency factories attain Rainforest Alliance certification; Monitoring and Evaluating the Farmer Field Schools and Rainforest Alliance certification up-scaling process; and Discussion.

4.2 Training Smallholder Tea Farmers Using Farmer Field Schools' and Rainforest Alliance Certification

About 65% of the Farmer Field Schools in the study were formed in the year 2010, 23% were started in 2011, 7% were started in the year 2007 and the rest in 2008 and 2009 (Figure 2).

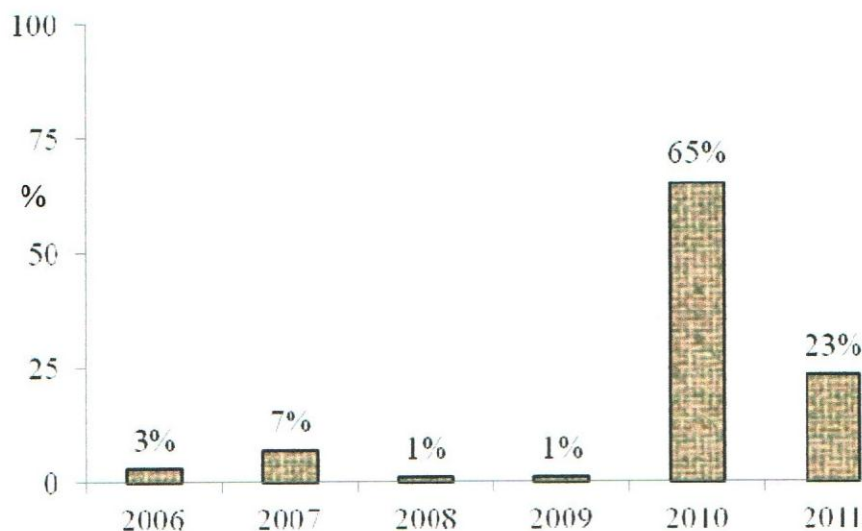


Figure 2. The year the FFS groups were formed

From the results, tea factories that included Gianchore, Iriani, Kapkatet, Kapset, Kebirigo, Kinoro, Mataara, Mogogosiek, Momul, Mudete, Mungania, Ngere, Nyankoba, Nyansiongo, Ogembo, Ragati, Sanganyi, Tegat, Theta and Thumaita contributed 4% of the respondents each from different FFS groups (Table 1). Makomboki tea factory contributed only 2% of smallholder farmer respondents while Kapkoros and Mununga tea factories contributed 6% and 5% respectively. The gender of FFS members varied from factory to factory, ethnicity, region, socio-cultural factors and the method used in recruiting them. Most FFS groups were initiated by the factory management in a top down approach thus attracting members with differing interests and gender. This resulted to some factories having more male than female in the FFSs or vice versa. For example, over 80% of the respondents from FFS groups from Kapkoros, Nyankoba, Kapkatet, Nyansiongo, Ogembo and Sanganyi tea factories were male. Over 60% of the respondents from FFS at Kebirigo, Kinoro, Iriani and Mataara tea factories were female.

The FFS groups from Gitugi, Iriani, Makomboki, Mudete, Ngere, Nyansiongo and Ragati tea factories did not have farmers in the age category of 21 to 30 years. Over 50% of the respondents from FFS groups from Nyansiongo, Ogembo, Ngere, Mudete, Nyankoba, Momul and Sanganyi were over 51 years old. Approximately 89% of the smallholder in Iriani and 83% at Kapkoros

were in the age category of 31 to 50 years. Approximately 10% of the respondents from FFS groups from Mataara, 5% from Kebirigo, 5% from mudete had non-formal level of education compared to 5% of the respondents from FFS groups from Mudete, Theta, Mungania and Thumaita that had university education. About 70% of the respondents from FFS groups from Mataara, 65% of the respondents from FFS groups from Togat, 52% smallholder respondents from Gitugi, 46% smallholder from Mogogosiek, 45% from Theta and 44% from Weru tea factory had received primary level of education. The results indicated a statistically significant relationship in up-scaling FFS and RA certification between KTDA factories and gender, age category and education level of FFS members ($P < 0.5$).

Table 1
Characteristics of Factory-Based Farmer Field Schools under Kenya Tea Development Agency (n=514)

FN	C	%	Gender (%)		Age category of FFS members (%)			Education level (%)				
			M	F	21-30 yrs	31-50 yrs	≥ 51 yrs	NE	PE	SE	CE	UE
Gia	20	3.9	75.0	25.0	5.0	70.0	25.0	.0	30.0	60.0	10.0	.0
Git	23	4.5	47.8	52.2	.0	60.8	39.1	.0	52.2	39.1	8.7	.0
Iri	18	3.5	33.3	66.7	.0	88.9	11.1	.0	33.3	66.7	.0	.0
Kat	20	3.9	80.0	20.0	10.0	55.0	35.0	.0	30.0	60.0	.0	.0
Kor	29	5.6	100.0	.0	6.9	82.7	10.4	.0	10.3	55.2	34.5	.0
Kap	20	3.9	55.0	45.0	10.0	50.0	40.0	.0	25.0	25.0	5.0	.0
Keb	20	3.9	30.0	70.0	5.0	60.0	35.0	5.0	20.0	75.0	.0	.0
Kin	20	3.9	30.0	70.0	5.0	60.0	35.0	.0	25.0	65.0	10.0	.0
Mak	7	1.4	57.1	42.9	.0	71.5	28.3	.0	28.6	42.9	28.6	.0
Mat	20	3.9	40.0	60.0	5.0	50.0	45.0	10.0	70.0	15.0	5.0	.0
Mog	22	4.3	77.3	22.7	4.5	72.7	22.8	.0	45.5	50.0	.0	.0
Mom	20	3.9	75.0	25.0	5.0	45.0	50.0	.0	25.0	50.0	15.0	.0
Mud	20	3.9	75.0	25.0	.0	35.0	65.0	5.0	35.0	50.0	5.0	5.0
Mun	21	4.1	81.0	19.0	4.8	76.2	19.1	.0	28.6	47.6	19.0	4.8
Mnu	26	5.1	73.1	26.9	7.7	50.0	42.3	.0	26.9	46.2	26.9	.0
Nge	20	3.9	75.0	25.0	.0	30.0	70.0	.0	20.0	65.0	15.0	.0
Nya	20	3.9	90.0	10.0	10.0	30.0	60.0	.0	10.0	65.0	5.0	.0
Nys	20	3.9	85.0	15.0	.0	15.0	85.0	.0	20.0	55.0	5.0	.0
Oge	20	3.9	85.0	15.0	5.0	25.0	70.0	.0	5.0	20.0	15.0	.0
Rag	22	4.3	63.6	36.4	.0	63.6	36.4	.0	13.6	77.3	9.1	.0
San	20	3.9	85.0	15.0	5.0	45.0	50.0	.0	20.0	55.0	25.0	.0
Teg	20	3.9	65.0	35.0	20.0	40.0	40.0	.0	65.0	20.0	15.0	.0
The	20	3.9	55.0	45.0	5.0	65.0	30.0	.0	45.0	40.0	10.0	5.0
Thu	21	4.1	52.4	47.6	4.8	71.4	23.8	.0	33.3	57.1	4.8	4.8
Wer	25	4.9	64.0	36.0	4.0	48.0	48.0	.0	44.0	56.0	.0	.0
χ^2				84.5			169.5					359.6
df				24.0			96.0					144.0
P				.00			.00					.00

Key: FN=Factory name; Gia=Gianchore; Git=Gitugi; Iri=Iriani; Kat=Kapkatet; Kor=Kapkoros; Kas=Kapset; Keb=Kebirigo; Kin=Kinoro; Mak=Makombok; Mat=Mataara; Mog=Mogogosiek; Mom=Momul; Mud=Mudete; Mun=Mungania; Mnu=Mununga; Nge=Ngere; Nya=Nyankoba; Nys=Nyansiongo; Oge=Ogembo; Rag=Ragati; San=Sanganyi; Teg=Tegat; The=Theta; Thu=Thumaita; Wer=Weru; Fa= Factory; C=Frequency; M=Male; F=Female; NF=No formal; PE= Primary; SE= Secondary; CE=College; UE=University; yrs=Years; χ^2 = Chi Square; df=Degree of freedom; P=P value

On average the farmers interviewed had been active members of a tea-based FFS for 11.67 months (standard deviation: 13.01; mode: 12 months) while the longest period that they had been active FFS members was 79 months (Table 2). Most of the FFS registered by the Ministry of Culture and Social Services had 30 members; the average was 28 and the maximum of 44. The number of active FFS members was 21, standard deviation of 8.31, mode of 30 and maximum of 35 members. The mean earnings for a smallholder farmer was three hundred (300/=) Kenya shillings per day, standard deviation of 365.05, mode of 200/= and maximum of 3,750/=. The mean number of hours worked per day was 7, standard deviation of 2.49, mode of 8 hours and a maximum of 12 hours.

It was observed that an FFS usually started with at least 30 members but this number gradually decreased to an average of about 21 members. On average, the farmers interviewed had established a buffer area measuring nine meters in width (standard deviation: 20.68; mode: six metres; maximum width: 200 metres). The average width of conservation area was one metre (standard deviation: 1.60; mode: one metre; maximum: 25 metres). The average area planted with tea was two acres and the maximum of 30 acres. Majority of tea farmer had planted about 57 native (indigenous) trees on their farm (mean: 57 trees; standard deviation: 255.76; maximum of 4500). The average number of workers employed as casual labourers was two and a maximum of 100 casual workers while only one worker was employed on permanent basis (Table 2).

Table 2
Farmer Field Schools' Membership and Rainforest Alliance Certification Variables
(n=514)

Variables	Mode	Mean	Max	Sd
Farmer duration as an active member of an FFS (Months)	12.0	12.0	13.0	79.0
Number of registered FFS members	30.0	28.0	7.3	44.0
Number of active FFS members	30.0	21.0	8.3	35.0
Number of household members	5.0	6.0	17.0	2.7
Average earnings per day (Ksh)	200.0	300.0	3750.0	365.1
Hours worked per day	8.0	7.0	12.0	2.5
Width of buffer area (Meters)	6.0	9.0	200.0	20.7
Estimated width of conservation area	1.0	1.0	25.0	1.6
Size of your farm in acres	1.0	2.0	30.0	2.3
Number of native (Indigenous) trees planted on your farm	10.0	57.0	4500.0	255.8
Litres of agrochemical used	2.0	38.0	4808.0	302.0
Number of permanent workers employed on my farm	1.0	1.0	8.0	1.0
Number of temporary workers employed on my farm	2.0	2.0	100.0	6.7
Number of foreign/migrant workers employed on my farm	0.0	0.0	3.0	0.1
Cost of paying worker/ employees per day (Kenya shillings)	150.0	142.0	4000.0	235.0

Key: Max= Maximum; Sd= Standard Deviation

Half (50%) of the FFS members (Figure 3) said they were taught through a combination of English, Kiswahili and Vernacular, 23% of them communicated using vernacular alone, 21% Kiswahili and Vernacular and 6% in English and Vernacular. Over 94% of smallholders indicated the language used in their FFS was appropriate.

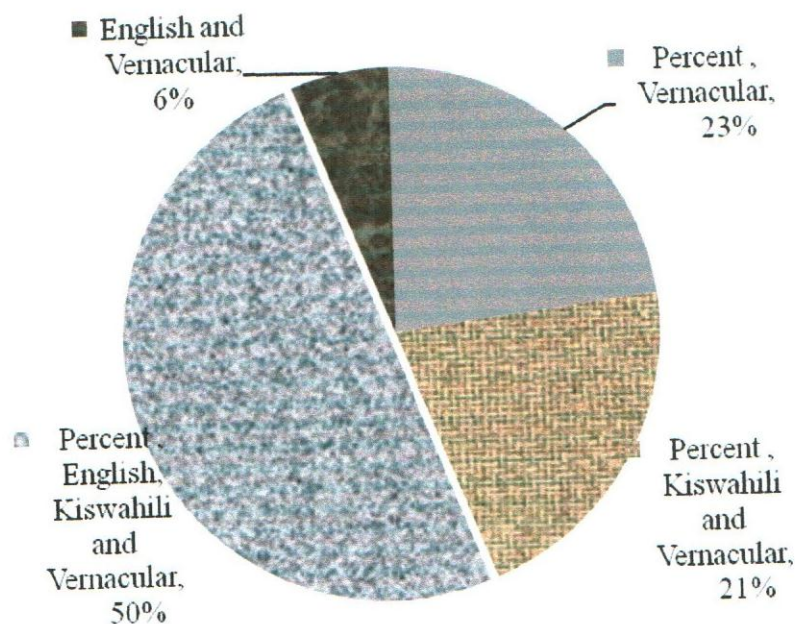


Figure 3. Main language used in Farmer Field School and Rainforest Alliance certification trainings

Over 53% of the FFS members planted tea in their individual farms, 43% of them planted it at the family land and 4% planted it on hired land (Table 3). Less than a third (30%) of the FFS groups had income generating activities. About 10% of the income generating projects in FFSs, were in horticulture and bee keeping, 8% in table-banking and 3% in tea nursery and seedlings. Over 14% of the proceeds from income generating activities in FFS were used to buy farm inputs, 10% of the proceeds was put as a saving in a cooperative society, 9% was used to buy food, 8% was used to buy tea seedlings for gaping and 6% used to hire farm labour. Over 90% of the tea based FFS were facilitated by KTDA extension agents.

Approximately 77% of the smallholder respondents in FFS rated the FFS facilitator's expertise in guiding the FFS activities as high. About 84% of the FFS members indicated that farmers' adapting available technology effectively for tea improvement was one of the factors that explained how tea-related FFS up-scaling processes work. Approximately 69% of the FFS members indicated that FFS up-scaling process could be improved by reducing success-related challenges through proactive strategic research, 70% indicated FFS up-scaling process could be improved by engaging in strategic partnerships with relevant stakeholders, 61% indicated it

could be improved by developing new markets that are responsive to consumer tastes. Over 76% of the FFS members indicated that improvement through networking with stakeholders who are involved in FFS up-scaling and careful monitoring and assessment of impacts were other factors that explained how tea-related FFS up-scaling processes work.

Table 3

Factors That Explain how Up-Scaling Processes Work (n=514)

Factors	Frequency	Per cent
Land tenure system among tea growers		
Individual land tenure system	272	53.0
Family land	221	43.0
Hired land	21	4.0
FFS groups with income-generating activities	154	30.0
Income generating activities by the FFS groups		
Established horticulture and bee keeping projects	49	9.5
Operating a table banking/Merry go round group	39	7.6
Established a tea nursery and sold tea seedlings	16	3.1
Soap making	7	1.4
Established agro-forestry tree nurseries	4	.8
Bought a tea pruning machine	1	.2
Dairy goat production	1	.2
How FFS group members used the proceeds from income generating activities		
Buying farm inputs	74	14.4
Saving in a saving account (SACCO)	53	10.3
Buying food	46	8.9
Buying seedlings for gaping (infilling)	43	8.4
Hiring farm labour	31	6.0
Purchasing training materials	22	4.3
Paying facilitators	3	.6
Facilitators in the tea based FFS		
KTDA extension agent.	466	90.7
FFS-trained farmer	46	8.9
None-farmer expert	2	.4
FFS members rating of the facilitator's expertise in guiding the FFS activities		
High	396	77.0
Moderate	117	22.8
Low	1	.2
Factors that promoted the FFS and RA certification up-scaling processes		
Farmers adapting available technology effectively for tea improvement.	433	84.2
Reducing success-related challenges through proactive strategic research	352	68.5
Engaging in strategic partnerships with relevant stakeholders.	359	69.8
Developing new markets that are responsive to consumer tastes.	315	61.3
Improving networking with stakeholders involved in FFS up-scaling.	392	76.3
Careful monitoring and assessment of impacts.	412	80.2
FFS group members involved in collective tea marketing	23	4.5

Over 93% of the FFS members interviewed (Table 4) indicated that their FFS had an established leadership structure which included the position of chairman, secretary, treasurer and committee members. Smallholder farmers in the FFS exercised various leadership roles as group officials, members, time keepers, lead farmers, appreciating visitors and group members through clapping, singer, energizer and FFS pastors. About 37% of the FFS groups were linked to other networks, groups or partners. About 12% of them were linked to the Ministry of Agriculture, Ministry of Livestock or Dairy Goat Association of Kenya that provided extension and training. Over 4% were linked to other FFS groups while 3% were linked to farmers' forums. Over 20% of the FFS members benefited through exchange of ideas, skill and experience from the linkages or networks, 5% of the FFS groups got trainers and facilitators to their FFS group, 4% enjoyed community relations, 2% were provided with credits and markets or benefited from acquisition of inputs to the FFS members.

Table 4

Governance in Farmer Field Schools (n=514)

Leadership structure in your FFS	Frequency	Per cent
FFS groups with an established leadership structure	496	96.5
Chairman	495	96.3
Secretary	494	96.1
Treasurer	476	92.6
Committee member	490	95.3

Leadership roles (duties) in the FFS

FFS Member	198	38.5
Chairman, chairlady of the sub group, vice-chairman	72	14.0
Host and in-charge of plucking tea at the experiment plots in the farm	8	1.6
Secretary, vice secretary, sub group secretary,	119	23.2
Treasurer	11	2.1
Appreciating visitors and group members by clapping and singing	12	2.4
Trainer/Lead farmer/ Facilitator	13	2.5
Lead prayers in FFS meetings, pastor	8	1.6
Provide and preparing venue for FFS meetings	2	.4
Time keeper and discipline master	21	4.1
FFS groups linked to other networks, groups or partners	190	37.0

Name of the FFS networks groups or partners the FFS groups are linked to

Government Ministries or Dairy Goat Association of Kenya	61	11.9
FFS groups/Networks	18	3.5
Mununga integrated forum	13	2.5
UTZ Certification	5	1.0
Other groups in table banking	1	.4
Buyers of tree seedlings	1	.4
Tea farmers' money saving groups such as Mwanga, Iruma, and Muramati Sacco/bank	5	1.0

Various ways that FFS groups benefit from the linkages or networks

Exchange of ideas, skill and experience	102	19.8
Benefited from trainers, and facilitators to the FFS group	25	4.9
Community relations	21	4.1
Acquire credit and marketing of farm produce together	9	1.8
Provided and facilitated acquisition of inputs to the FFS members	8	1.6

The main information source (Figure 4) on Farmer Field Schools and Rainforest Alliance certification was extension officers from KTDA and government departments (85% and 78%), followed by Kenya Tea Development Agency (71% and 70%), Farmer Field Schools (39% and 47%), farmer-teachers (24% and 25%) and farmer groups (22% and 21%) respectively.

Newspaper and churches were other important sources of information for FFS and RA certification.

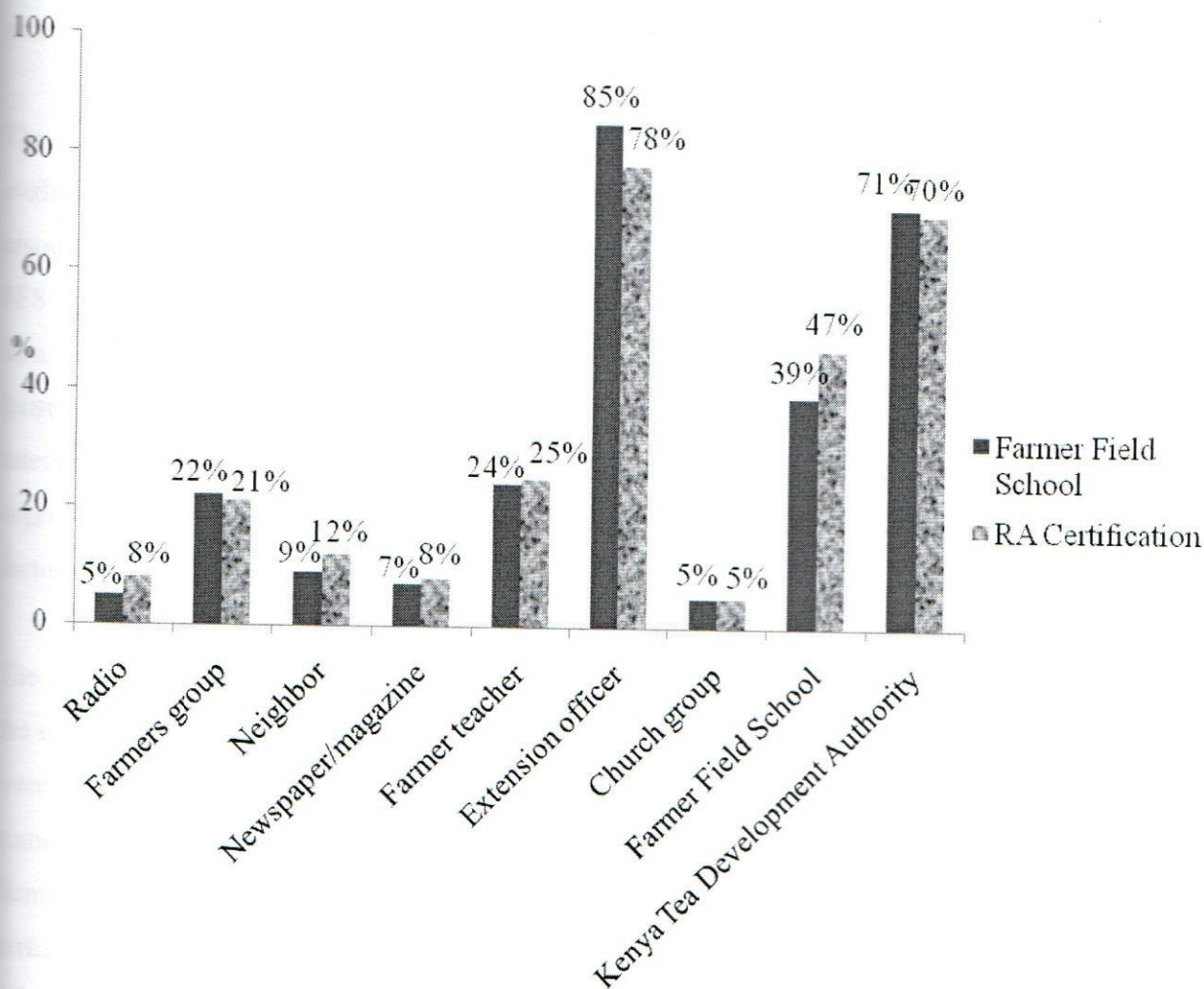


Figure 4. First sources of information on Farmer Field School and Rainforest Alliance certification

4.3 Kenya Tea Development Agency Business Model for Up-Scaling Farmer Field School and Rainforest Alliance Certification

The proposed business model for up-scaling FFS and RA Certification was envisaged to offer (value proposition) (Table 5) increased farmers' knowledge and skills in adopting sustainable tea production. Capacity building to increase knowledge and skills in tea farming practices were identified as central to the value proposition that KTDA offers to smallholder tea producers. This was offered through two channels namely the FFSs (training in tea production and other topics)

and a lead farmer (farmer trainers) system (training in RA certification). The key partners in the up-scaling model were identified as KTDA, The sustainable trade initiative (IDH), tea buyers (Unilever), NGOs and research support institutions. Trainings through FFSs and lead farmers promoted knowledge transfer of sustainable tea practices and RA certification requirements.

The respondents identified key activities in the up-scaling process to be training, monitoring and evaluation, marketing of RA-certified tea and promoting FFS. They also identified the key resources needed for up-scaling as training materials, human resources that include TESAs and FFS groups and internal management system. The respondents noted that smallholder tea farmers could be attracted to participate in the up-scaling of FFS and RA certification process (customer relations) by rewarding the best performing FFS and tea farmers, promoting interactions at leaf collection centres, encouraging FFS to participate in local area development, organizing exposure visits, sensitizing the up-scaling of FFS and RA certification during KTDA factories' annual general meetings and through mass media.

The respondents identified KTDA smallholder tea producers as the main customer segments in the up-scaling process. The costs incurred to up-scale FFS and RA certification (cost structure) were mainly on marketing, trainings, RA certification and compliance costs (farmer and factory compliance, purchase of personal protective equipment, auditors' fees and payment of lead farmers). The source of revenue (revenue streams) generated by the up-scaling of FFS and RA certification process were identified as increased productivity, quality, overall consistency; enhanced sustainability and sustainability fee. The results showed that one key challenge to the model was to create an up-scaling system that could sustain itself financially. The realized productivity and quality improvement arising from FFS and RA certification was assumed that it would deliver enough indirect revenues for KTDA factories to fund the up-scaling of FFS and RA certification costs.

Table 5

Kanya Tea Development Agency Business Model Canvas for Up-Scaling Farmer Field School and Rainforest Alliance Certification

Key partners	Key activities	Value proposition	Customer relations	Customer segments
KTDA (Coordinates need-based involvement)	Training		Acquire motivational equipment; promote interactions at leaf collection centres	
Donors	Monitoring and Evaluation	Production of knowledge and skill	Activate FFS; plan exposure visits; Promote during annual general meetings	
Buyers	Marketing FFS		Promote in mass media	Tea producers in KTDA
NGO/Research support	Marketing tea		Channels	
	Key resources	Enhanced sustainability	Farmer or TESA-led FFS	
	Training materials			
	Human resources TESA/FFS			
	Internal management system			
Cost structure			Revenue streams	
Marketing costs			Increased productivity, quality, overall consistency	
Training costs			Enhanced sustainability	
Certification costs (Purchasing personal protective clothes, paying auditors and RA certification trainers)			Sustainability fee	

Modeling the Up-Scaling of Farmer Field School and Rainforest Alliance Certification System Using a Context Diagram

Figure 5 indicate a context diagram for up-scaling FFS and RA certification modeled to analyze how the up-scaling system interacts with the different stakeholders and specified the system inputs and outputs. The up-scaling of FFS and RA certification itself is viewed as a process. The process symbol defines the boundary of the system. The system itself is shown as a computer in the middle of the diagram. The figures around the outside of the diagram are the actors (persons, organizations, and other information systems that interact with the system). The actors/stakeholders involved in the up-scaling of FFS and RA certification system include KTDA, The sustainable trade initiative (IDH), tea buyers (Unilever), smallholder tea farmers, Farmer field schools, KTDA and factory board of directors, tea consumers, KTDA factory managers and workers, extension agents and farmer trainer, NGOs and research support institutions. The lines indicate the inputs (arrows pointing to the system) provided by actors to the system and the outputs (arrows pointing to the actors) created by the system.

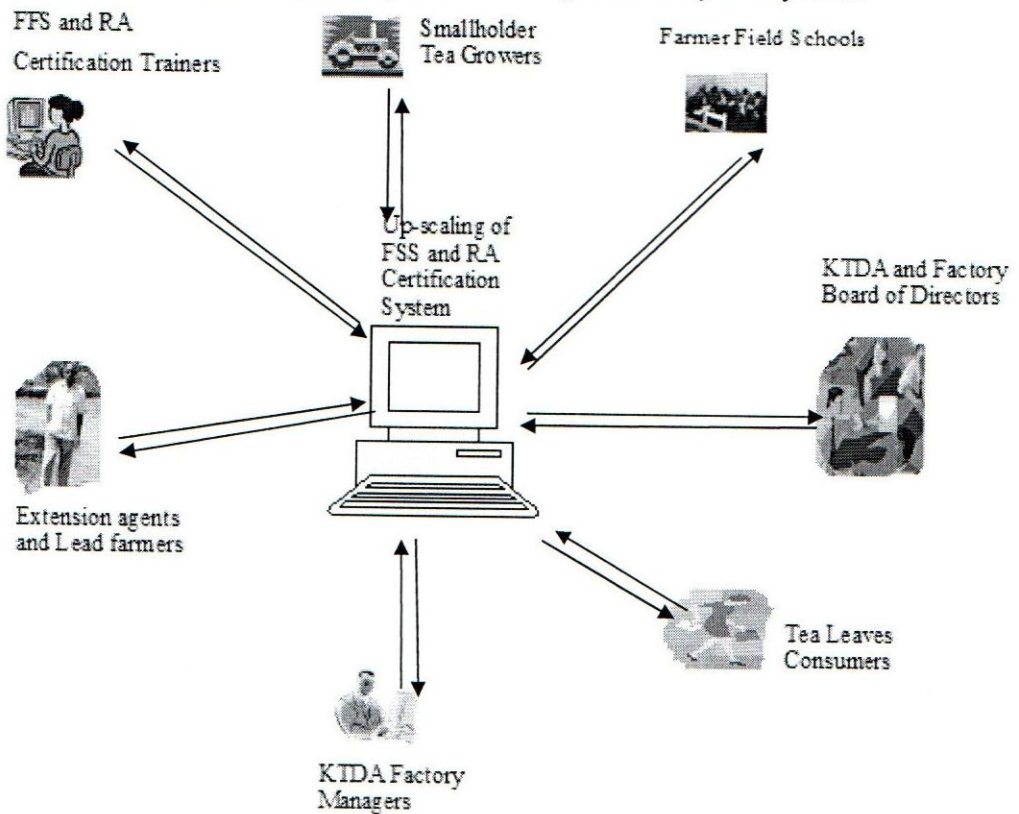


Figure 5. A Context Diagram for up-scaling Farmer Field School and Rainforest Alliance certification

During the field study, the respondents indicated their needs and wants (use case) from the up-scaling of FFS and RA certification process. Table 6 indicates the inputs, the use case description and the participating actors and roles. The Up-Scaling of FFS and Rainforest Alliance certification use cases (the primary inputs that trigger business event) were also identified by looking at the context diagram which indicated how the system interacts with the different stakeholders and specified in general terms the system inputs and outputs. Some of the input or use case identified include to train staff on FFS and RA certification, form FFS, train farmers in FFS and RA certification, place stationery order, recruit members of FFS, record FFS trainings, recruit lead farmers, record adoption of RA certification principles, recruit purchase of PPEs, trace RA-certified tea, label RA certified tea, pay RA certification cost, submit RA certification compliance order and monitor the FFS and RA certification progress.

Table 6

Examples of Inputs, Use Case Description, and Participating Stakeholders in the Up-Scaling System

Input (Use-case Name)	Use case description	Participating actors and roles
Train staff on FFS and RA certification	The event of the KTDA agriculture department training extension staff on FFS and RA certification	FFS and RA certification trainers
Form FFS	The event of the factory managers procedures to start FFS	KTDA factory manager
Train farmers in FFS and RA certification	The event of the KTDA agriculture department training procedures for FFS and RA certification	KTDA and factory board of directors
Place stationery order	The event of a TESA submitting an order to the factory to purchase training materials	Training officer
Recruit members of FFS	The event of the training department recruiting members in FFSs	KTDA factory manager
Record FFS trainings	The event of the factory managers capturing information on FFS trainings	Farmer Field Schools
Recruit lead farmers	The event of an extension agent recruiting lead farmers to train farmers in RA certification	KTDA factory manager
Record adoption of RA certification principles	The event by the factory managers recording the adoption RA certification recommendations	Extension agents and lead farmers
Recruit purchase of PPEs	The event of the extension agents recruiting purchasing of personal protective equipment	Extension agents and lead farmers
Trace RA-certified tea	The event of the factory management ensuring traceability of RA certified	KTDA factory manager; Tea consumers
Label RA certified tea	The event of the KTDA factories in labeling tea products from RA certified tea	Rainforest Alliance; Tea consumers
Pay RA certification cost	The event of the KTDA factories paying certification compliance fees	Factory board of directors
Submit RA certification compliance order	The event of the factory directors submitting a request for RA certification	KTDA and factory board of directors
Monitor the FFS and RA certification progress	The event of the KTDA agriculture department monitoring and evaluation FFS and RA certification	KTDA and factory board of directors

4.5 The Leverage Points in Up-Scaling Farmer Field School and Rainforest Alliance Certification in Kenya Tea Development Agency Factories

System design improve system performance by identifying where improvements are necessary and how to improve and regain lost system performance. Up-scaling of FFS and RA certification could be achieved with the greatest impact if KTDA management created a context for change, divergent views, opinions, and ideas in the up-scaling process. The KTDA staff suggested to be trained to change their attitudes about the up-scaling process because it is a strong leverage point for enhancing FFS and RA certification up-scaling. Changing staff mind-sets in the up-scaling process could be achieved by selecting extension workers with strong personality and attitudes, communicating, repeatedly and consistently pointing out anomalies and failures in the up-scaling process. There is need to develop attitudes of commitment and ownership in the current KTDA staff by training and socializing them to embrace FFS and RA certification up-scaling. This could be achieved by instituting organization-wide training in KTDA to underscore the importance of up-scaling FFS and RA certification.

The capacity building process could start by creating awareness of the need to up-scale, then determining the direction which up-scaling process could take, identifying and evaluating the possible courses of action and making a choice of the preferred action. Mobilizing energy and commitment through joint identification of problems and solutions, developing a shared vision, identifying the leadership required, focusing on results, institutionalizing success through policies and structures and monitoring and adjusting appropriately could improve the FFS and RA certification up-scaling among smallholder farmers.

From the results, the up-scaling process could also be enhanced through proper facilitation, building on the past experience, bargaining for implementation, early involvement of stakeholders, proper and timely communication, gaining commitment, economic incentives and turning perceptions of threats into opportunities. This could involve using change strategies like rational explanation of need for up-scaling, imposing the up-scaling (use of authority) and highlighting the benefits of up-scaling. Changing of attitude could be achieved using multiple strategies like persuasion, exchange of views, training, evidence of success and negotiation.

Using influencing tactics like assertiveness, imposing targets, blocking, incentives, recognition and advancement could enhance the FFS and RA certification up-scaling. Managing resistance to up-scaling could be done through education and communication, participation, negotiation, top management support and coercion.

From the results, focusing on the goal of scalability of FFS and RA certification is a strong leverage point. A goal is a statement of intent about some existing or to-be system. Some authors define business requirements as the high-level goals and objectives of the system. Achieving FFS and RA up-scaling goals could entail giving purpose and direction to staff on what needs to be achieved, involve people in decision making, communicate the up-scaling vision, create plans and taking responsibilities to deliver results. The ability to change or self-organize the up-scaling process by assembling and arranging the resources required and giving people the tasks they are best able to perform in the up-scaling process is also a strong leverage point.

Paying attention to rules of the up-scaling process and structuring information flow in FFS and RA certification up-scaling is a major leverage for change. This is because they define its scope, boundaries, degrees of freedom and change of behavior. The aim is to motivate and develop people to achieve high performance by knowing individuals and their aspirations; adapting leadership style to different people, cultures and situations; identifying and bringing on talent, especially amongst TESAs. The up-scaling process can be enhanced by listening and taking account of diverse views; giving and expecting frequent constructive feedback; tackling poor performance; praising achievements and celebrating success; clarifying future actions; constructively challenging for performance improvement; gaining real commitment to deliver and creating team collaboration. Printing information on FFS and RA certification could have a lot of effect on people's opinions regarding sustainable tea farming.

4.6 Proposed Kenya Tea Development Agency Model for Up-Scaling Farmer Field School

Information from Face-to-Face interviews indicated a five-stage model of FFS up-scaling at KTDA factories. The respondents identified these five phases as the pilot phase, factory level phase, electoral level/areas phase, buying centres phase and all farmers registered in a tea buying

centre phase (Figure 6). Stage one involved a pilot testing of the FFS approach in four KTDA factories at Momul, Ngere, Nyasiongo and Mungania. Each factory had one FFS during the pilot phase. Stage two involved targeting and initiating at least one FFS in several KTDA factories at the East and West of the Rift Valley (Up-scaling within the factories). Stage three involved starting at least one FFS in one buying centre per KTDA electoral area/zone based on the availability of TESAs (Up-scaling within the electoral area/zone). KTDA factory companies are managed by directors elected from several electoral areas/zones. Many factories have about six electoral areas represented by a director. The fourth stage of up-scaling was across the tea buying centres in every electoral area. Up-scaling within the electoral area involved targeting the remaining buying centres gradually to have at least one FFS per buying centre until there is one FFS in each buying centre in a given electoral area. This phase is targeted to be completed by end of 2015. An electoral area/zone comprises several tea buying centres distributed across the factory catchment. A tea buying centre has approximately 300 registered tea growers. The fifth stage of up-scaling was to up-scale to more than 560,000 tea growers within the 3250 tea buying centres. This involves forming more FFSs within a given buying centre.

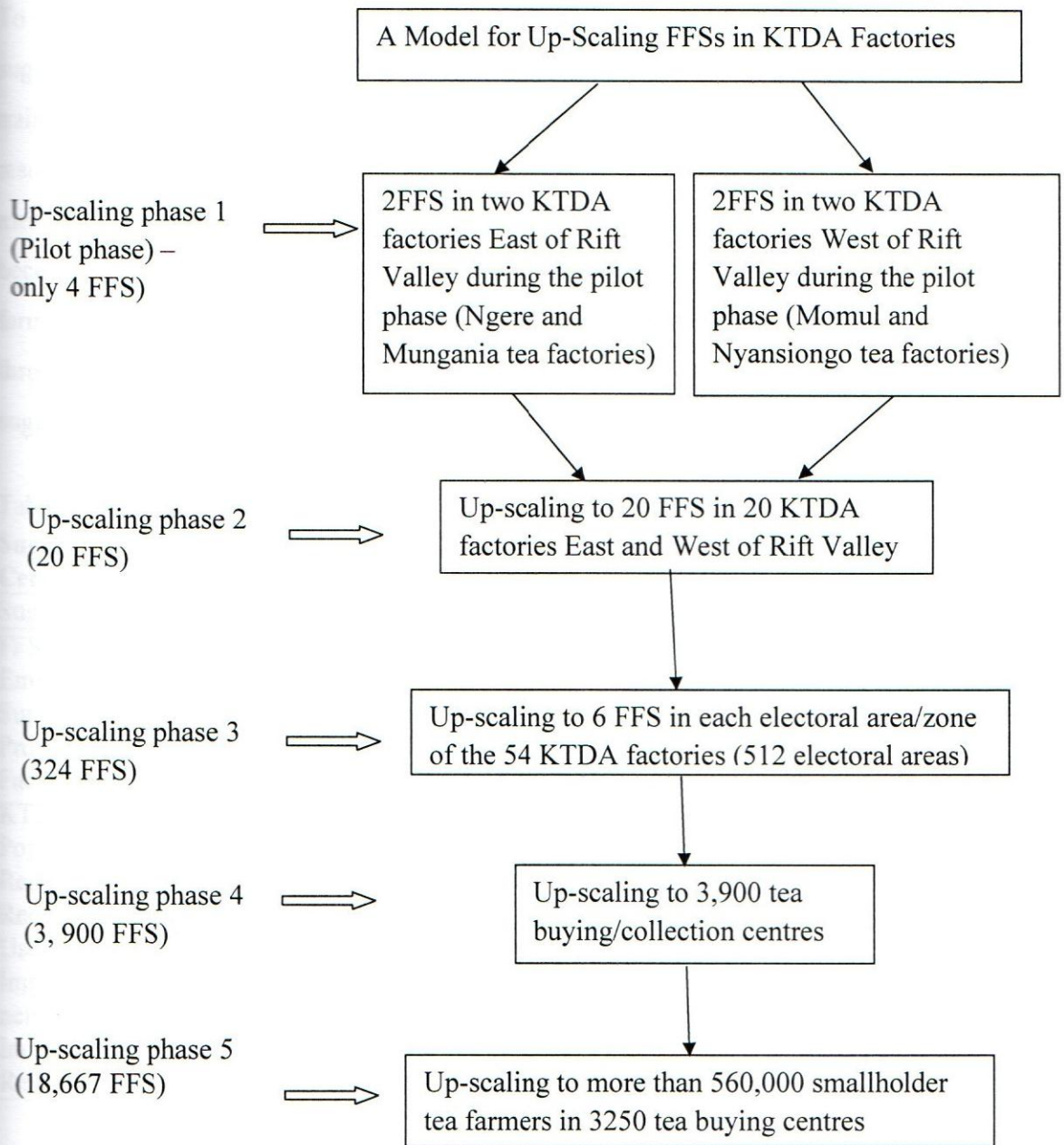


Figure 6. A Kenya Tea Development Agency model for up-scaling Farmer Field Schools

To enhance up-scaling of FFSs and RA Certification (Table 7), over 23% of the FFS members suggested to be facilitated to visit other successful groups, 21% suggested empowering FFS trained farmers to form, facilitate and train new FFS, 19% Support FFS groups with material resources and 16% suggested providing funds to paying farmer led-FFS facilitators and FFS members. Approximately 16% of the respondents suggested facilitation of members in FFS to become role models by motivating them, 12% suggested KTDA to increase the number of farmer-led FFS and RA facilitators, 6% suggested popularizing FFS and RA certification through public forums like barazas, 5% to reduce the costs involved in RA certification while 5% suggested Reduced FFS meeting time.

Table 7
Suggestions by Farmers on How to Up-Scale Farmer Field Schools or Rainforest Alliance Certification (n=514)

Suggestions by farmers on how to up-scale FFSs or RA Certification	Frequency	per cent
FFS members to be facilitated to visit other successful groups	121	23.5
Empower FFS trained farmers to form, facilitate and train new FFS	108	21.0
Support FFS groups with material resources	100	19.5
Provide funds to paying farmer led-FFS facilitators and FFS members	81	15.8
Facilitate members in FFS to become role models by motivating them	80	15.6
KTDA to increase the number of farmer-led FFS and RA facilitators	63	12.3
Popularize FFS and RA certification through public forums like barazas	32	6.2
Reduce the costs involved in RA certification	28	5.4
Reduce FFS meeting time	24	4.7
Use the tea buying centre as avenues for training FFS by Lead farmers	16	3.1
Improving linkages of FFS members to other extension providers, FFS networks and initiate income generating projects	11	2.1
Increase the number of FFS facilitators	9	1.8
Reward farmers that have implemented RA in their farm	6	1.2

4.7 A Mechanism for Up-Scaling the Farmer Field Schools Methodology and Rainforest Alliance Certification in Kenya Tea Development Agency Factories Using Various Options

The results (Table 8) indicated four options for up-scaling Farmer Field Schools and Rainforest Alliance certification. They include:

A. Maintain the system as it is. The strength of this option is that it is already working, many FFSs are operational and some factories are RA compliant. The major weakness is that it may

take longer before all KTDA farmers are reached and the speed of scalability will be slowed or halted.

- B. Have FFS only: The strength of this option is that farmers will benefit from hands on experience. However, farmers will miss benefits of RA certification and this methodology may not reach educated and well to do farmers, whose opportunity cost of attending FFSs is very high.
- C. Have RA only: The strength of this option is that all physical and human resources can be used to enhance RA certification. But RA certification deals with tea that is already established and therefore prospective tea growers will not benefit from RA certification in the initial stage of developing their tea farms. Also, farmer might not benefit from other extension methods such as field days and other methods of transferring technologies.
- D. Maintain the current system with some improvements including use of field days, farm visits and mass media. The strength of this option is that compliance with up-scaling of FFS and RA certification would be faster and would benefit more farmers, the quantity and quality of sustainable tea would be increased, market accessibility would be guaranteed and all stakeholders in the value chain would benefit from sustainable tea. More physical and human resource would be required. However, goodwill from different stakeholders will be required to make the system efficient and effective. Improvement on this option can be made to reach educated and well-to do farmers through information technology like Internet and Telephone messaging, Initiate farmer-led FFS, Involve other stakeholders and Ensure that in the management structure of KTDA people are specifically assigned to do participatory monitoring and evaluation.

Options for Up-Scaling Farmer Field Schools and Rainforest Alliance Certification

Option	Strengths	Weaknesses	Proposal for improvements/implications
Maintain the current system as it is	It is already working. Many FFSs are operational and some factories are RA compliant	It may take longer before all KTDA farmers are reached	Implication A. People are satisfied with its current performance B. No additional investment of staff and resources C. Speed of scalability will be slowed or halted
Have FFS only	Farmers will benefit from hands on experience	Farmers will miss benefits of RA certification. FFSs may not reach educated and well to do farmers, whose opportunity cost of attending FFSs is very high	Implication Farmer might not benefit from other extension methods such as field days and other methods of transferring technologies
Have RA only	All physical and human resources can be used to enhance RA certification	RA certification deals with tea that is already established and therefore prospective tea growers will not benefit from RA certification in the initial stage of developing their tea farms.	Implication Farmer might not benefit from other extension methods such as field days and other methods of transferring technologies.
Maintain the current system with improvements by using FFS for training RA certification issues	Compliance with up-scaling of FFS and RA certification would be faster and would benefit more farmers; quantity and quality of sustainable tea increased; Market accessibility guaranteed	More physical and human resource would be required. Goodwill from different stakeholders will be required to make the system efficient and effective	Reach educated and well-to do farmers through information technology like Internet and Telephone messaging. Initiate farmer-led FFS Involve other stakeholders. Ensure that in the management structure of KTDA people are specifically assigned to do PM&E

4.3 Estimated Cost of Conducting a Tea-Based Farmer Field School for 12 Months in

Kenya

The cost of setting up and running a Farmer Field School varied depending on the enterprise and the cost of facilitators and the materials required for training. Table 9 indicates the cost of conducting a tea-based FFS in Kenya for 12 months based on the 2011 prices as derived from KTDA field staff and smallholder farmer respondents. In the study area, the average cost of hiring a venue per year was Kenya shillings 17,100/=. Money was also spent to buy stationery (e.g., a flip charts was bought 400/= Kenya shillings, exercise books at 675/=, pens at 675/=, file folder at 675/=, felt pens at 180/=) and a flip chart tri-pond stand for Kenya shillings 600/=. In order to run an FFS effectively, one needs to build the capacity of staff or to engage competent/qualified trainers. Their remuneration would depend on their level of formal education, experience, seniority and whether they are from the public or private sector. The FFS facilitators who are farmers earned less than well trained FFS facilitators from extension, research or other specialists. Although KTDA tea factories had no obligation to pay the salaries of such facilitators, they gave a facilitation allowance.

KTDA factories gave FFS farmer-trainers a facilitation fee of 500/= per session and non-farmer trainers a facilitation fee of 1,000/=. The respondents proposed that a trainer from a research institution should be given a facilitation fee of 3,337/=: an extension agent 1,689/= and a farmer facilitator 1,310/=. The FFS participants took some refreshments anytime they met for training costing 1733/= per session and spent 2,639/= to buy fertilizer for the demonstration plot. They also used 558/= to buy pruning saws, 487/= to buy watering cans, and 450/= to compensate the host farmer for offering the 90 tea bushes used by FFS members for field experiments, 3,000/= for tea and snacks during meetings organized at the KTDA factories and 20,000/= for visiting and training in a research station.

Most KTDA factories spent an average of 182,290/= to run a Farmer Field school per year, which translates to 6,076/= or \$71 (182,290/= divided by 30 FFS members) per farmer per year. In the opinion of most FFS members, this amount was inadequate and should be increased. They

proposed an FFS budget of 231,746/=. This translates to 7,725/= (\$91/= at an exchange rate of 1/=Ksh85/=) per farmer per year (231,746/= divided by 30 FFS members).

Table 9
Cost in Kenya Shillings of Conducting a Farmer Field School for Twelve Months (n=514)

Item	Proposed by farmers			Spent by a KTDA factory		
	Unit cost	No	Total cost	Unit cost	No	Total cost
Hiring a venue	1,125	24	27,000	300	24	7,200
Flip chart	400	1	400	400	1	400
Exercise books	30	30	900	15	30	450
Pen	30	30	900	15	30	450
File Folder	30	30	900	15	30	450
3 felt pens	180	1	180	180	1	180
Flip chart/ tripod stand	600	1	600	600	1	600
Paying researcher facilitator	3,337	4	13,340	1,000	4	4,000
Paying extensioni facilitators	1,689	24	40,536	1,000	24	24,000
Paying farmer-led Facilitator	1,310	3	3,930	500	3	1,500
Estimated cost of refreshment	1,733	24	41,592	1,733	24	41,592
Fertilizer,	2,639	1	2,639	2,639	1	2,639
Pruning saws	558	5	2,790	558	5	2,790
Watering cans	487	5	2,435	487	5	2,435
FFS members tour costs to factory	20,000	1	20,000	20,000	1	20,000
FFS members tour to a research station	20,000	1	20,000	20,000	1	20,000
Compensation for 90 tea bushes x 5 groups x 1kg/bush/year	450	40	18,000	450	40	18,000
Hospitality costs (tea & snack)	3,000	2	6,000	3,000	2	6,000
Cost incurred by the TESA's when training in FFS.	2,467	12	29,604	2,467	12	29,604
Total costs			231,746			182,290

Note: The current level of KTDA financial support for the FFS facilitators is inadequate and might not attract the quality and commitment of the qualified professionals required.

The KTDA Tea Extension Service Assistant (TESA) that trains tea farmers in an FFS visits 30 farmers in the FFS group for two monthly sessions of two hours each. The TESA's opportunity cost in terms of the time spent in the training is based on the TESA's monthly salary and 8 hours' work per day. This comes to Kenya shillings 467/=: 28,000/= divided by 30 days by eight hours times four hours. The TESA gets 1,000/= for training in an FFS per day (500/= for travel and 500/= for lunch), which comes to 2,000/= for

the two monthly training sessions. Since a tea-based FFS has 30 members, the combined cost of training them would be Kenya shillings 2,467/= ($467 + 2,000$) or 82/= Kenya shillings per farmer ($2,467/=$ divide by 30 farmers).

Although the FFS learning takes an average of only two hours, participants spend more time preparing to attend and adjusting to do other things after the FFS session is over. The exact time that farmers spend before and after the training varied from farmer to farmer. Although this time is often not taken into account in calculating the cost of a tea-based FFS, it must be considered calculating the farmers' opportunity cost. Because most FFS members did not keep time, the FFS sessions often started later than scheduled and tended to take longer than planned, which means using the two hours to calculate the cost of farmers' time at the FFS are just a minimum. The FFS session often took longer and members coped by extending the session. They sometimes spend the whole morning or afternoon in FFS trainings but on average they spent three hours attending the FFS. This opportunity cost of the farmer's time in FFS could be used for income generating. For a farmer who earns 300/= per day and spends three hours attending an FFS, he would have to forgo an income of Kenya shillings 225/= (i.e. $300/=$ divide by eight hours per day times three hours per session times two sessions per month). When a farmer's opportunity cost of attending an FFS (Kshs 225/=) is added to the cost of a TESA training a farmer in the FFS (82/=), the total cost per farmers was Kenya shillings 307/= or \$3.6, where \$1=Kshs 85/=.

While calculating the cost of a field day organized by KTDA to train farmers on tea, the researchers considered the cost incurred by six TESAs to administer the field day based on a TESA's monthly pay of 28,000/=, the TESA's transport expenses to the field day, participants' cost of food and refreshments, and participants' opportunity cost for attending the field day. Six field days, each lasting a full day, were being conducted every year in all the six electoral areas. The monthly cost of conducting a field day is $28,000/=$ divide by 30 days times six TESAs is equals 5,600/= (\$65.88) that trains 400 farmers. The cost of hiring trainers (usually six per field day) to conduct a mini tea-based field day per farmer is Ksh 14/= or \$0.16 ($Ksh\ 5600/=$ divide by 400 farmers). The cost of conducting a major tea-based field day (attended by 800 farmers) is Ksh 14/= divide by two, which is equal to 7/= or \$0.08. KTDA spends 20,000/= per mini field

day and 120,000/= for a major field day to cater for refreshments and transport. The amount spent per field day per farmer is equal to (20,000/= divided by 400 farmers and 120,000 divided by 800 farmers) 50/= and 150/= respectively. Farmers' opportunity cost of attending a field day, based on a farmer's pay per day, was 300/=. The total cost of educating a tea farmer in a mini field day was 364/= or \$4.28 (14/= plus 50/= plus 300/=). The total cost of educating a tea farmer in a major field day was 457/= or \$5.38 (7/= plus 150/= plus 300/=).

While calculating the cost of training a tea farmer through a farm visit, a KTDA TESA is required to visit 100 farmers per month. The TESA's opportunity cost of making a visit to a farmer's farm is calculated on the basis of the TESA's monthly salary of 28,000/= Kenya shillings. Assuming he can train 100 farmers (4 farmers per day for 25 days) in one month about tea, his opportunity cost would be equal to 280/= (28,000/= divided by 100 farmers). The TESA receives 500/= per day for travel and 500/= for lunch in each of the 25 daily visits to farmers per month. The cost would be (500 + 500) x 25 days) or 25,000/= per month divided by 100 farmers equals a cost of 250/= (25,000/= divided by 100 farmers). In calculating the exact cost of a farm visit, one must consider the cost incurred by the extension agent and the opportunity cost that a farmer forgoes in order to welcome and receive training from the extension agent. The farmer's opportunity cost of participating in a training session on the farm was calculated on the basis of his or her average daily earning of 300/=: which covers eight working hours per day. The farm visit lasts an average of two hours which translates to a farmer's opportunity cost of 75/= (2hrs divided by 8hrs x 300/=). When the farmer's opportunity cost (75/=) is added to a TESA's two hours' pay (280/=) and transport cost (250/=) it becomes 605/= (\$7.1), which is then the total cost of a two hours' field visit.

4.9 Rainforest Alliance Certification Costs

The cost of obtaining a RA certificate per factory depended on the numbers of farmers in that factory and the percentage of farmers practicing various RA certification principles. About 65% smallholder tea farmers had established conservation/buffer areas alongside streams and rivers on their farm, 83% had established conservation areas, 77% of them had dug waste water capture pit while 76% smallholder tea farmers managed solid waste by recycling or removing from the

farm (Figure 7). More than 76% tea growers used agrochemicals at the farm, 54% recorded the type of agrochemicals used, 50% tracked the quantity of agrochemicals they used per year, 42% recorded the type of toxicity level, 70% use appropriate personal protective equipment where required and 55% of them provided portable water to farm-workers.

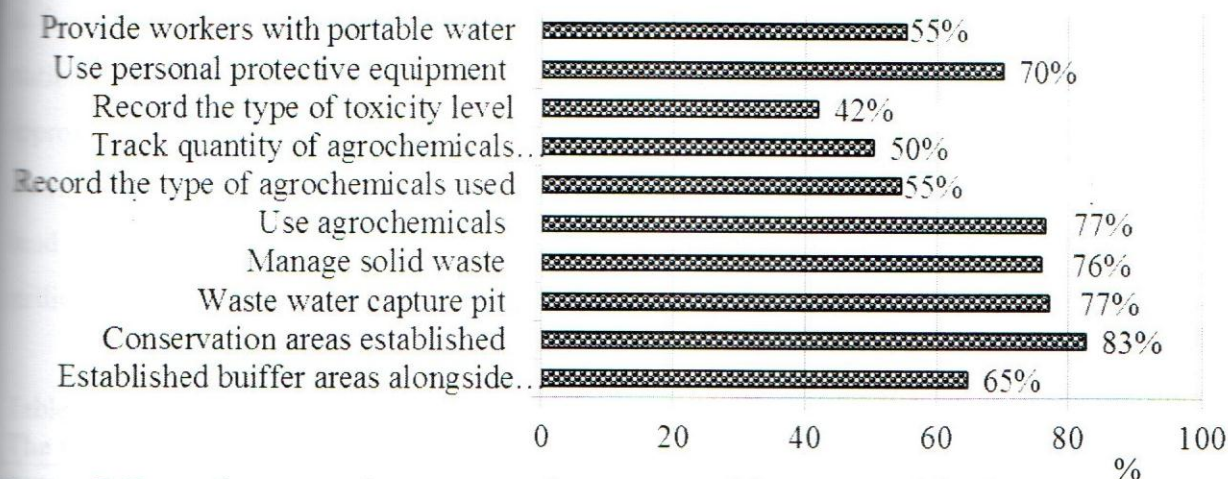


Figure 7. Type of necessary investment and percentage of farmers practicing it

The cost of obtaining a RA certificate per factory was \$470,000, while the recurrent cost of certification per year was \$170,000 (Table 10). The cost of obtaining the RA certificate per farmer was \$43 and \$0.24 per kilo. The recurrent cost of obtaining the certificate per farmer was \$15 and \$0.01 per kilo. The average fees for RA certification inspection was 7,300/= Kenya shillings (\$85.9/=) with the average cost per farmer inspected being 50/= Kenya shillings (\$0.6). The factories pay the auditor's fees while other RA certification costs are sponsored by The Sustainable Trade Initiative (IDH). The costs paid to external auditors depended on the size of the factory (whether big or smaller) but ranges from \$12,000 to \$19,000. Those tea factories with about 30,000 tea growers paid a maximum of \$43,000 while on average it costs about \$1.5- \$2.5 per farmer depending on factory size. The costs per farmer are higher in factories with relatively large number of farmers. During the pilot phase in 2008, the lowest paid audit fees amount was \$15,000. Initially, the factory companies used to pay annual RA certification fees but the arrangement was stopped in 2010. The charges for RA certification are about \$5 per hectare per year with a ceiling of \$5,000. Tea growers also incur direct cost at farm level especially on buying personal protective equipment's (PPE) at 1,800/= Kenya shillings (\$21.2/=). They also

spend huge resources to provide workers with potable water, establishing buffer areas, establishing soil and water conservation structures, digging waste water capture pit, and managing solid waste from the farm. Other costs incurred during RA certification include nine million Kenya shillings on waste water treatment, cost of compliance by the factory, cost of facilitating internal factory and farmer audits, cost of sensitizing and training on RA certification at factory and farm level. At the factory level, the training expenses are incurred for buying stationery, posters and paying trainers which according to Rainforest Alliance costs approximately \$2.5 per farmer. There are also costs of continuous monitoring at farm level, internal inspection and recurrent expenditures for the RA certification co-coordinators at KTDA head office and the two regional offices. On average, the factories spend approximately one million Kenya shillings including the cost of stationery and hospitality.

Table 10

The Cost Items in Rainforest Alliance Certification in a Tea Factory

Item	Cost in \$
Obtaining RA certificate per factory	470,000.00
Recurrent cost of certification per year	170,000.00
Obtaining the RA certificate per farmer	43.00
Obtaining the RA certificate per kilo	0.24
Recurrent cost of obtaining the certificate per farmer	15.00
Recurrent cost of obtaining the certificate per kilo	0.01
The average fees for RA certification inspection	85.90
Average cost per farmer inspected	0.60
Range of fees paid to external Auditors	12,000 to 19,000.00
Range of RA certification costs per farmer	1.50- 2.5.00
Lowest amount paid to RA certification auditors	15,000.00
The charges for RA certification per hectare per year	5.00
Maximum cost of RA certification	5,000.00
Cost of buying Personal Protective Equipments (PPE)	21.20
Training expenses (buying stationery and paying trainers) per farmer	2.50

Over 86% of the total Rainforest Alliance certification costs was incurred by tea growers at farm level to provide workers with potable water, establishing buffer areas, establishing soil and water conservation structures, digging waste water capture pit, purchase personal protective equipments and managing solid waste from the farm (Figure 8). Over 5% of the RA certification cost was used to train tea growers and factory workers on SAN standards and Rainforest

Alliance certification requirements. About 5% of the total RA certification cost paid external auditors while approximately 2% was used to pay internal farm audits. Other costs were on facilitating internal farmer audits, payment for factory compliance, facilitating trainings at the factory level and facilitating internal factory audit.

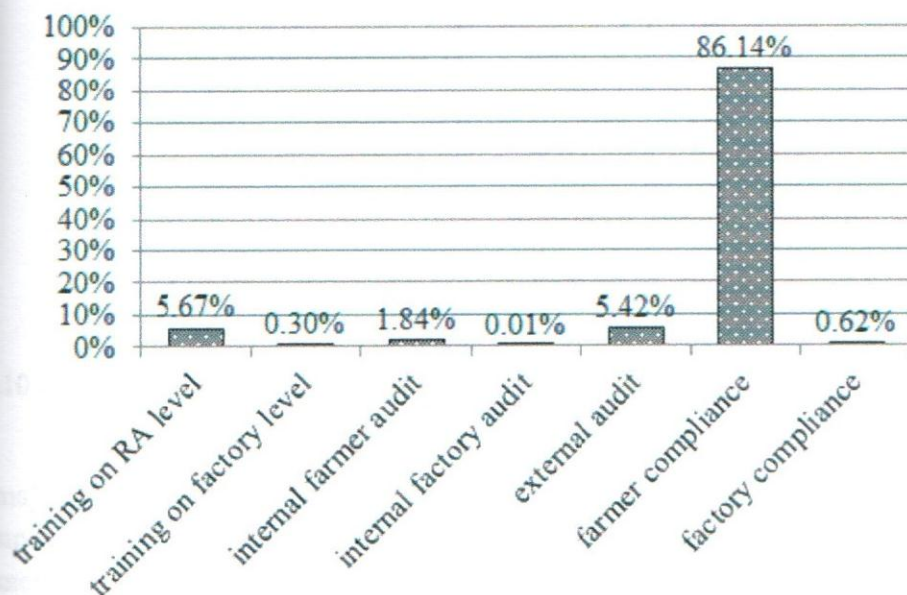


Figure 8. Cost of obtaining Rainforest Alliance certification

Over 78% of the recurrent expenditure on Rainforest Alliance certification was incurred by the farmer to comply with all the ten RA certification principles (Figure 9). Over 15% of the recurrent cost was used to pay external auditors while 5% was spent in facilitating internal farmer audits. Other RA certification costs were on payment of the factory compliance, facilitating trainings on RA certification at factory and farm level and facilitating internal factory audit.

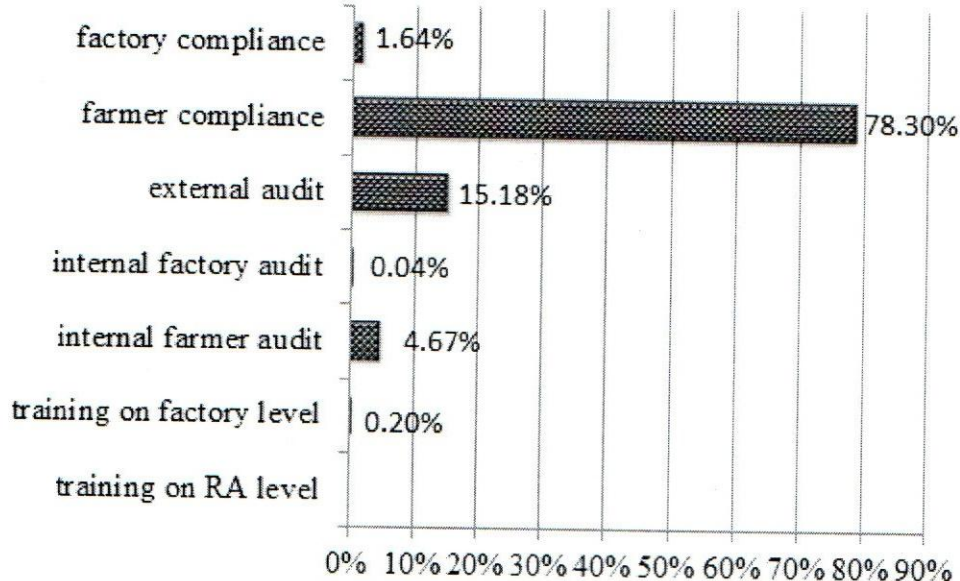


Figure 9. Recurrent cost of Rainforest Alliance certification

4.10 Farmers' Benefits of Participating in Farmer Field School and Rainforest Alliance Certification Trainings

Smallholder farmers in this study (Figure 10) benefited from participating in the FFS through empowerment in sustainable farming, better tea husbandry, improved yields, social capital benefits and leadership skills.

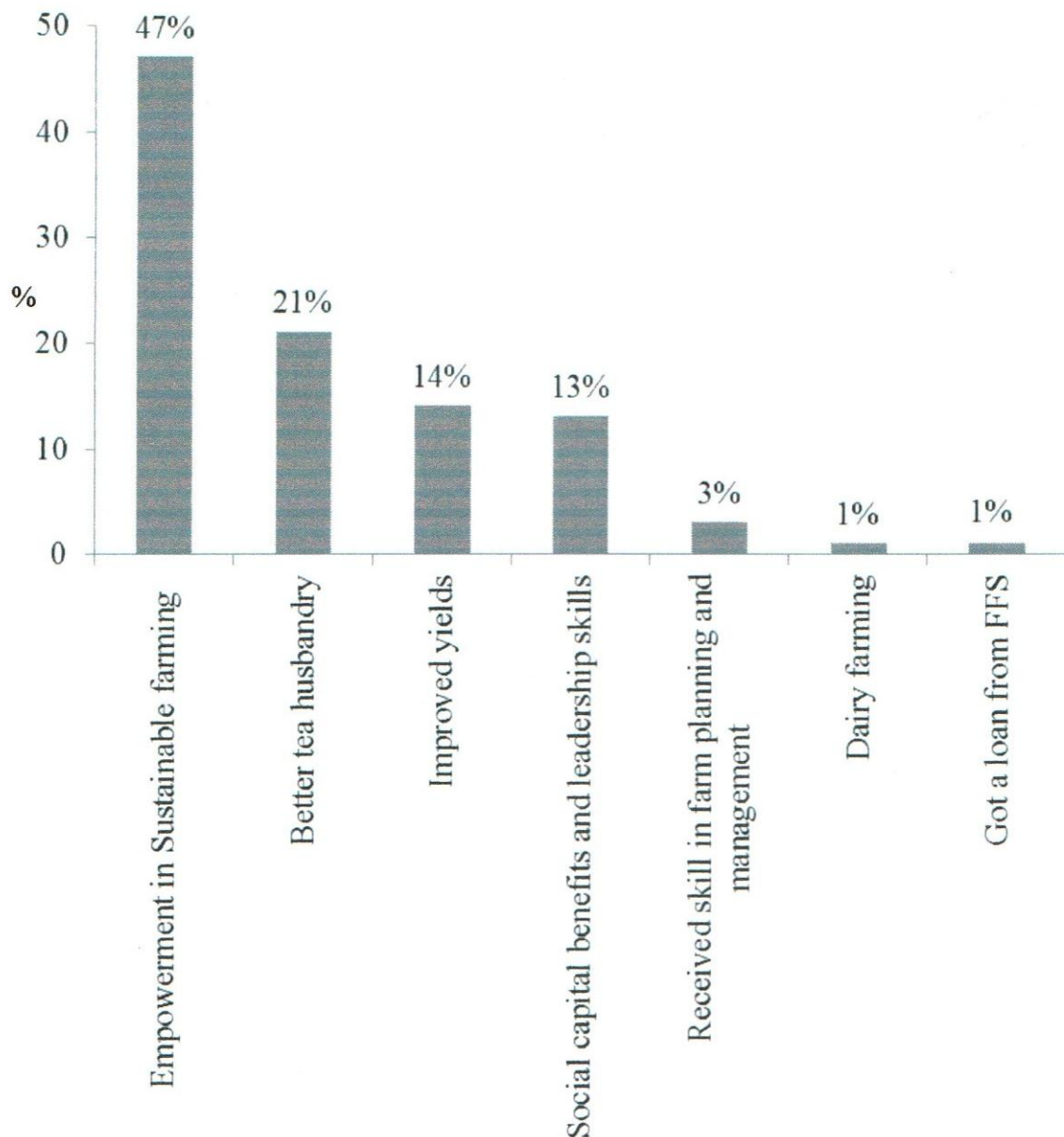


Figure 10. Farmers' benefits of participating in Farmer Field School trainings

About 20% smallholder farmers in the study (Figure 11) benefited from participating in RA certification trainings. They learned about land, soil, water and environmental conservation, improved hygiene and personal health due to safe use of agrochemicals, waste and water Management and good agricultural practices and sustainable farming.

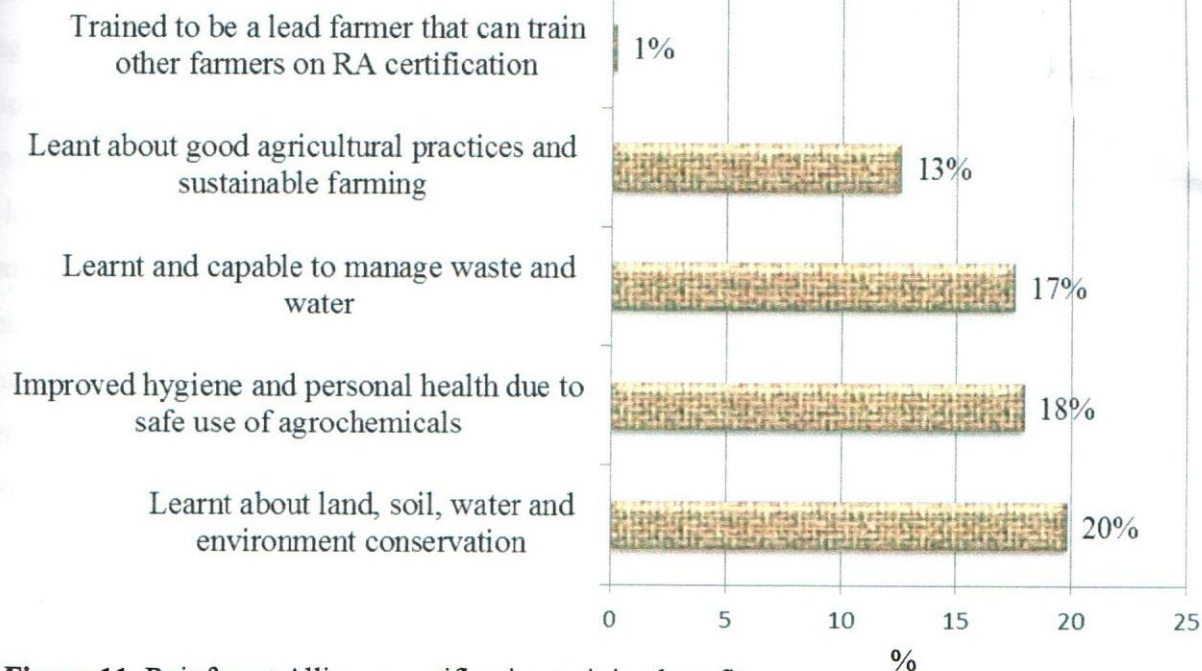


Figure 11. Rainforest Alliance certification training benefits

By the farm having a social and environmental management systems, most farmers find that such a system not only improves conditions for workers and the environment, but also results in better-organized and more efficient farms. The farmer are able to conserve the existing ecosystems and aid in the ecological restoration of critical areas such as waterways, wetlands and forested areas from erosion, contamination, uncontrolled tree logging and deforestation. The RA certified farms serve as refuge for wildlife and endangered species because their habitats on the land are protected. The farm benefit from better utilization of water because the SAN standard requires that farmers conserve water by keeping track of water sources and consumption. This involves modifying a farm's practices and machinery or installing new technology to reduce water consumption or to avoid contamination of springs and rivers on and near the farm. Farmers are also required to have the proper permits for water use, treat wastewater and monitor water quality. The farm workers benefited from improved working conditions from good house condition, with portable water, sanitary facilities and waste collection. Workers and their families have access to healthcare and education. Workers are made aware of their rights and of farm policies and benefit from legally established salaries, work schedules and any benefits

required by the national government. Farmers also benefit from improved occupational Health since the RA certified farms have an occupational health and safety programs to reduce the risk of accidents. This was achieved by training farmer on safe use of agrochemicals, acquiring and using the necessary protective gear while ensuring that farm infrastructure, machinery and other equipment were in good condition and posed no danger to human health. Farmers also benefit from good community relations with their neighbors since they inform surrounding communities and local interest groups about their activities, plans and consult with interested parties about the potential impacts of their farm. They also contribute to local development through employment, training and public works. By practicing an integrated crop management, the farms eliminate all chemical products that pose dangers to people and the environment. By long-term conservation improvement program of soils, the certified farms take steps to prevent erosion, apply fertilizer based on crop requirements and soil characteristics and use organic matter to enrich soil.

The farms also benefit by being clean and orderly. This is because RA certified farms have programs for managing waste through recycling, reducing consumption and re-use. Waste is segregated, treated and disposed of in ways that minimize environmental and health impacts while workers are educated about properly managing waste on the farms and in their communities. RA certified farms also benefit from market assurance, competitiveness and compliance with consumer demands who are keen and stress on sustainable source; improved prices depending on how the entity (factory) negotiates with the buyer (marketers); Rainforest Alliance certification creates tea demand and increase the pool of sustainable tea where marketers and consumers can select from; market access through Unilever which is a major player at international level in tea marketing which is targeting to buy its tea from only sustainable sources by 2015.

4.11 Farmers' Observed Changes in Livelihood After Training in a Farmer Field School and Rainforest Alliance Certification

Over 84% of the smallholders recorded a good-to-excellent increase in yields and reduced tea plucking interval after training in FFSs' and Rainforest Alliance Certification, 78% observed good-to-excellent change in improved public health, 76% observed a good-to-excellent increase in empowerment and increased savings while 62% observed increased ability to fund own

activities (Figure 12). However, 58% of the smallholders' ability to pay facilitators' costs remained poor, 33% of their ability to acquire affordable credit was poor, 31% of their ability to lobby through farmer networks (e.g., for better tea prices) was unchanged, 30% of their ability to pay operational costs did not improve, 27% of the smallholders said their chances for membership to a federation was poor. Twenty five percent were yet to market their farm produce as a group and 24% were yet to access linkages and networking with other groups. This lack of progress was probably because many FFS groups were still in the early stages of their curriculum and were yet to observe real changes in their livelihood.

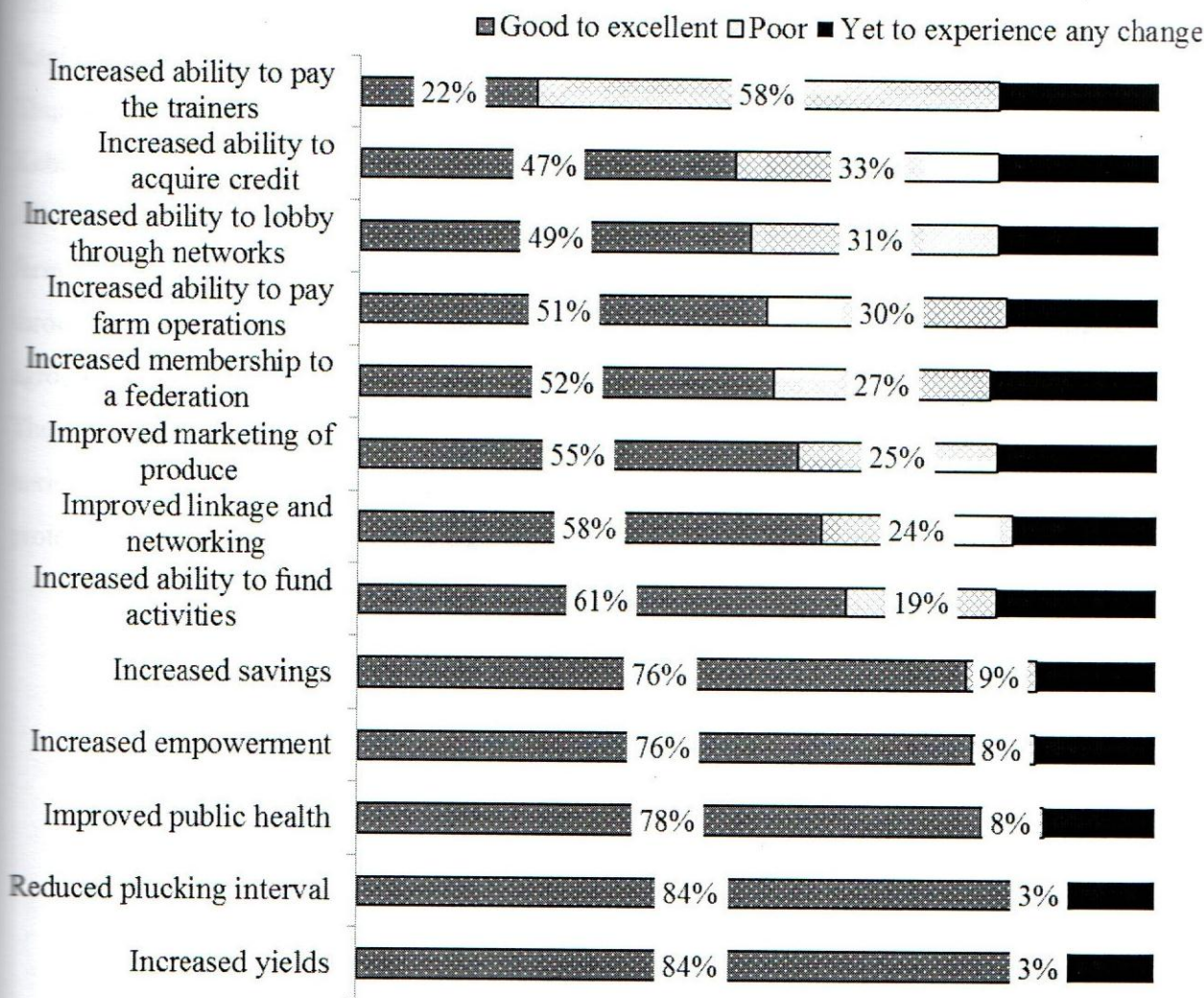


Figure 12. Farmers' observed changes in livelihood after training in a Farmer Field School and Rainforest Alliance certification

4.12 The Process by Which Kenya Tea Development Agency Factories Attain Rainforest Alliance Certification

All members of FFS at many KTDA factories (Table 11) had been trained in RA certification compared to only 40% at Kebirigo, 50% from Kapset, 65% from Gianchore, 75% from Ogembo and 80% from Nyankoba. Only 15% of FFS members' farms had conservation/buffer areas established alongside streams and rivers at Ogembo tea factory, 24% from Weru, 32% at Ragati, 40% at Kebirigo, 44% at Iriaini, 45% at Gianchore and Kapset. All FFS members' farms at Kapkoros, Makomboki, Mataara, and 90% at Ngere, Theta and Thumaita had conservation/buffer areas established alongside streams and rivers. All FFS members' farms at Kapkoros, Kinoro, Makomboki, Mataara, Ngere, Ragati and over 95% at Mungania, Theta, Thumaita and Weru had conservation areas established in the farm. Only 30% at Ogembo, 40% Kebirigo, 50% Kapset, and 55% at Gianchore had conservation areas established in the farm. All FFS members' farms at Gitugi, Kinoro, Makomboki, Mataara, Ngere, Thumaita and Weru farms had waste water capture pit or similar preventative measure and also managed solid waste through recycling or removal from farm. Most FFS members at all the factories used agrochemicals at their farm and recorded the type of agro-chemicals they used to some extent. They were also able to track quantities of agrochemicals used per year or record the chemical toxicity level. They also indicated at various proportions the use of appropriate personal protective equipment (PPEs) and workers having access to portable water.

Table 11

Implementation of Rainforest Alliance Certification Principles at the Tea Factories (n=514)

Factory name	Trained in RA certification (%)	Farms with buffer areas in streams and rivers (%)	Farms with conservation areas (%)	Farms with waste water capture pit (%)	Farms where solid waste is managed (%)	Farm that use agrochemicals (%)	Farms that record type of agrochemicals used (%)	Farm that track quantity of agrochemicals (%)	Farm that record chemical toxicity (%)	Farmers that use PPEs (%)	Workers access to water (%)
Gia	65.0	45.0	55.0	40.0	35.0	65.0	25.0	10.0	35.0	35.0	45.0
Git	100.0	73.9	87.0	100.0	95.7	69.6	39.1	56.5	4.3	78.3	91.3
Iri	100.0	44.4	88.9	94.4	83.3	77.8	72.2	66.7	61.1	64.7	27.8
Kap	90.0	55.0	85.0	75.0	80.0	85.0	40.0	50.0	35.0	50.0	25.0
Kap	100.0	100.0	100.0	65.5	93.1	100.0	96.6	51.7	24.1	93.1	27.6
Kap	50.0	45.0	50.0	55.0	50.0	50.0	35.0	15.0	20.0	55.0	35.0
Keb	40.0	40.0	40.0	40.0	45.0	100.0	5.0	.0	.0	.0	45.0
Kin	100.0	75.0	100.0	100.0	85.0	95.0	75.0	80.0	90.0	100.0	75.0
Mak	100.0	100.0	100.0	100.0	100.0	100.0	71.4	100.0	28.6	100.0	28.6
Mat	100.0	100.0	100.0	100.0	100.0	75.0	75.0	60.0	25.0	70.0	70.0
Mog	100.0	72.7	86.4	40.9	59.1	100.0	22.7	86.4	72.7	95.5	31.8
Mom	100.0	65.0	85.0	85.0	90.0	40.0	25.0	20.0	15.0	95.0	85.0
Mud	100.0	50.0	80.0	75.0	65.0	85.0	70.0	40.0	20.0	55.0	50.0
Mun	95.2	76.2	95.2	95.2	95.2	95.2	95.2	90.5	90.5	95.2	76.2
Mun	100.0	80.8	92.3	96.2	73.1	88.5	57.7	26.9	53.8	84.6	80.8
Nge	100.0	90.0	100.0	100.0	90.0	80.0	60.0	60.0	35.0	95.0	35.0
Nya	80.0	60.0	60.0	60.0	15.0	60.0	50.0	30.0	30.0	25.0	55.0
Nya	95.0	65.0	70.0	70.0	65.0	80.0	75.0	60.0	40.0	75.0	60.0
Oge	75.0	15.0	30.0	25.0	30.0	40.0	15.0	.0	.0	20.0	30.0
Rag	100.0	31.8	100.0	95.5	90.9	100.0	54.5	54.5	86.4	90.9	31.8
San	95.0	70.0	85.0	85.0	95.0	100.0	90.0	100.0	80.0	95.0	75.0
Teg	100.0	65.0	85.0	60.0	85.0	90.0	30.0	65.0	20.0	85.0	35.0
The	100.0	90.0	95.0	80.0	95.0	80.0	55.0	60.0	60.0	70.0	60.0
Thu	100.0	90.5	95.2	100.0	100.0	100.0	85.7	81.0	76.2	90.5	76.2
Wer	100.0	24.0	96.0	100.0	84.0	48.0	40.0	28.0	36.0	40.0	100.0
χ^2	318.5	305.8	253.6	293.6	276.5	294.5	336.5	330.2	337.5	313.2	334.3
df	48.0	72.0	96.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
P	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Key: Gia=Gianchore; Git=Gitugi; Iri=Iriani; Kat=Kapkatet; Kor=Kapkoros; Kas=Kapset; Keb=Kebirigo; Kin=Kinoro; Mak=Makombok; Mat=Mataara; Mog=Mogosiek; Mom=Momul; Mud=Mudete; Mun=Mungania; Mnu=Mununga; Nge=Ngere; Nya=Nyankoba; Nys=Nyansiongo; Oge=Ogembo; Rag=Ragati; San=Sanganyi; Teg=Tegat; The=Theta; Thu=Thumaita; Wer=Weru; Fa= Factory; χ^2 = Chi Square; df=Degree of freedom; P=P value

Rainforest Alliance certification is based on a set of identified good agricultural practices formulated by the Sustainable Agriculture Network (SAN), called the Sustainable Agriculture Standard. In 2007, the FFS extension program was used to build capacity of tea farmers on RA certification requirements. The FFS training curriculum was also expanded to cover topics on RA certification issues on ecosystem conservation, wildlife protection, worker rights and safety, water and soil conservation, agrochemical reduction, decent housing and legal wages for workers. The up-scaling of RA certification started in selected factories in 2008 and has been gradually up-scaled from four factories to 47 factories. In 2010, KTDA, Unilever, Rainforest Alliance (RA) and the Sustainable Trade Initiative (IDH), started a joint program for training farmers so that the tea factories and the smallholders would become Rainforest Alliance certified under group certification schemes.

Each year, The Sustainable Agriculture Network develops some guidelines (SAN standard and policy) for farmers to follow in order to become SAN – RA certified. The Rainforest Alliance trainers organize trainings to KTDA factories board of directors, managers and extension agents on SANs standards and RA certification. These trainings on SANs standards and RA certification focus on the process, procedures, requirements, costs, benefits and aims to prepare the factory for RA certification auditing within a period of six months. The KTDA factory board must make and endorse a board resolution to undergo RA certification. To accelerate trainings in RA certification, KTDA initiated the concept of farmer trainers (lead farmers) as a parallel system to FFS trainings.

The lead farmers were mainly farmers from the same factory with above-average tea management capacities who volunteered to support their neighbouring farmers to prepare them for the RA certification audit. The KTDA factory extension officers choose the lead farmers who are normally trained as trainers (TOT) for a period of three days by Rainforest Alliance and Partner Africa with the assistance from KTDA extension agents (TESAs and FSCs). A lead farmer received compensation ('lunch allowance') of \$ 2.5 per day after reaching out and training 300 tea growers. Currently, about 1455 lead farmers have been trained on Rainforest Alliance program with a ratio of one lead farmer to 300 tea farmers. Awareness creation and sensitization

on RA certification is also made to all the tea growers. The RA certification lead farmers train the other farmers for a period of 3-4 days.

The tea factories and the smallholders become Rainforest Alliance certified under group certification schemes. During training and capacity building in group certification standard, the group administrator (KTDA Factory Company) trains its group members (tea growers) and internal management personnel on SAN standard and policy contents according to the local language, education and culture of the training event participants. The group administrator implements a training program for its group members to comply with Sustainable Agriculture Network standards targeting those that actually do the job. The factory management train its internal management system personnel to enable them to fulfill their roles and document the trainings date and location, summary of contents, name and qualification of the trainer, and names and signatures of the participants. The trainings were conducted in participants' local languages or dialects, considering the educational levels and cultural characteristics for successful communication.

During risk assessment the factory management evaluates internal and external risks for the factory's management system in terms of compliance with SAN standards and policies, factory membership, chain of custody and systems' costs and performance, in general. This risk assessment forms the basis for corrective and preventive actions, with special emphasis on assuring traceability of Rainforest Alliance Certified products. The factory management creates an annual risk identification and assessment covering internal inspections, external audits, new factory members, farm production, chain-of-custody, compliance costs and performance of the internal management system. The factory management must implement measures to prevent or minimize risks identified in the assessment. The factory must have a system for avoiding the mixing of certified tea products with non-certified products in its facilities, including harvesting, handling, processing and packaging of products, as well as transportation. All transactions involving certified products must be recorded. Tea products leaving the factory as certified must be identified and accompanied with the relevant documentation. The factory management must establish procedures to ensure that non-certified tea is not brought into the factory's certified tea.

Factory members must not individually sell their tea products as certified, however their tea can be segregated as a certified tea for sale by the factory management (Sustainable Agriculture Network, 2011).

The factory management implements an internal management system with competent personnel and sufficient finances assuring compliance with SAN standards through trained personnel, governance procedures and factory members that commit to the factory's rules, including a sanction system for non-compliant factory members. The management system is free from conflicts of interest and ensures annual follow-up of factory members' compliance with the group administrator's rules. Accurate and complete records of factory members and member farms are the basis for a successful certification process. The factory management implement an effective internal management system that have an organizational chart with details of committees, positions and job responsibilities, including those serving; Responsibilities, required qualifications and competencies of personnel, elected persons, and committees; Governance procedures for approval of new factory members and annual status of each member farm; factory and factory member record keeping requirements; Internal inspections; as well as Sanctions and appeals. Each factory member signs or marks an agreement with the factory management. Each factory member must be informed of their right to resign.

The factory management must assure that each factory member understands the agreements' contents including factory members' duties to comply with SAN standards and factory management's internal requirements; provide the factory management with required information; cooperate with internal inspections and external audits; report their intentional and unintentional non-compliances with SAN standards and factory management's internal requirements. The Internal Management System personnel and procedures must be resourced with competent personnel and sufficient finances, and must reflect the factory members' characteristics and composition, including its geographical and cultivation diversities. The factory management must manage conflicts of interest with impartiality and independence, including decision makers' absence of their own actual or potential conflicts of interest. Prior to an external audit, the factory management internally inspect all group member farms. They must be internally inspected no

less than annually, preferably at different times of the year. New group member farms must be internally inspected before being included in the factory subject to certification. The Internal Management System must have policies and procedures for sanctioning individual group members for non compliance with SAN standards or internal factory management requirements.

Progressive sanctioning measures must be established, which may include exclusion from sales of certified products and each factory member must be informed of the sanctioning system. Records must allow for the easy identification of sanctioned factory members. Each factory member must have the right to appeal findings of non-compliance and its resulting sanctions. Upon factory member's request, the factory management must facilitate a factory member's ability to create records. The factory management's documents must be consistent with group members' language and level of understanding. The factory management must keep accurate factory member records, including a list of factory members with their names, date of entry to the factory, any assigned identification and certification status; Information on certified member farms with location, total area, total production area, annual production volume, farm maps or sketches indicating location of natural ecosystems; Regional maps or sketches of all the member farms' locations, including access roads and main natural ecosystems; Volumes of certified products at buying, handling, processing, packaging and selling stages; External audits and internal inspection reports, dates, and any complaints received; and Prior non-compliances, including sanctions, follow-up actions and appeals.

The SAN standard prohibits the use of several pesticides on certified farms determined by international lists of reference selected by the SAN. If use of these pesticides on certified farms is detected during audits, this consequently leads to the cancelling of certification as defined by SAN's Farm Certification Policy. SAN standards and policy document is binding for farm certification. It provides a complete list of pesticides currently prohibited or to be phased out on certified farms. The chemical or biological substances that cannot be used on certified farms include biological or organic substances that are not legally registered in the country for commercial use; agrochemicals that are not registered officially in the country and those mentioned in the List of Banned and Severely Restricted Pesticides in the U.S. by the

Environmental Protection Agency (EPA). They also includes pesticides banned or severely restricted in the European Union and substances banned globally under the Stockholm Convention on Persistent Organic Pollutants (POP); substances listed in Annex III of the Rotterdam Convention on Prior Informed Consent (PIC) in relation to national bans or severe restrictions for documented health or environmental reasons in at least two regions of the World; and all Pesticide Action Network Dirty Dozen substances.

SAN authorized auditors evaluate the applicability of each criterion of this standard according to the size and complexity of the operation (plantations or smallholder farms), the use or non-use of agrochemicals within the farm, the hiring of contracted labor or use of non-contracted family labor, the presence or absence of aquatic or terrestrial ecosystems within the farm and the presence or absence of infrastructure within the farm. The SAN's sustainable agriculture standard is represented by the ten guiding principles outlined as:

- A. Social and environmental management systems;
- B. Ecosystem conservation;
- C. Wildlife protection;
- D. Water resource conservation;
- E. Fair treatment and good working conditions for workers;
- F. Occupational health and safety;
- G. Community relations;
- H. Integrated crop management;
- I. Soil management and conservation;
- J. Integrated waste management.

Through the factory management, internal farm inspection is carried out to all the farms by visiting each farmer and checking what he has and the level of non-compliance. During this stage, recruitment for personal protective equipments (PPE) is done and internal management system documented. The second internal audit that also recommended areas for improvement is also done. When the changes are made, the factory applies for certification and farm auditing by independent auditors. Before requesting a certification audit, a factory can request a pre-

assessment to determine the farmers, or processing facility's compliance with the standards which is optional and paid for by the client.

The process of auditing begins when a KTDA factory interested in RA certification fills out and submits an application form depending on the type of audit in order to receive a quotation, which includes the scope and cost of the audit. The Rainforest Alliance-Certified is the division of the Rainforest Alliance that is responsible for all certification and verification activities. It schedule and conduct audits to the SAN standards. Based on the factory's application, Rainforest Alliance-Certified prepares a quotation within two to four weeks for the audit service. The Quotation is valid for 30 calendar days and is based upon the level of effort required to carry out the audit (e.g., farm or group size, type of crop(s), geographic setting and distribution of farms) and the costs associated with the service (e.g., auditor daily rates, travel costs and administrative support). Upon the factory accepting the quotation, Rainforest Alliance-Certified send a "service agreement" and an invoice for the total cost of the audit. The factory must return a signed copy of the service agreement and pay the full cost of the audit through a bank transfer prior to Rainforest Alliance-Certified initiating fieldwork. When the audit payment is made to Rainforest Alliance-Certified, the certification agreement is also sent to the factory at this time. The factory is encouraged to review this agreement and be prepared to sign it, as it is required to activate the certification should the factory receive a positive certification decision.

Once the factory returns a signed a service agreement, the Rainforest Alliance-Certified provide the client with an audit plan that describes the objectives, scope, logistics, methodology and dates of the audit. At this time, the factory also receives a monitoring and evaluation form that must be completed and returned to Rainforest Alliance-Certified. The data requested in this form is integrated into the audit report and used to measure the environmental, social and economic impacts of certification and sustainable management practices. The RA certification audit is conducted by SAN-accredited auditors who are Rainforest Alliance-Certified staff or contractors. The audit process includes the initial meeting, review of the documentation, gathering evidence, interviews and final meeting to communicate the preliminary results. The KTDA factory should ensure that administrative and field personnel are present and available during the dates of the

audit, so that the audit team may conduct interviews and meetings. All information provided during the audit is confidential as specified in the Service Agreement.

After completing the audit, the auditors prepares a draft audit report that details the factory's/group's conformance with the SAN standards. The Rainforest Alliance-Certified may request additional information before presenting the final audit report, such as the factory's corrective actions plan. Approximately four to eight weeks after the field work is completed, the draft audit report is provided to the factory for review, comments, corrections and approval. The Rainforest Alliance-Certified use these comments to revise the draft audit report. If no comments are received, the report is considered approved. The final audit report is submitted to the Sustainable Farm Certification (SFC) committee for review. The SFC is an independent certification body responsible for the decision of whether or not a farm or group achieves certification. The SFC committee analyzes the final audit report and makes a decision to confirm or deny certification which they notify Rainforest Alliance-Certified and then Rainforest Alliance-Certified communicates the decision to the factory by email. If the certification decision is positive, a Certification Agreement must be signed by the factory and returned to Rainforest Alliance-Certified.

Certification is effective on the date the SFC Certification Committee makes the positive certification decision. However, products cannot be sold as certified until the Certification Agreement has been signed and returned to Rainforest Alliance-Certified. If the certification decision is negative, the client can make the necessary changes outlined in the final audit report and request a new audit with Rainforest Alliance-Certified. If the client feels that certification was unjustifiably denied, they can appeal this decision. In order for a factory/group to sell a product as Rainforest Alliance Certified to any buyer, the buyer must first be registered in the Rainforest Alliance Certified Marketplace and comply with Rainforest Alliance and SAN policies related to traceability, chain of custody, and use of the Rainforest Alliance Certified seal. Certified factories/groups may also use the Rainforest Alliance Certified seal to communicate their achievement. Once the factories get a Rainforest Alliance certificate, they can use it to bargain in the market place (to widen their market assurance/niche, and to access better returns

including premiums). The factory maintains the validity of its certification through continued compliance with the SAN standards, continuous improvement and addressing non-conformities identified in previous audits. The factory and farms performance to these standards is verified in annual audits. Failure to complete annual audits on time leads to cancellation of a factory certification. Annual audits are conducted at the end of the first and second years of the certification period.

In order to obtain and maintain the certification status during SAN factory audits, the factory management complies with all critical criteria of the SAN Group Certification Standard. These standards are identified with the text "Critical Criterion" at the beginning of the criterion. Any factory management or farmer who fails to comply with a critical criterion cannot be certified even if he or she has met all other certification requirements. To be audited and certified during the second certification cycle onwards, farmers must meet at least 50% of the criteria of each principle, at least 80% of all criteria of this standard at the first certification audit (Year 1); at least 85% of all criteria of this standard at the second (first annual) audit (Year 2); and at least 90% of all criteria of this standard at the third (second annual) audit (Year 3). In order to obtain and maintain certification during member farms' compliance, the factory management ensures that all tea farmers comply with the SAN certification requirements (including the scoring system) defined in the SANs Sustainable Agriculture Standard. The following additional rules apply for factory management with 17 or more group members: Up to 20% of the audited sample of factory member farms can score less than 80% but not below 70%. There must be full compliance with all of the SAN Sustainable Agriculture Standard's critical criteria and compliance with at least 50% of the criteria of each principle.

For every subsequent audit, those factory members who had not previously received an 80% score must fully comply with SAN's certification requirements as defined in the SAN Sustainable Agricultural Standard. This applies for all following audits and also for audits of new audit cycles. All sampled factory member farms of group administrators with 16 or less factory members must each comply with the general scoring system of the Sustainable Agriculture Standard. SAN Farm Certification Policy applies in circumstances where by not implementing

any or some of the practices as defined by the criteria of the SAN Group Certification Standard or SAN Sustainable Agriculture Standard will result in the assignment of a non-conformity determined on the basis of each individual criterion. There are two categories of non-conformities:

- A. Major Non-Conformity (MNC): indicates compliance with less than 50% of the criterion requirements.
- B. Minor Non-Conformity (MNC): indicates compliance with equal or more than 50% of the criterion requirements, but less than 100%.

Currently about 28 KTDA factories are RA certified with 31 of them having the garden mark of quality. Using lead farmers as trainers remains a big challenge because of their age, education level, experience and the level of their facilitation. Because of mobility challenges, they can only access neighboring farmers. Since lead farmers are trained for only three days in training of trainers (TOTs), they sometimes give some conflicting recommendations yet farmers must understand, implement and comply 100per cent with the critical criteria of SAN standards. There is no curriculum for training lead farmers. Lead farmers also lack a training guide for training tea growers. The use of tea buying centres as training venues for RA certification by lead farmers is limiting because only 30per cent of tea farmers visit or attend the buying centres. The lead farmers in most cases met casual workers and labourers at the farm level and not the owners. Others still met tea growers on the roads and market places away from the tea farm and trained them there. Trainers in RA certification identified sustainable agricultural practices that farmers can do to get money. For example, cutting eucalyptus had an opportunity cost but was replaced by promoting Giant bamboo which also provided poles and was environmentally friendly.

4.13 Monitoring and Evaluating the Farmer Field Schools and Rainforest Alliance Certification Up-Scaling Process

Monitoring and evaluation of FFS and RA certification is important because it equips the project management with information that enables it to identify deviations from set targets in the plan of operation so as to take timely corrective measures, to review the critical aspects of the project outside the relevance of management, to help the project learn from experiences so as to improve

the relevance and outcome of the program/project. What to monitor is an important factor in monitoring the achievements of the activity's targets/milestones of scheduled activities, and the occurrence of important assumptions set out in the project planning matrix and in the plan of action. A good monitoring system for FFS and RA certification should analyze the inputs (timely acquisition and procurement, flow of funds, employment of personnel according to establishment posts, deployment of inputs according to plan of operation, participation and contribution of beneficiaries); and outputs (the extent to which the physical outputs have been realized in relation to the activity targets/milestones. This monitoring should be carried out continuously throughout the project implementation.

Monitoring is done by collecting data using various methods like reports, questionnaires/interview schedules, physical observation and analysis of secondary sources. The data should be collected in a regular and formalized manner from the stakeholders, analyzing and organizing it into useful information. Monitoring is done by head office/national level, at the regional and zonal level, factory level and village level. The management at KTDA head office carries out the monitoring. Those at regional and zonal level carry out monitoring and only inform the headquarters of the progress of the activities. At the factory and village level they carry out the monitoring and may ask for guidance from the zonal, regional or at KTDA head office. Monitoring should be started by determining the relevant data that can be economically and reasonably collected so as to measure the activity targets/milestones and indicators with sufficient degree of objectivity and reliability. Then, it needs to be determined who is to collect, how it is to be collected and when to collect the data. There is need to gather the data and determine who can analyze it. Finally, one needs to consolidate and analyze the data, draw conclusions and make recommendations. Then, one can report to the people concerned for corrective action at the operation level and monitor if corrective measures have been taken.

Evaluation of FFS and RA certification is important in assessing the impact and effect of a project and in deriving lessons for future development planning, better formulation and implementation of the project. Evaluation objectively determines the relevance, effectiveness, efficiency, sustainability and impact of activities in the light of specified objectives in the project

planning matrix. Rainforest Alliance certification and Farmer Field Schools may have an impact on economic, social, environmental, institutional and sustainability dimensions. Each of these dimensions can have different levels at the farm, catchment, factory, ecological zone, and national. Assessments need to be at different levels to capture all the impact. Evaluation starts by determining data required for the particular evaluation to be carried out. Potential indications of FFS and RA certification up-scaling impacts includes change in income, variability of income, availability of food supply in households over the year, change in production costs, change in yield, change in acreage, diversification of crops, change in yield per hectare, returns to labour, returns to inputs, labour cost of officers while training and facilitating, real cash costs (materials, offices), indirect costs (time of farmers), number of farmers trained, cost of the Farmer Field School per farmer, absolute cost versus relative cost, initial costs versus long-run costs, cost per facilitator and number of Farmer Field Schools conducted, capacity building, networking, access to credit and marketing ability.

Other indicators of impact includes cohesiveness of the farmer field school group, demand by farmers for services, leadership (election/management, functions within the FFS), advocacy (participation in forums, decision making by farmers), regulation and registration, gender balance (women's and men involvement in decision making and leadership roles), farmer networks, farmer-stakeholder networks (linkages with others), number of erosion control measures, number of water harvesting techniques, presence of water use organizations, water quality and quantity, change in agro-biodiversity (crop, livestock, associated species), conservation of resources, afforestation, pesticide use and pollution (by chemical fertilizers). Sustainability of FFS indicators include number of non-FFS participants forming and adopting FFS technologies, number of semi self-financing FFSs, number of FFS groups still functioning several years after project ends, number of technologies or innovations being implemented several years afterwards, relation with research (new technologies adopted by farmers and farmer innovations taken up by researchers).

One should evaluate whether the objectives in the project matrix have been achieved to the level defined by the objectively verifiable indicators. Evaluation should be scheduled in the project

design and detailed in the plan of operation with regard to on-going, midterm, terminal and ex-post evaluation. The on-going evaluation is done by the project management. The others are carried out by an external independent evaluator, who is agreed upon by both the project management and funding institution. The evaluator starts the evaluation by determining the data required, who is to do the particular evaluation and the terms of reference. The evaluator then retrieves and gathers information from the monitoring database and other additional sources consolidate and analyze that data, draw conclusions and make recommendations. Finally, the evaluator writes a report and makes recommendations regarding the affirmation or modification in objectives, implementation strategies and resources.

4.14 Discussion

About 65% of the Farmer Field Schools in the study were formed in the year 2010. This short period made the respondent not to observe real changes in their livelihood. The research findings indicated that many FFS members had received primary or higher level of education. Davis *et al.* (2010) noted that households whose head had primary or secondary level of education were more likely to participate in FFSs in Kenya than those with no formal education. The findings revealed that the composition of FFS groups was varied in-terms of age. This finding supports the work of Glendenning (2010) who noted that FFS like other extension approaches may experience problems of composition and representation. According to him, one strategy to address this is to form groups exclusively for the youthful farmer, women farmers or disadvantaged farmers. The results indicated a statistically significant relationship in up-scaling FFS and RA certification between KTDA factories and gender, education level and Age category of FFS members ($P < 0.5$). Davis *et al.* (2010) pointed out that younger farmers who belong to other groups, such as savings and credit groups, tended to participate in field schools. According to Davis *et al.* (2010), FFSs were shown to be especially beneficial to women, people with low literacy levels, and farmers with medium-size land holdings.

The findings indicated that an FFS usually started with at least 30 members but this number gradually decreased to an average of about 21 members. Half (50%) of the FFS members said they were taught through a combination of English, Kiswahili and Vernacular. Over 94% of

smallholders indicated the language used in their FFS was appropriate. Over 53% of the FFS members planted tea in their individual farms. The findings revealed that the presence of secure land tenure systems supported the FFS and RA certification scaling-up efforts which agree with the finding of the Sustainable Agriculture and Rural Development (2007). Less than a third (30%) of the FFS groups had income generating activities. Having income generating activities increased sustainability and effectiveness of the overall FFS approach because the proceeds could be used to buy farm inputs, save in a cooperative society, buy food, buy tea seedlings for gaping and even hire farm labour. Over 90% of the tea based FFS were facilitated by KTDA extension agent with 77% FFS members rating of the FFS facilitator's expertise in guiding the FFS activities as high.

This agrees with Hartl (2009) and Endalew (2009) assertion that the popularity and success of FFS programmes relies on the FFS trainers/ facilitators. Who must have skills in addressing farmers' need, managing participatory, discovery-based learning as well as technical knowledge to guide the groups' learning and action process. The use of FFS graduates to train other farmers says Endalew (2009), helps to reduce costs and dependence of FFS groups on external funding, up-scaling FFS coverage, increasing sustainability and effectiveness of the overall FFS approach.

The findings revealed that up-scaling of FFS could be enhanced by farmers' adapting available technology effectively for tea improvement, reducing success-related challenges through proactive strategic research, engaging in strategic partnerships with relevant stakeholders, developing new markets that are responsive to consumer tastes, networking with stakeholders who are involved in FFS up-scaling and careful monitoring and assessment of impacts. The findings showed that over 93% of the FFS groups had an established leadership structure and smallholder farmers in the FFS exercised various leadership roles. Only a third of the FFS groups were linked to other networks, groups or partners.

Linkages to networks, federations or associations according to Braun *et al.* (2006), Nyambati *et al.* (2011) and World Economic Forum (2011) connected FFS members to government institutions, micro-credit institutions, research and development organizations and thus

improving the efficiency, effectiveness and sustainability of the up-scaling process. The FFS members also gained self-confidence, got empowered, exercised leadership and played an important role for strengthening rural institutions (Hartl, 2009). Linkages to networks also assisted FFS groups to be self-evolving, grow strong, cultivate mutual trust, transparency, good and democratic leadership (Food and Agriculture Organization, 2008).

The findings suggested a KTDA business model for up-scaling FFS and RA certification by using the business model canvas. The concept of designing a business model corresponds to similar work done by Doorneweert and Waarts (2012) who also participated in developing a KTDA new business model for up-scaling of FFS and RA certification. In that study, they indicated that a project must follow an approved methodology to generate the baseline scenario and the outputs must be generated by a wide stakeholder group involved in implementing the current business model. Doorneweert and Waarts (2012) pointed out that one key challenge to the model was to create an up-scaling system that could sustain itself financially. The realized productivity and quality improvement arising from FFS and RA certification was assumed that it would deliver enough indirect revenues for KTDA factories to fund the up-scaling of FFS and RA certification costs.

While improvements in the system are envisaged in the short and in the long term, the findings indicated that selected FFS graduates could be used as Lead Farmers in RA Certification training and farm inspections. Some of the GAPS such as safe use of agrochemicals and riverine protection in the SAN Standard could be integrated into FFS topics. Field days and tea buying-centre meetings could be used to sensitize farmers on both RA and FFS issues. Managing these changes require institutional and policy adjustments within KTDA and enhanced dialogue with existing donors and collaborators for strategic intervention that can ensure continuity beyond donor funding. Most of the project costs in phase one were largely met by the donors. During the next up-scaling phases, structures and process should be created within KTDA to promote and ensure sustainability.

The researcher developed a context diagram for up-scaling FFS and RA certification which could be converted into a physical system design that could eventually assist in development of a structure design which according to Whitten and Bentley (2007) would serve as a blue print of a computer system solution to the up-scaling process. These blueprints and specifications could then be used to implement required databases, programs, user interfaces, and networks for the information systems (Whitten & Bentley, 2007; Wiegers, 2003). The input, output, databases, forms, codification schemes and processing specifications can also be drawn and the programming language, the hardware and software platform in which the new system will run are also decided.

The results agreed with findings of Meadows (1999) on intervening at leverage points that created the greatest impacts in the up-scaling process. According to Soderquist (2010) and Meadows (1999), the up-scaling process could be enhanced if KTDA, factory management, farmers and other stakeholders focused on changing the mindset and attitude through paradigm shift, having clear goals and focusing on them, building the capacity to change or self-organize the up-scaling process by assembling and arranging the resources required, giving people the tasks they are best able to perform in the up-scaling process, paying attention to rules of the up-scaling process and structuring information flow in FFS and RA certification up-scaling.

The KTDA model identified five stages of FFS up-scaling. Stage one involved pilot testing of the FFS approach in four KTDA factories. Stage two involved up-scaling within the factories. Stage three involved starting at least one FFS per electoral area/zone. The fourth stage of up-scaling was across the tea buying centres and the fifth stage was within the tea buying centres.

Up-scaling of FFS can be enhanced by farmer-to-farmer visits, initiating farmer-led FFS, increasing financial support to FFS groups and deploying FFS-trained farmers to train other farmers. The research findings agree with those of Eicher (2007) that the success of a Farmer Field School depends largely on the motivation and dedication of its participants. The suggestion to increase the number of farmer-led FFS and RA facilitators by employing/engaging FFS graduates permanently to train other farmers agrees with Bunyatta *et al.* (2006) and Rusike *et al.*

(2004) that most FFS's graduates are willing to share information with other farmers and to facilitate the formation of more FFS in their communities if given financial support. Stigter (2010) proposed a strategy of up-scaling using farmer-led and partial self-funded FFSs

The findings indicated four options for up-scaling Farmer Field Schools and Rainforest Alliance certification namely maintaining the system as it is, have FFS only, have RA only or maintaining the current system with some improvements including use of field days, farm visits and mass media. Maintaining the current system with some improvements is the best option because the compliance with up-scaling of FFS and RA certification would be faster and would benefit more farmers, the quantity and quality of sustainable tea would be increased, market accessibility would be guaranteed and all stakeholders in the value chain would benefit from sustainable tea. More physical and human resource would be required. However, goodwill from different stakeholders will be required to make the system efficient and effective.

Most KTDA factories spent an average of 182,290/= to run an FFS per year, which translates to 6,076/= (\$71) per farmer per year. This amount, in the opinion of most FFS members, was inadequate and should be increased. They proposed an FFS budget of 231,746/=, which translates to 7,725/= (\$91/=) per farmer per year. This cost is reasonable compared to Barbut (2011) who indicated the costs of establishing a new FFS to be \$800 and that of training a new FFS facilitator as \$1,350. Van den Berg and Jiggins (2007) estimated the costs of running a FFS in Indonesia and the Philippines as \$62 and \$48 per participant, respectively. According to Gallagher (2003), the cost of conducting a season-long field school for 25 farmers range from \$150 to \$1,000 depending on the country and the organization.

Braun, Thiele and Fernández (2000) gave the average cost of a field school facilitated by a professional extension worker as \$532. According to Braun and Duveskog (2010), FFSs can be expensive or low-cost depending on implementer and how they are conducted but costs per FFS decline as activities become routine, prices become lower due to bulk purchase of materials, and trainer and facilitator skills and experience increase. The results contradict the findings of Rusike

et al., (2004), and that of Swanson and Rajalahti (2010) who considered FFSs as more costly to implement, labor-intensive extension model that reaches a small number of interested farmers. The findings of the study confirm that group extension methods are cheaper than individual extension methods in the training of tea farmers. Among the three methods considered, FFS was the cheapest (\$3.6 per farmer) followed by field days (\$4.28 for a mini field day and \$5.38 for a major field day) and farm visits (\$7.1 per farmer), which were the most expensive. The research findings showed that the cost of running a tea-based FFS was cheaper compared to that of a field day and farm visit. These results contradicts the findings of Bunyatta *et al.* (2006) who noted that high training costs take up a large portion of the FFS recurrent budget. While comparing the FFS approach with the farm visit in Zanzibar, Endalew (2009) noted that FFSs have many promising attributes which gives it much higher chances of effectiveness as an extension methodology in Sub-Saharan African than farm visits.

According to him and in the opinion of most FFS members, FFS graduates accrue additional benefits which can be difficult to quantify in monetary forms such as gaining superior leadership skills and become more cohesive as a group than non-FFS farmers. Rusike *et al.* (2004) concurs that FFS trainings provided more opportunities for experimentation and collective learning-by-doing that improves farmers' understanding of new technologies, their capacity to effectively use the technologies and to make better decisions, and improves adoption rates. International Initiative for Impact Evaluation (2010), suggested that FFSs can be a cost - effective way of increasing farmers' skills. Smallholder farmer derived a lot of benefits from participating in the FFS through empowerment, group cohesion and gaining superior leadership skills in sustainable farming, better tea husbandry, improved yields, social capital benefits and leadership skills. FFS-trained farmers benefited from increased tea yields, improved farmer empowerment and health as well as increased savings and improved self-reliance.

A key finding also supported by the Rainforest Alliance (2012) is the benefit of helping people to transform their land-use practices through sustainable use of resources, KTDA factories got recognition in the marketplace for having met the comprehensive SAN standards and were able to use the Rainforest Alliance Certified seal in selling, promotion and commercialization of

products from the certified farm. The findings are also consistent to Rainforest Alliance, 2012c) that more than two million farmers, farm workers and their families directly benefit from real improvements in farm management, efficiency, productivity, and market access. According to Rainforest Alliance (2012b), a study conducted at Côte d'Ivoire in 2011 demonstrated that certified farms increased productivity and got a net income of \$161 per acre while in Colombia, a study of streams and waterways demonstrated that Rainforest Alliance Certified coffee farms scored significantly higher than noncertified farms on a stream health index. However, according to the SCSKASC (2012), the effects of standards on yield and quality are variable and difficult to attribute to the standard per se. But the requirements in standards to implement good agricultural practices and soil conservation, as well as improving traceability systems, have resulted in productivity gains in quality and yield and reduced human exposure to pesticides (UNEP, ITC & ICTSD, 2012).

The findings on the benefits the tea growers and factories got from participating in RA certification trainings corresponded with those of Waarts *et al.* (2012) that 52% of the RA certification trained farmers received a better price or an additional bonus because the factory they delivered tea to was certified by Rainforest Alliance. In that study more than 84 per cent said they had benefitted from participating in the RA certification activities through improved waste management, soil conservation, water management, knowledge of health and safety, and wildlife protection. According to them, tea farmers benefited from a cleaner house with fewer flies, fewer ailments because of the safer use of agrochemicals, increased agroforestry that led to more shade, fuel wood, and increased water flows in streams and rivers. The results agree with the findings of Rainforest Alliance (2012a) that In 2011, certified farms produced 576Kg (1,270lbs.) of cocoa per hectare, compared with 334Kg (736lbs.) per hectare on non-certified farms resulting to significantly higher net income on certified cocoa farms than noncertified: \$403 and \$113 \$ per hectare, respectively.

This research also found that 80 per cent of certified farms implemented at least one water protection measure, certified farms implemented more soil-conservation practices, with 43 per cent instituting one or more of these measures, compared with five per cent of non-certified.

Over 65 per cent of certified farmers reported that their care of the environment had improved over the previous year, compared with only 13 per cent of non-certified farmers (Rainforest Alliance, 2012a). The findings also agree with those of Rainforest Alliance (2012e) that more than 250,000 farms, covering approximately 2.7 million acres, farmers have reduced their use of herbicides and pesticides, invested in recycling and provided their workers with improved training, housing, health benefits and education, thereby earning the Rainforest Alliance Certified seal of approval (Rainforest Alliance, 2012e). Research work by Rainforest Alliance (2010) on hotel businesses indicated that seventy-one per cent of the hotels surveyed decreased their water consumption, resulting to in average annual savings of \$2,718 per year while 31 per cent decreased the amount of money they spent on water payments. Also, seventy-one per cent of the businesses reduced their solid waste production and the health and safety of staff and clients were also positively affected. While most research focuses on the extent of positive change, benefits are also derived where certification slows or impedes harm, particularly in those cases where a resource is very much under assault. Under these conditions, certification may not fix the problem, but it does buy time and, in combination with other interventions, may eventually lead to positive change (SCSKASC, 2012).

The findings showed that the cost of obtaining a RA certificate per factory was \$470,000, the recurrent cost of certification per year was \$170,000 and cost of obtaining the RA certificate per farmer was \$43. Over 86per cent of the total Rainforest Alliance certification costs was incurred by tea growers at farm level by farmers. The SCSKASC (2012) lamented that given the costs associated with certification, the assurance process is sometimes viewed as a constraint to the achievement of the system's sustainability objectives rather than a benefit. The UNEP, ITC and ICTSD (2012) agree that there are situations where producers cannot meet the costs of implementing a sustainability standard and producer takes a risk in complying with a standard without having a buyer and a guaranteed price premium; and Standards gradually become a de facto market access condition where price premiums are eventually eroded in the market place. Some businesses are now looking at certification in a much more strategic way by not focusing on price premium for certified products alone but also shifting the whole commodities to certified standards (SCSKASC, 2012). Approximately 65 to 75 per cent of the total audit cost is

associated with the audit itself, including fieldwork, travel costs and preparation of the audit report. The remaining 25 to 35 per cent of the total audit cost is associated with administrative support, including customer service, preparation and scheduling of the audit, audit report quality review, technical support, and SFC Certification Committee fees (Rainforest Alliance, 2012d). The findings cost of certification agree with the findings of Rainforest Alliance (2012f) that the cost of audit and the Rainforest Alliance was \$3 per acre (\$7.50 per hectare) in coffee while the total cost achieving certification was \$50 per acre (\$123 per hectare). The returns on certification in the form of price bonuses for certified coffee averaged \$0.13 per one kilogram. The average gross increase in income per hectare of coffee was \$321.31 (of which \$158.04 is earned from premiums for certified coffee) (Rainforest Alliance, 2012f). However becoming certified is a choice made by individual enterprises, typically for market recognition and reward, assessment of their performance, a roadmap for improvement, or a strategy for managing risk (SCSKASC, 2012). Waarts *et al.* (2012) confirmed that lead farmers are normally compensated for the time with a 'lunch allowance' of \$2.5 per day when training farmers on RA certification.

According to Farley, Lucas, Molyneaux, Penn, and Hogue (2012) having a good monitoring and evaluation (M&E) systems makes information about outputs available when required. Monitoring and evaluation are critical project management tools says Barbut (2011) which FFS and RA certification managers can use to measure and evaluate progress and outcomes, and then feed this information back into processes of decision making, management and governing (The World Bank, 2008). The SCSKASC, (2012) concurs that there was limited demand from donors, the public, or the press for impact evaluation, and only limited data for monitoring was collected by certification and standard bodies and only a few studies were conducted to assess the impacts of these systems.

According to them, various methodological challenges exist in the design of studies assessing standards and certification systems and much of the evidence base is relatively new, and impacts in many cases have not been studied over long periods of time. LEI Wageningen UR together with other project partners in 2010 developed a monitoring and evaluation (M&E) plan for FFS and RA certification implementation (Waarts, Ge, Ton, & Jansen, 2012) and carried out the

baseline situation study. The baseline data according to World Bank, (2008) is the first measurement of an indicator, which sets the pre-project condition against which change can be tracked and evaluated. According to Shapiro (2012), the baseline data provides information about the initial situation, information on which the problem analysis is based and information that assist to measure the impact of up-scaling process in future.

Waarts *et al.* (2012) conducted another study in 2012 and developed the second report in the M&E cycle. This study compared the baseline situation done in the year 2010. This study monitored the training modalities, and generated data to track the impact of FFS and RA certification training models on knowledge levels, implementation of GAPs, production, income and livelihood. The up-scaling process subsequent data gathering and repeat surveys for the FFS and RA certification implementation period and beyond is in place and already planned. Monitoring and evaluation of FFS and RA certification is important because it equips the project management with information that enables it to identify deviations from set targets.

A well-designed M&E system according to Swanson and Rajalahti (2010) provides specific information and data on the progress being made in project implementation and whether the agreed-upon interventions are meeting the stated objectives. According to Forest Trends (2012), the M&E system should help clarify objectives, involve and improve accountability to all stakeholders. Baseline studies and benchmark indicators can provide the empirical basis for measuring and assessing progress (Food and Agriculture Organization, 2008; Swanson & Rajalahti, 2010).

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study had five objectives based on the terms of reference. This chapter is organized into three sections namely summary, conclusions and recommendations.

5.2 Summary

The first objective was to design the FFS system for training farmers on tea production. This objective was addressed by using four approaches that complemented each other. They included (A) Developing a KTDA business model for up-scaling FFS and RA certification; (B) Modeling a context diagram for up-scaling FFS and RA certification; (C) Identifying the leverage points in up-scaling FFS and RA certification system; and (D) Designing a model for up-Scaling FFSs in KTDA Factories.

The Business Model Canvas created an understanding, discussion, creativity, and analysis for the up-scaling process. The KTDA business model described the FFS and RA certification up-scaling value proposition, infrastructure, customers, and finances. This proposed business model value proposition was to increase farmers' knowledge and skills in adopting sustainable tea production. It could be achieved through trainings in FFSs and lead farmers. The key partners in the up-scaling model were identified as KTDA, The sustainable trade initiative (IDH), tea buyers (Unilever), NGOs and research support institutions. Trainings through FFSs and lead farmers promoted knowledge transfer of sustainable tea practices and RA certification requirements. The key activities identified in the up-scaling process were training, monitoring and evaluation, marketing of RA-certified tea and promoting FFS. The key resources required included training materials, human resources that include TESAs and FFS groups and internal management system. The smallholder tea producers were identified as the main customer segments in the up-scaling process. The costs incurred to up-scale FFS and RA certification were mainly on marketing, trainings, RA certification and compliance costs. The source of revenue was money obtained from increased productivity, quality, overall consistency; enhanced sustainability and sustainability fee. From the results, a key challenge to the model was how to create an up-scaling system that could sustain itself financially. There was also a challenge of whether the realized

productivity and quality improvement arising from FFS and RA certification would deliver enough indirect revenues for KTDA factories to fund the up-scaling of FFS and RA certification costs.

An FFS and RA certification up-scaling survey data and analysis enabled the researcher to model a context diagram (A logical system design). This was the first step towards development of the technical blueprints and specifications required to implement the required databases, programs, user interfaces, and networks for achieving the goals for the up-scaling systems. The context diagram helped in specifying the system inputs, outputs and how the up-scaling system interacted with the different stakeholders. It was also useful in answering the question of who or what provided inputs to the up-scaling system? Who or what received outputs to the up-scaling system. It also assisted in examining the different stakeholders and how they will use the FFS and RA certification up-scaling system. The stakeholders involved in the up-scaling of FFS and RA certification system included KTDA, The sustainable trade initiative (IDH), tea buyers (Unilever), smallholder tea farmers, Farmer field schools, KTDA and factory board of directors, tea consumers, KTDA factory managers and workers, extension agents and farmer trainer, NGOs and research support institutions.

The researcher suggested places in the up-scaling of FFS and RA certification process where KTDA could intervene to achieve high level of scalability and training for tea farmers. Increased and successful up-scaling of FFS and RA certification system could be achieved by changing the mind-sets and attitudes of staff and farmers to embrace the up-scaling process, re-orienting and focusing on the goal of scalability by giving purpose and direction to staff on what needs to be achieved, involving people in decision making, communicating the up-scaling vision, creating plans and taking responsibilities to deliver results. It could also be achieved by proper facilitation, building on the past experience, bargaining for implementation and early involvement of stakeholders. The ability to change or self-organize the up-scaling process by assembling and arranging the resources required and giving people the tasks they are best able to perform in the up-scaling process was also a strong leverage point. Paying attention to rules of

the up-scaling process and structuring information flow in FFS and RA certification up-scaling was a major leverage for change.

Up-scaling of FFS in KTDA factories could also be achieved in five phases or stages of implementation. Stage one involved pilot testing of the FFS approach in four KTDA factories. Stage two involved up-scaling within the factories. Stage three involved starting at least one FFS per electoral area/zone. The fourth stage of up-scaling was across the tea buying centres. The fifth stage was up-scaling FFS within the tea buying centres to finally cover all the 560,000 tea farmers in 18,667 FFS.

The second objective was to develop a mechanism for up-scaling the FFS methodology and RA certification in KTDA factories from the current four in the pilot phase to over 51 in order to gradually cover over 560,000 tea growers. This objective was addressed by proposing four options and several mechanisms for up-scaling FFS and RA certification. They include maintaining the system as it is, having FFS only, having RA only or maintaining the current system with some improvements including using field days, farm visits and mass media. Maintaining the current system with some improvements was the best option because the compliance with up-scaling of FFS and RA certification would be faster and would benefit more farmers, the quantity and quality of sustainable tea would be increased, market accessibility would be guaranteed and all stakeholders in the value chain would benefit from sustainable tea. However, more physical and human resource would be required and goodwill from different stakeholders would be required to make the system efficient and effective.

Graduates of FFS could be used effectively to enhance scalability of FFS and RA certification because they knew the area well, were cheaper, were readily available and were willing to do the job at a lower cost. Proper and timely training of staff and farmers on the scalability of FFS and RA certification could enhance its implementation. Recruiting lead farmers without some minimum qualification requirements made them unable to train their fellow tea growers effectively. The FFSs with a variety of income-generating activities such as agro-forestry, tree nursery, bee keeping, rabbit keeping, horticulture and harvesting of water run-off were likely to

be more sustainable and were likely to afford hiring facilitators, paying variable costs and providing success stories. In some areas, farmers were willing to attend FFS meetings but because they depended on meager daily pay for their subsistence, they often opted to go for activities that earned them money.

The research findings also indicated various opportunities for up-scaling Farmer Field Schools and Rainforest Alliance certification among smallholder tea producers which can be utilized. They include improving FFS and facilitators' efficiency and effectiveness in sustainable tea production by increasing resources for buying personal protective equipments (PPEs), tree seeds and seedlings and for the collection and disposal of non-biodegradable and recyclable materials. By building the capacity of lead farmers to deliver extension services more effectively, improving communication and training of staff and farmers to enhance adoption of FFS and RA certification principles, educating non-FFS members on the benefits of FFS and RA principles, and using a variety of methods to disseminate information on FFS and RA certification.

The results indicated a statistically significant relationship in up-scaling FFS and RA certification between KTDA factories and gender, education level and Age category of FFS members ($P < 0.5$). The language used to train tea farmers in FFS was appropriate and presence of secure land tenure systems supported the FFS and RA certification scaling-up efforts. The findings revealed that the up-scaling process could be enhanced by farmers' adapting available technology effectively for tea improvement, reducing success-related challenges through proactive strategic research, engaging in strategic partnerships with relevant stakeholders, developing new markets that are responsive to consumer tastes, networking with stakeholders who are involved in FFS up-scaling and careful monitoring and assessment of impacts.

The capacity of lead farmers to training smallholder farmers on RA certification was a big challenge because of their age, education level, experience and the level of their facilitation. Because of mobility challenges, they could only access neighboring farmers. Since lead farmers are trained for only three days in training of trainers (TOTs) they sometimes gave some

conflicting recommendations making it difficult for tea farmers to understand, implement and comply fully with the critical criteria of SAN standards which is a major requirement.

The third objective was to determine and describe the costs, benefits and opportunity costs of FFSs and RA certification to participating tea farmers for 12 months duration/learning cycle and the 6 months needed to prepare one factory to attain RA certification. This objective was addressed by documenting the costs and benefits of FFS and RA certification. The findings indicated that most KTDA factories spent an average of 182,290/= to run an FFS per year, which translates to 6,076/= (\$71) per farmer per year. The FFS members proposed an FFS budget of 231,746/=, which translates to 7,725/= (\$91/=) per farmer per year. The findings of the study confirmed that group extension methods are cheaper than individual extension methods in the training of tea farmers. Among the three methods considered, FFS was the cheapest (\$3.6 per farmer) followed by field days (\$4.28 for a mini field day and \$5.38 for a major field day) and farm visits (\$7.1 per farmer), which were the most expensive. Smallholder farmer derived a lot of benefits from participating in the FFS through empowerment, group cohesion and gaining superior leadership skills in sustainable farming, better tea husbandry, improved yields, social capital benefits and leadership skills. The FFS-trained farmers benefited from increased tea yields, improved farmer empowerment and health as well as increased savings and improved self-reliance.

Over 86 per cent of the total Rainforest Alliance certification costs was incurred by tea growers at farm level to buy PPEs, providing workers with potable water, establishing buffer areas, establishing soil and water conservation structures, digging waste water capture pit, and managing solid waste from the farm. The cost of obtaining a RA certificate per factory was \$470,000, while the recurrent cost of certification per year was \$170,000. The cost of obtaining the RA certificate per farmer was \$43 and \$0.24 per kilo. The recurrent cost of obtaining the certificate per farmer was \$15 and \$0.01 per kilo. The average fees for RA certification inspection was 7,300/= Kenya shillings (\$85.9/=) with the average cost per farmer inspected being 50/= Kenya shillings (\$0.6). The recurrent cost of obtaining the certificate per farmer was \$15 and \$0.01 per kilo. The average fees for RA certification inspection was 7,300/= Kenya

shillings (\$85.9/=) with the average cost per farmer inspected being 50/= Kenya shillings (\$0.6). The costs paid to external auditors ranged from \$12,000 to \$19,000. The charges for RA certification are about \$5 per hectare per year with a ceiling of \$5,000. Over 5 per cent of the RA certification cost was used to train tea growers and factory workers on SAN standards and Rainforest Alliance certification requirements. About five per cent of the total RA certification cost paid external auditors while approximately two per cent was used to pay internal farm audits.

Smallholder farmers benefited from participating in RA certification trainings through learning about land, soil, water and environmental conservation, improved hygiene and personal health due to safe use of agrochemicals, waste and water Management and good agricultural practices and sustainable farming. The RA certified farms benefited from good and efficient management that conserved and restored waterways, wetlands and forested areas. The farms experienced better utilization of water, improved working conditions, houses with portable water, sanitary facilities and waste collection. Farmers also benefited from improved occupational health, good community relations with their neighbors apart from being clean and orderly. The RA certified farms also benefit from market assurance, competitiveness and compliance with consumer demands, improved prices depending on how the factories negotiated with the tea buyer, satisfied tea demand and increase the pool of sustainable tea where marketers and consumers could select from.

The fourth objective was to determine, explain and document how KTDA factories attain RA certification. It was achieved by carrying out a preliminary survey and documenting the processes. The findings indicated that Rainforest Alliance certification is based on a set of identified good agricultural practices formulated by the Sustainable Agriculture Network (SAN), called the Sustainable Agriculture Standard. In 2007, the FFS extension program was used to build capacity of tea farmers on RA certification requirements. The FFS training curriculum was also expanded to cover topics on ecosystem conservation, wildlife protection, worker rights and safety, water and soil conservation, agrochemical reduction, decent housing and legal wages for workers. The up-scaling of RA certification started in selected factories in 2008 and has been

gradually up-scaled from four factories to 47 factories. In 2010, KTDA, Unilever, Rainforest Alliance (RA) and the Sustainable Trade Initiative (IDH), started a program for training farmers so that the tea factories and the smallholders would become Rainforest Alliance certified under group certification schemes. Because the number of FFS was still low and limited to a few areas, KTDA initiated the concept of lead farmers as a parallel system to hasten RA certification outside the FFS. The lead farmers were mainly farmers from the same factory with above-average tea management capacities who volunteered to support their neighbouring farmers to prepare for the RA certification audit. The lead farmers were trained as trainers (TOTs) by Rainforest Alliance and Partner Africa with the assistance from KTDA extension agents (TESAs and FSCs). A lead farmer received a compensation ('lunch allowance') of \$2.5 per day after reaching out and training 300 tea growers.

At the factory level, the RA certification trainers organized trainings for factory board of directors on SANs standards and RA certification after which the board made and endorsed a board resolution to undergo RA certification. The next step involved the RA team carrying out a diagnostic audit to check whether the tea farmers and the factory complied with the ten RA certification principles. The specific KTDA tea factory company or the tea buyer then made a request to Rainforest Alliance to be audited for RA certification. There were two types of audits: compliance and diagnostic audits. A factory applied to the stakeholder that offered RA certification depending on the location of the factory and the number of farmers (factory logistics). The RA trainers organize trainings based on SAN standards to prepare the factory within a period of six months.

Each year, The Sustainable Agriculture Network develops some guidelines (SAN standard and policy) for farmers to follow in order to become SAN – RA certified. First, a client or a factory company contacts a member of the SAN or a regional Rainforest Alliance office. The RA staff/office arranges a pre-assessment of the farming activities, identifies the strengths and weaknesses of the operation and outlines the corrective actions needed to ensure compliance of production and management practices with SAN standards. An audit report is prepared by an independent and voluntary committee of experts; on which basis the SAN International Assessor

Committee makes a decision whether or not to award the certificate of compliance. Applicants whose farming activities fail to meet RA certification requirements are encouraged to reapply for certification after implementing corrective actions. Once the standard requirements are met and the certificate has been delivered, the Rainforest Alliance Certified seal may be used on the final products at the point of sale (Sustainable Agriculture Network, 2011).

The fifth objective was to determine and describe existing procedures for monitoring and evaluation of FFSs and RA certification used in the current project framework. It was achieved through literature review and document analysis. Monitoring and evaluation are critical project management tools in the FFS and RA certification process to measure and evaluate progress and outcomes. The findings indicated that there is a monitoring and evaluation (M&E) plan in place, the baseline data is also available and the second report in the M&E cycle was written in 2012. However, there are opportunities to monitor the training modalities, and generate more data to track the impact of FFS and RA certification trainings, knowledge levels, implementation of GAPs, production, income and livelihood. The up-scaling process subsequent data gathering and repeat surveys for the FFS and RA certification implementation period and beyond is in place and already planned.

5.3 Conclusions

Based on the findings of the study, the researcher concluded as follows:

- A. A KTDA business model presented the business logic for up-scaling FFS and RA certification to create an up-scaling system that could be self-sustaining financially and allow managers to articulate the value of the up-scaling process.
- B. An up-scaling process context diagram provided a blue print that could be used to implement required computer input, output, databases, forms, codification schemes, processing specifications, programs, user interfaces, programming language, the hardware and software platform and networks for the FFS and RA certification up-scaling information systems.
- C. It is important to re-orient the FFS and RA certification up-scaling paradigms, attitude and peoples' mindset, having clear goals and focusing on them, change or self-organize,

- paying attention to rules, and structuring information flow in the FFS and RA certification up-scaling process.
- D. There is need to continue up-scaling of FFS up-scaling within the factories, in at least one FFS per electoral area, across the tea buying centres and within the tea buying centres.
 - E. For the FFS up-scaling to continue from one FFS per electoral area to one per buying centre and finally to cover all tea producers, human and material support are needed.
 - F. Up-scaling of FFS can be enhanced by encouraging farmer-to-farmer interactions, initiating farmer-led FFS, educating non-FFS members on the benefits of FFS and RA principles; and using different methods to disseminate FFS and RA certification information.
 - G. Maintaining the current system with some improvements was the best option for up-scaling Farmer Field Schools and Rainforest Alliance certification.
 - H. The formation and training of tea growers through FFS would be supported by farmers, KTDA factories and other stakeholders.
 - I. The FFSs that had income generating activities were more effective and likely to be sustainable.
 - J. Continuously training of FFS facilitator's on how to identify farmers' need, managing participatory, discovery-based learning, technical skills to guide the groups' learning and action process could enhance the up-scaling process.
 - K. The use of FFS graduates to train other farmers could help to reduce costs and dependence of FFS groups on external funding, up-scaling FFS coverage, increasing sustainability and effectiveness of the overall FFS approach.
 - L. Linking FFSs to financial and micro-financial institutions, Ministry of Agriculture, Livestock, and NGOs enhanced sustainability of FFS.
 - M. Training tea farmers in FFS was cheaper and more effective in bringing behavioral change related to adoption of agricultural technologies compared to field days and farm visits.
 - N. Smallholder tea farmers trained in FFS benefited from better tea husbandry, reduced plucking interval, improved tea yields, increased empowerment and enhanced leadership skills.

- O. Tea growers and factories got a lot of benefits from participating in RA certification through higher productivity, improved waste management, soil conservation, water management, knowledge of health and safety, wildlife protection, a cleaner house, increased agroforestry and increased water flows in streams and rivers.
- P. A lot of investments is required by tea stakeholders in the development of more FFS and supporting the current initiative of up-scaling FFSs and RA certification.
- Q. A monitoring and evaluation (M&E) plan for FFS and RA certification is in place, baseline data has been collected and an M&E report written.

5.4 Recommendations

Based on the conclusions of the study, the researcher made the following recommendations:

- A. KTDA should use the business model approach to provide a business logic/case for up-scaling FFS and RA Certification
- B. KTDA should use a context diagram to guide in development of a computer-based software to be used in the FFS and RA certification process.
- C. KTDA, Rainforest Alliance, Unilever/Lipton, LEI, part of Wageningen, Partner Africa, tea farmers and ETC East Africa should develop FFS and RA up-scaling goals and through education, change the mindset of KTDA board members, factory directors, factory managers, trainers and farmers to appreciate and support up-scaling of FFSs and RA certification.
- D. KTDA should continue up-scaling FFSs within the factories, at electoral areas, across the tea buying centres and within the tea buying centres.
- E. KTDA, Rainforest Alliance, Unilever/Lipton, LEI, part of Wageningen, Partner Africa, tea farmers and ETC East Africa should invest in human and material support for the up-scaling process to succeed.
- F. Kenya Tea Development Agency, The Sustainable Trade Initiative, and the Kingdom of Netherlands Embassy, among others, should promote farmer-to-farmer interactions, initiate farmer-led FFS, educate non-FFS members on the benefits of FFS and RA principles; and use different methods to disseminate FFS and RA certification information.

- G. They should maintain the current system of up-scaling FFS and RA certification with some improvements.
- H. Kenya Tea Development Agency, The Sustainable Trade Initiative, and the Kingdom of Netherlands Embassy, among others, should continue using FFS and RA certification in the training of tea farmers.
- I. KTDA should encourage FFSs to have income generating activities.
- J. KTDA, IDH, the Kingdom of Netherlands Embassy and other donors should invest in training of FFS facilitator's.
- K. KTDA should use FFS graduates to reduce costs and dependence of FFS groups on external funding, to increase coverage, sustainability and effectiveness of the overall FFS approach.
- L. KTDA should link tea-based FFSs to financial and micro-financial institutions, Ministry of Agriculture, Livestock, and NGOs enhanced sustainability of FFS.
- M. KTDA should continue training tea farmers in FFS because it was cheaper and more effective in bringing behavioral change related to adoption of agricultural technologies compared to field days and farm visits.
- N. The tea stakeholders should continue promoting the up-scaling of FFSs to enable many tea producers benefit from better tea husbandry, reduced plucking interval, improved tea yields, increased empowerment and enhanced leadership skills.
- O. The tea stakeholders should ensure tea growers and factories participating in RA certification benefit from higher productivity, improved waste management, soil conservation, water management, knowledge of health and safety, wildlife protection, a cleaner house, increased agro-forestry and from increased water flows in streams and rivers.
- P. KTDA should involve tea stakeholders such as tea buyers, NGOs and willing sponsors to financially support the current initiative of up-scaling tea-based FFSs and RA certification.
- Q. KTDA should continue implementing the monitoring and evaluation (M&E) plan for FFS and RA certification.

5.5. Suggestions for Further Research

- A. Researchers should conduct a comparative cost-benefit analysis of the various certification schemes (RA compared with others) being promoted among smallholder tea production and should identify and describe the roles of various stakeholders.

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APPENDICES

Appendix A: Questionnaire for Participants Trained in Farmer Field School and Rainforest Alliance Certification

Instructions: Please respond to all items.

1. Factory name: _____ County: _____
2. KTDA administrative region: _____
3. Name (Optional): _____
4. Gender (Tick one): a) ☐ Male b) ☐ Female
5. Marital status (Tick one): Single _____ Married _____ Divorced _____ Separated
Widowed _____ Others (specify) _____
6. Year of birth: _____
7. Education level (Tick one) a) ☐ Non-formal, b) ☐ Primary, c) ☐ Secondary
d) ☐ College, e) ☐ University, f) ☐ Others (specify) _____
8. Number of household members: Males _____ Females _____
9. Average earnings per day in Ksh: _____ Hours worked per day: _____
10. Currently, are you trained in Rainforest Alliance (RA) Certification?
a) ☐ Yes b) ☐ No (Skip to 28)
11. If Yes, are conservation/buffer areas (distance from the river that should not be cultivated)
established alongside streams and rivers on your farm?
a) ☐ Yes b) ☐ No (Skip to 13)
12. If Yes, indicate: a) Width of buffer area in meters _____
b) Type of vegetation _____
13. Are conservation areas established in your farm? a) ☐ Yes b) ☐ No (Skip to 16)
14. If Yes, indicate: a) Estimated size of conservation area _____ (ha).
b) Size of your farm _____ (ha).
c) Estimated per cent of total area _____
15. Number of native (indigenous) trees planted on your farm _____
16. Is waste water capture pit or similar preventative measure in place on your farm?
a) ☐ Yes b) ☐ No
17. Is solid waste managed (recycled/or removed from farm) adequately on your farm?
a) ☐ Yes b) ☐ No

18. Do you use agrochemicals at your farm?
a) ☐ Yes b) ☐ No (Skip to Q25)
19. Do you record the type of agrochemicals used?
a) ☐ Yes b) ☐ No
20. If Yes, name the agrochemicals used _____
21. Do you track quantity of agrochemicals used per year? a) ☐ Yes b) ☐ No
22. If Yes, specify litres of agrochemical used _____
23. Do you record the type of toxicity level? a) ☐ Yes b) ☐ No
24. Do you use appropriate personal protective equipment where required?
a) ☐ Yes b) ☐ No
25. Number of workers employed on my farm:
a. Permanent, _____
b. Temporary _____
c. Foreign/migrant _____
26. What I pay my employees per day in Ksh: _____
27. Workers have access to portable water a) ☐ Yes b) ☐ No
28. Number of RA Certification trainings I participated during the last one year _____
29. Currently, are you an active FFS member?: a) ☐ Yes b) ☐ No (Skip to Q32)
30. If Yes, what is your experience in months _____
31. If you are an FFS member, how many hours do you meet in a month? _____
32. Sources of information about Farmer Field Schools (Tick all that apply):
a) ☐ Radio d) ☐ Newspaper/magazine g) ☐ Church group
b) ☐ Farmer's group e) ☐ Farmer teacher h) ☐ Farmer Field School
c) ☐ Neighbor f) ☐ Extension officer i) ☐ KTDA/NGO/CB
j) ☐ Other source (Specify) _____
33. Sources of information about RA Certification(Tick all that apply):
d) ☐ Radio d) ☐ Newspaper/magazine g) ☐ Church group
e) ☐ Farmer's group e) ☐ Farmer teacher h) ☐ Farmer Field School
f) ☐ Neighbor f) ☐ Extension agent i) ☐ KTDA/NGO/CBO
k) ☐ Other source (Specify) _____
34. Number of FFS Members: _____ a) Registered: _____ b) Active: _____
35. In which year was your FFS formed? _____

36. What is the main language used in your FFS? _____
37. Was the language used in the FFS appropriate? ☐ Yes (Skip to 38) ☐ No.
38. If No, please explain: _____
39. Do you have an established leadership structure in your FFS? ☐ Yes ☐ No (Skip to Q41)
40. If Yes, which of the following officials do you have? (Tick all that apply)
- a) ☐ Chairman, b) ☐ Secretary c) ☐ Treasurer d) ☐ Committee Members
41. What is your role (duties) in the FFS?
- _____
- _____
42. The land you use falls under what type of land tenure system? (Tick all responses that apply)
- a) ☐ Individual b) ☐ Family c) ☐ Hired d) ☐ Others (specify) _____
43. Name two activities your FFS or RA group is involved in:
- a) _____
- b) _____
44. Does your FFS have income-generating activities? a) ☐ Yes b) ☐ No. (Skip to 48)
45. IF Yes, which ones? _____
- _____
46. How are the proceeds from income generating activities used? (Tick all that apply)
- a) ☐ To pay facilitators
- b) ☐ To buy training materials
- c) ☐ To buy farm inputs
- d) ☐ To buy food
- e) ☐ To hire farm labor
- f) ☐ To buy seedlings for gaping (infilling)
- g) ☐ To save in a Sacco
- h) ☐ Others (please specify): _____
47. How do you benefit from participating in the FFS
- _____
- _____
- _____
48. How do you benefit in participating in RA Certification trainings _____
- _____
- _____

49. Who Facilitates your FFS (Tick one)? a) ☐ None-farmer expert b) ☐ FFS-trained farmer c) ☐ KTDA extension agent. d) ☐ Others (Specify) _____
50. How do you rate the facilitator's expertise in guiding the FFS activities (Tick one)?
a) ☐ High b) ☐ Moderate c) ☐ Low
51. Is your FFS linked to other networks, groups or partners (Tick one)? a) ☐ Yes b) ☐ No
52. If yes, name the network(s) _____

53. If the linkage or network is useful to you, please explain how. _____

54. As an FFS group member, have you been involved in collective tea marketing?
a) ☐ Yes b) ☐ No
55. If Yes, for what benefits? _____

56. As a tea grower, how did FFS and RA Certification trainings affect your livelihood (Please tick one of the three responses provided: poor, good, or very good to excellent)?

<i>Observed changes in farmers' livelihood.</i>	<i>Poor</i>	<i>Good</i>	<i>Very Good to Excellent</i>
Increase yields			
Increased savings			
Plucking interval			
Linkage and networking with other groups			
Ability to lobby through farmer networks (e.g. for better tea prices)			
Marketing of produce			
Ability to acquire affordable credit			
Increased chances for membership to a federation			
Improved public health			
Increased empowerment			
Increased ability to fund own activities			
Increased ability to pay operation costs			
Increased ability to pay facilitators' costs			

57. Which of the following factors explain how tea-related FFS up-scaling processes work? (Tick all that apply)

- a) ☐ Farmers adapting available technology effectively for tea improvement.
- (b) ☐ Reducing success-related challenges through proactive strategic research.
- (c) ☐ Engaging in strategic partnerships with relevant stakeholders.
- (d) ☐ Developing new markets that are responsive to consumer tastes.
- (e) ☐ Improving networking with stakeholders who are involved in FFS up-scaling.
- (f) ☐ Careful monitoring and assessment of impacts.
- (g) ☐ Other factors (Specify) _____

58. Give two suggestions on how to up-scale FFSs or RA Certification in KTDA factories

- a) _____
- b) _____

59. What is the estimated cost of conducting an FFS for 12 months? Use the table below.

Item	Unit cost (Ksh)	No	Total cost
Hiring a venue			
Paying for stationery			
Paying			
(a) Researcher-led facilitator			
(b) Extension-led facilitators			
(c) Farmer-led Facilitator			
Operational costs (e.g. for transport and refreshments)			
Fertilizer,			
Pruning saws			
Watering cans			
Others (Specify)			
Total costs			

60. Give two challenges that you have faced as an FFS member?

- a) _____
- b) _____

61. Give two challenges that you have faced in the process of being RA Certified?

- a) _____
- b) _____

Appendix B: Guiding Questions for Face to Face Interviews

- 1 What is an FFS system?
- 2 What are the processes and requirements of Rainforest Alliance certification?
- 3 What are the components of an FFS and RA certification system in terms of inputs, process and outputs?
- 4 Explain the role of each component in the overall functioning of the system.
- 5 Suggest a suitable mechanism for designing a tea-specific FFS and RA certification system.
- 6 How may FFS and RA certification experiences in a KTDA-specific model of extension be systematized and documented with special reference to thematic knowledge components and extension delivery mechanisms?
- 7 Please explain other dimensions of up-scaling FFSs and RA certification in addition to dimensions of governance, stakeholders' participation and broadening extension service provision.
- 8 How do FFSs' producer organizations improve governance, stakeholders' participation and broadening of extension service provision?
- 9 Please describe a suitable procedure for monitoring and evaluation of FFSs and RA certification among small-scale tea producers?

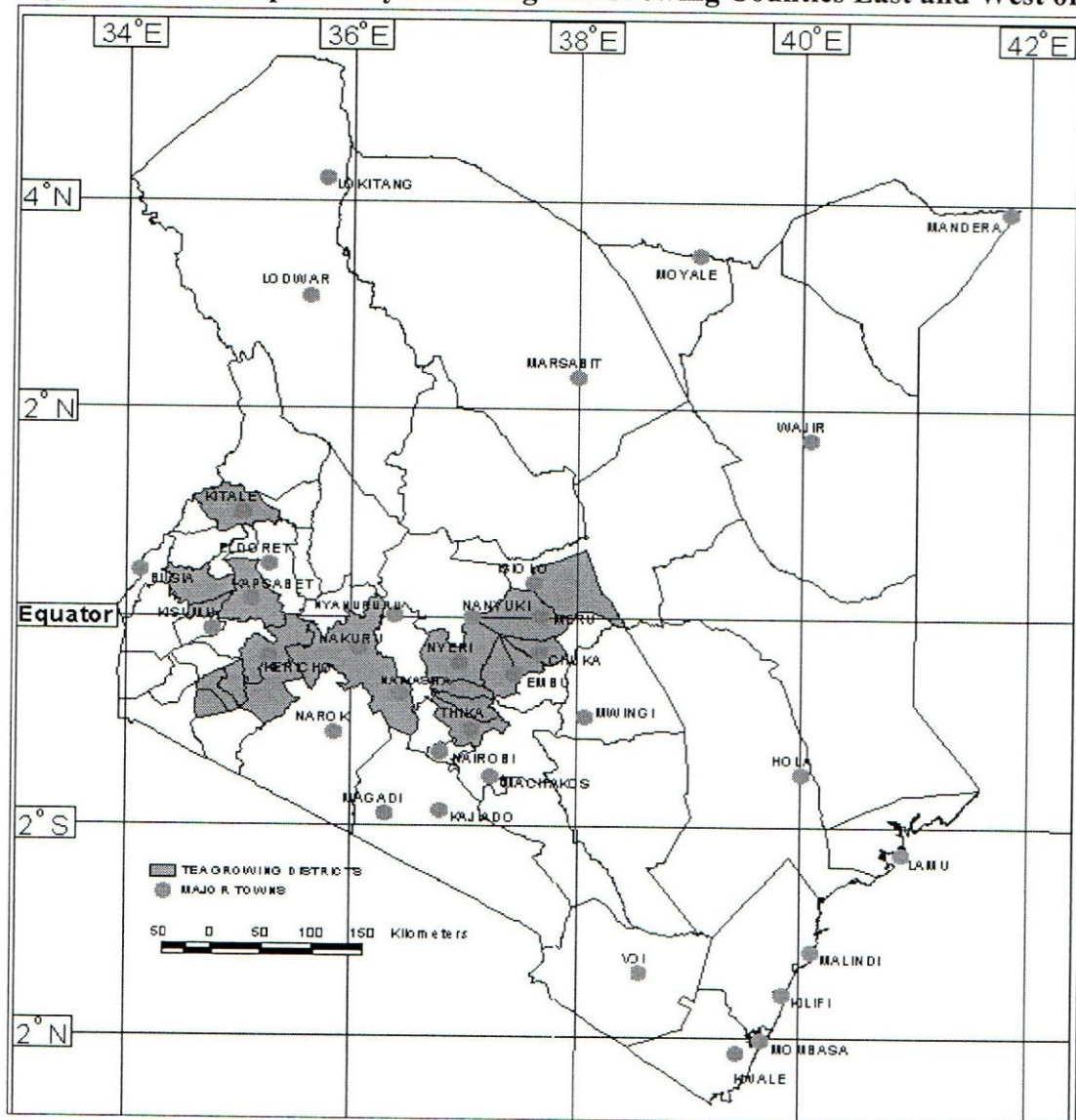
Appendix C: Information Gained from Document Analysis

1. How can we systematize FFS and RA certification experiences related to thematic knowledge components and extension delivery mechanisms in a KTDA-specific model of extension?
2. What are the mechanisms of up-scaling FFSs and RA certification schemes that produce impacts in-terms of inclusiveness, resilience, cost effectiveness, challenges and opportunities in the model at the project and at macro-levels?
3. How do KTDA factories attain RA certification?
4. What would be a suitable procedure for monitoring and evaluation of FFSs and RA certification activities?

Appendix D: Sampling Frame

Folio	Geographical Location	KTDA admin Region	KTDA Factory	Up-scaling Level	No. of Farmers
1.	East of Rift Valley	1	Theta	FFS+RA	6,882
2.		1	Mataara	FFS+RA	3,942
3.		1	Ngere	FFS +RA	6,737
4.		1	Makomboki	FFS +RA	5,274
5.		2	Ragati	FFS+RA	8,114
6.		2	Iriaini	FFS +RA	5,989
7.		2	Gitugi	FFS+RA	5,237
8.		3	Mununga	FFS+RA	8,411
9.		3	Thumaita	FFS+RA	11,592
10.		3	Mungania	FFS +RA	9,160
11.		4	Kinoro	FFS+RA	8,355
12.		4	Weru	FFS+RA	9,958
1.	West of Rift Valley	5	Kapkoros	FFS+RA	24,382
2.		5	Mogogosiek	FFS+RA	19,695
3.		5	Kapset	FFS+RA	14,237
4.		5	Tegat	FFS+RA	11,215
5.		5	Kapkatet	FFS+RA	12,900
6.		5	Momul	FFS	9,611
7.		6	Nyankoba	FFS+RA	14,493
8.		6	Nyansiongo	FFS	10,750
9.		6	Sanganyi	FFS+RA	19,932
10.		6	Ogembo	FFS+RA	27,880
11.		6	Gianchore	FFS +RA	10,894
12.		6	Kebirigo	FFS +RA	
13.		7	Mudete	FFS +RA	15,435

Appendix E: A Map of Kenya Showing Tea Growing Counties East and West of Rift Valley



Source: (http://www.ktdateas.com/maps/factories_western.html)

submit report to the District Officer before

the District Education Officer of the area before
embarking on your research. Failure to do that
may lead to the cancellation of your permit.

Government Officers will not be interviewed
without prior appointment.

No questionnaire will be used unless it has been
approved.

Excavation, filming and collection of biological
specimens are subject to further permission from
the relevant Government Ministries.

You are required to submit at least two(2)/ four(4)
bound copies of your final report for Kenyans and
non-Kenyans respectively.

The Government of Kenya reserves the right to
modify the conditions of this permit including its
cancellation without notice



REPUBLIC OF KENYA

RESEARCH CLEARANCE
PERMIT

(6055t3mt10/2011) (CONDITIONS—see back page)

of/Dr./Mr./Mrs./Miss/Institution

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KSH. 2,000

Wambugu Maina

(Address) Egerton University

P.O. Box 536-20115, Egerton

been permitted to conduct research in

Location

District

Province

Rift Valley

the topic System design and scalability of

er field school and rainforest alliance

tification of smallholder tea producers East

West of Kenya's Rift Valley

a period ending 31st December, 2013



Applicant's

Signature

Secretary

National Council for

Science & Technology

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UP-SCALING FARMER FIELD SCHOOLS AND RAINFOREST ALLIANCE CERTIFICATION AMONG SMALLHOLDER TEA PRODUCERS IN KENYA: OPTIONS, OPPORTUNITIES AND EMERGING LESSONS

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Abstract

Kenya Tea Development Agency (KTDA) has been encouraging small-scale tea (*Camellia sinensis*) producers through Farmer Field Schools (FFS) to adopt good agricultural practices since 2006. The scaling of FFS and Rainforest Alliance (RA) certification to 560,000 tea producers remains a big challenge. Hence the need to learn about options, opportunities and emerging lessons for up-scaling FFS and RA certification among smallholder tea producers in Kenya. This study sought to improve tea producers' understanding on how successful innovations such as FFSs and RA certification can be up-scaled to more stakeholders and how to produce tea sustainably. It also sought to describe the options, opportunities and emerging lessons related to up-scaling. The study used a Cross-Sectional design to collect data from a two-stage random sample of 514 small-scale tea growers drawn from KTDA factories. A semi-structured questionnaire validated by extension experts, whose 0.92 α reliability was above the 0.7 acceptable was used to collect data. Face-to-Face interviews, document analysis, record reviews, field visits, observations, living the system and a stakeholders' workshop were carried out to ensure triangulation. Data were analyzed using Chi-square at 0.05 α set a priori. The results indicated that

maintaining the current system with some improvements was the best option for up-scaling FFS and RA certification. The researchers concluded that FFSs and RA certification can be up-scaled by increasing resources, improving communication, training and educating non-FFS members using different methods. They showed that up-scaling training for certification and FFS come with a need for additional investments and eventually will alter KTDA's cost and revenue model of the sustainable tea production. To sustain this system, the true costs and benefits of sustainable tea are incorporated in the KTDA business model, which implies that donors strategically move from subsidizing costs to strategic investments in human resource development, capacity building and extension technologies.

Key words: *certification, emerging lessons, farmer field schools, good agricultural practices, Kenya Tea Development Agency, Rainforest Alliance, opportunities, options.*

Introduction

Institutional failures, market constraints, limited education and knowledge transfer and adoption by farmers of improved technologies are largely responsible for reduced farm productivity and farmers' inability to generate income (Kilimo Trust, 2010) - leading to unnecessary poverty and food insecurity. Kenyan tea - world famous for its brightness, attractive color, brisk, flavor and texture (Mutai, 2011) face challenges of output and price fluctuations, inadequate affordable drought-tolerant clones and credit for buying essential farm inputs. According to Braga, Lonescu-Somer, and Seifert (2011), KTDA have been using Farmer Field Schools (FFS) since 2006 to training farmers, and to achieve sustainable tea production. By participating in the FFS, which is a learning-by-doing approach, farmers develop skills that enable them to identify and analyze their problems, opportunities, feasibility of different options, and to adapt to changing circumstances. This flexible, participant-led learning facilitates their demand for knowledge and enables them to choose, test and adapt useful technologies based on their needs (Mwangi, Oloo & Maina, 2010). The FFS provides a forum for participant-led learning, flexible interactions and integration of different types of knowledge.

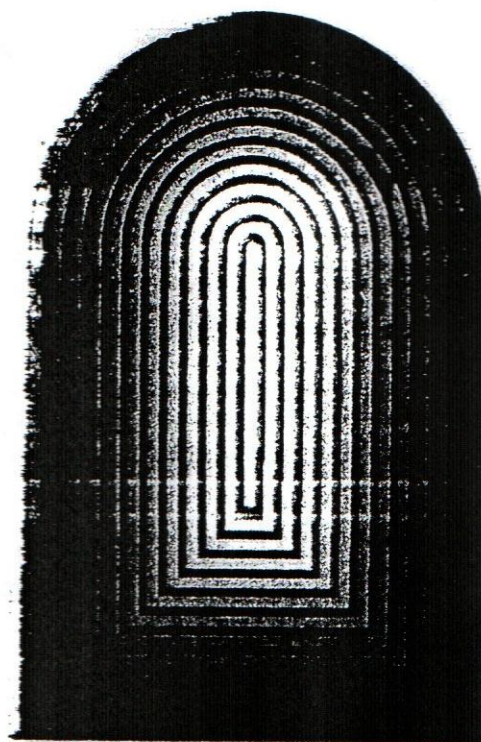
Tea is an important crop in East Africa, and is a source of income for countless smallholder farmers (Rainforest Alliance, 2011). The adoption of good agricultural practices (GAPS) in tea production through the conventional method of extension according to De Jager, Onduru, Hiller and Van den Bosch (2009) has proved to be slow and thus, FFS extension approach was adopted to increase the adoption of GAPS. Braga, Lonescu-Somer and Seifert (2011), Hiller, Onduru, and Jager (2009) have indicated that in 2006-2008, Kenya Tea Development Agency (KTDA) in cooperation with Lipton under the KTDA/Lipton Sustainable Agriculture Project launched four pilot FFSs spread equally over four KTDA factories under the Department for International Development (DFID) funding. They report that FFSs were used to successfully train smallholder tea producers on sustainable tea production practices, which constitute Good Agricultural Practices (GAPs); and the chain actors in the project expressed the need to roll-out the FFS approach to reach 560,000 tea producers using this methodology.

A number of quality assurance and certification initiatives such as Ethical Tea Partnership (ETP), Rainforest Alliance (RA), Fair Trade (FLO and IFAT) and Organic (IFOAM) have been started in the tea sector to guarantee quality to consumers and to take corporate social responsibility (De Jager *et al.*, 2009). These initiatives, according to De Jager *et al.* (2009) have set standards and product labels assuring consumers that the products they purchase are produced, processed, and certified to be consistent with the set standards. During the pilot phase, Hiller *et al.* (2009) report that the need to attain Rainforest Alliance (RA) certification became apparent with LIPTON, the main buyer of KTDA tea, seeking to buy tea produced from sustainable sources. Rainforest Alliance promotes sustainable production through standards set by the Sustainable Agriculture Network (SAN) (Coffee & Conservation, 2010, Rainforest Alliance, 2011). Rainforest Alliance (RA) certification - built on the three pillars of sustainability (environmental protection, social equity, and economic viability) - promotes and

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COST AND BENEFITS OF RUNNING A TEA-BASED FARMER FIELD SCHOOL IN KENYA

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Abstract

The Kenya Tea Development Agency (KTDA), through its extension workers, has been educating tea producers on good agricultural practices using Farmer Field Schools (FFS). Information on training cost and benefits of running a tea-based FFS in Kenya were not readily available. Such information would enable tea stakeholders to develop a strategy for up-scaling FFS. This study sought to determine and describe the cost and benefits of running a tea-based FFS among small-scale farmers in the Rift Valley. The study used a Cross-Sectional research design to collect data from 514 small-scale tea growers drawn randomly from KTDA factories. A questionnaire with a reliability coefficient of 0.92 α was used after validation by extension experts. Face-to-Face interviews and a stakeholders' workshop were used for triangulation purposes. Data were analyzed qualitatively and reported using descriptive statistics. The results indicated that training a farmer in a tea-based FFS in a year costs Ksh 6,076/= (US\$71). The training gave farmers skills to improve their tea husbandry, yields, level of empowerment and leadership skills. The researchers concluded that training tea farmers in FFSs was cheap, sustainable and effective in changing their behavior. Stakeholders in the tea-value chain should increase funding and use of FFS in training tea farmers.

Key words: *benefits, cost, farmer field schools, good agricultural practices, Kenya Tea Development Agency.*

Introduction

Agriculture is the backbone of Kenya's economy contributing 26% directly and another 25% indirectly of the GDP, accounting for 65% of Kenya's total exports and provides more than 18% of formal employment (Government of Kenya, 2010). Tea is a key foreign exchange earner and in 2009, the value of tea exports was Kenya shillings 69/= (US\$ 0.86) billion (Government of Kenya, 2011; Mugambi, 2010; Odhiambo, 2010). Kenya is the World's third largest tea producer and the world's largest exporter of black tea with approximately 110,000 hectares of land under tea that is world famous for its brightness, attractive color, brisk, flavor and texture (Maina *et al.*, 2012a; Mutai, 2011). Kenya Tea Development Agency (KTDA) is the second largest exporter of black tea in the world and is responsible for 62% of all tea produced

in Kenya (Braga, Lonescu-Somer, Seifert, 2011). Since 2006, KTDA extension workers have been using Farmer Field Schools (FFSs) to educate its smallholder tea producers in soft and technical skills (Campbell, 2010; Maina *et al.*, 2012b; Odhiambo, 2010). Farmer Field School popularly known as “informal” or “school without walls” is a community-based, capacity building, learning by doing extension model or system that uses adult education principles in farmers’ groups (Akinagbe & Ajayi, 2010). This group-based experiential learning encourages farmers (normally in groups of 20-30) to learn improved technologies and farming practices through observation (Hartl, 2009; Mwangi, Oloo & Maina 2010). The experiential learning approach and empowerment - that refers to the development of skills so that individuals can make informed choices in their lives - make FFS a popular training method for farmers and provides an up-scaling model for knowledge empowerment (Dzeco, Amilai & Cristóvão, 2010; Stigter, 2010). The FFS can be an effective methodology for building trainers’ capacity and changing their attitudes (Maina *et al.*, 2012a).

Problem of Research

The Kenya Tea Development Agency (KTDA) extension workers have been training small-scale tea (*Camellia sinensis*) producers through various extension methodologies to adopt good agricultural practices (GAPs). Tea growers’ adoption of GAPs through the conventional method of extension has been slow. The KTDA extension workers from the year 2006 started educating tea producers on good agricultural practices using the FFS approach. Most FFS initiatives got financial support from KTDA tea factories but were expected to be self-sustaining as the FFSs are up-scaled to reach 560,000 tea producers. However, information on the cost and benefits of running a tea - based FFS were not readily available. This study sought to provide the missing information in order to assist tea stakeholders’ to mobilize enough training resources for the up-scaling of FFSs.

Research Focus

Limited education, knowledge transfer and adoption by farmers of improved technologies are largely responsible for reduced farm productivity, farmers’ inability to generate income, poverty and food insecurity (Kilimo Trust, 2010; Maina, Mwangi, Boselie, Onduru & Buses, 2012a). The KTDA factories have used FFS since 2006 to train farmers in sustainable tea production and aim to reach 560,000 tea producers using this methodology (Braga, Lonescu-Somer & Seifert, 2011; Hiller, Onduru, & Jager, 2009). This flexible, participant-led learning facilitates their demand for knowledge and enables them to choose, test and adapt useful technologies based on their needs (Mwangi, Oloo & Maina, 2010). The FFS provides a forum for participant-led learning, flexible interactions and integration of different types of knowledge. The FFSs may be expensive or low-cost depending on who implements them and how they are conducted but costs per FFS decline as activities become routine, prices become lower due to bulk purchase of materials, and trainer and facilitator skills and experience increase (Braun & Duveskog, 2010; Maina *et al.*, 2012b). The costs of up-scaling FFSs include expenses for training extension workers and for buying inputs for running FFS. It is possible to up-scale the FFS system to many farmers by deploying FFS-trained farmers to train other farmers (Bunyatta *et al.*, 2006). The FFS graduates are selected and appointed as FFS farmer facilitators that carry the knowledge gained in FFSs as farmer facilitators to new FFS groups in the community. Tea smallholder farmers can also be trained through demonstrations in field day that lasts for one to several days and normally attended by several hundred farmers. Field days’ costs are related to the opportunity cost of the trainers’ time, transportation of experts to the field day and participants’ food, refreshments and time (Ricker-Gilbert, 2005). Other field day costs include