
Cranfield University at Silsoe
Institute of Water and Environment

PhD Thesis

April 2006

Emmanuel F. Simbua

**The Economic Sustainability of Smallholder Tea Production
Systems in Tanzania**

Supervised by Prof. J. Morris

© Cranfield University, 2006. All rights reserved. No part of this publication may be reproduced without the written permission of the copyright holder.

This thesis is submitted in fulfilment of the requirement for the degree
of Doctor of Philosophy

“to all people of the world who earn their livelihoods through tea”

ABSTRACT

Tea is an important crop in Tanzania, contributing over US\$45 million to exports each year. It is grown by over 30,000 smallholder households, and a further 10,000 people are employed in the estates sector. In this context, this study explores the current and potential contribution of the smallholder tea sector towards economic sustainability of the Tanzanian tea industry and rural livelihoods.

Following literature review and an exploratory study of key stakeholders, a methodology incorporating two main components, an Asset Based Model of Sustainability and a Value Chain Assessment Model, was developed and applied to assess the sustainability of the smallholder tea production systems. The tea based livelihood systems and the associated tea value chains for three case study areas were compared involving a survey of over 300 tea growing and over 100 non-tea growing households, and three processing factories.

The study showed that there is an existing synergy between processing factories and smallholder producers which is important for the future development as factories are set to expand the volume of greenleaf sourced from smallholders. At farm level, greenleaf prices, yield, access to input credit, access to research and extension support, availability of farm labour, and access to a reliable greenleaf markets were identified as critical factors that influence the livelihood of the tea growing households. The quantitative analysis showed clear association between farmers involvement in tea production and accumulation of assets (natural, physical and financial), confirming the role of tea in supporting livelihoods.

The study concludes that the smallholder tea production systems can contribute to sustainable livelihood systems. Finally the study gives recommendation for various groups of stakeholders regarding ways to improve the performance of the smallholder production systems.

ACKNOWLEDGEMENTS

I wish to express my heartfelt appreciation to my supervisor Professor Joe Morris for the reassuring guidance throughout the entire period of this research work. His constructive comments and patience are highly appreciated.

I am also indebted to my colleagues at the Tea Research Institute of Tanzania for their assistance during data collection phase in Tanzania. I am particularly grateful to John Mhagama and his colleagues at TRIT Extension Unit Rungwe; for diligently collecting data despite facing other priority tasks. The same appreciation goes to TRIT technical staff at Ngwazi Tea Research Station, Julio Lugusi, Felister Kisuusange, Stella Mgayi, Silus Chelesi and Ernesto Ng'umbi for their valuable assistance during data processing.

The assistance from Chief Executive Officers of Unilever Tea Tanzania Limited, Mufindi Tea Company and Wakulima Tea Company is highly appreciated. The information provided by their respective companies was very useful and without which, this study would never be complete.

I also wish to express my gratitude to the management of the Tea Research Institute of Tanzania, particularly Professor Bruno Ndunguru for giving me the opportunity to come to Silsoe. I highly appreciate the moral support from my colleagues at Silsoe, Roy, Cecil, Emmanuel and Elias, also not forgetting my colleagues at TRIT who kept calling and encouraging me. I also feel indebted to all tea growers whose contribution provided the resources needed for this research work.

Finally, I wish to record my admiration to my family: Valentino and Jackson particularly for waiting patiently even when my return home kept on stretching beyond the promised Christmas!

ABBREVIATIONS AND ACRONYMS

ABMS	Asset Based Model of Sustainability in Agriculture
ASDS	Agricultural Sector Development Strategy
CHAWACHAMU	<i>Chama cha Wakulima wa Chai Mufindi</i>
CTC	Cut Tea and Curl
DALDO	District Agricultural Development Office
DFID	Department for International Development
EATTA	East African Tea Trade Association
EUTCO	East Usambara Tea Company
GCC	Global Commodity Chains
GDP	Gross Domestic Product
GVC	Global Value Chains
GVCM	Generic Value Chain Model
IPN	International Production Networks
KTDA	Kenya Tea Development Authority
LDC	Least Developed Countries
MAFF	Ministry of Agriculture Fisheries and Food (UK)
MoAFS	Ministry of Agriculture and Food Security (Tanzania)
MTC	Mufindi Tea Company
MVTBF	Mkonge Village Tea Block Farm
NBS	National Bureau of Statistics (Tanzania)
NGO	Non-Governmental Organisation
NRi	Natural Resources Institute
PHDR	Poverty and Human Development Report
RSTGA	Rungwe Smallholders Tea Growers Association
SA	Stakeholders Analysis
SACCOS	Savings and Credit Cooperative Society
SC	Supply Chains
SHTPS	Smallholders Tea Production Systems
SLA	Sustainable Livelihoods Approach
TAT	Tea Association of Tanzania
TATEPA	Tanzania Tea Packers
TBEAL	Tea Brokers East Africa Limited
TBT	Tea Board of Tanzania
TIRDO	Tanzania Industrial Research and Development Organisation
TRIT	Tea Research Institute of Tanzania
TSHTDA	Tanzania Smallholders Tea Development Agency
TTA	Tanzania Tea Authority
UNDP	United Nations Development Programme
UTTL	Unilever Tea Tanzania Limited
VCA	Value Chain Assessment
WCED	World Commission for Environment and Development
WTC	Wakulima Tea Company

TABLE OF CONTENTS

ABSTRACT	iii
ACKNOWLEDGEMENTS	v
ABBREVIATIONS AND ACRONYMS.....	vii
CHAPTER 1: INTRODUCTION.....	1
1.1. Overview of the Tanzanian economy and agricultural policies.....	1
1.2. Structure and institutional set-up.....	3
1.3. Justification for this study	6
1.4. Aim	7
1.5. Objectives.....	7
1.6. The structure of the thesis.....	8
CHAPTER 2: TEA PRODUCTION IN TANZANIA AND SUSTAINABLE DEVELOPMENT	9
2.1. Introduction.....	9
2.2. An overview of the Tanzanian tea industry.....	9
2.3. Size and importance of the Tanzanian smallholder tea sector	12
2.4. The context	14
2.5. The concepts of Sustainable Development.....	16
2.5.1. Origin and definitions	16
2.5.2. The paradigm of weak and strong sustainability	17
2.5.3. Sustainable agriculture.....	18
2.5.4. The cash crop versus food crop debate	23
2.6. The concept of sustainable livelihoods (SL).....	27
2.6.1. Overview and origin	27
2.6.2. Basic livelihood models	33
2.6.3. The Generic livelihood model	33
2.6.4. The DFID sustainable livelihoods framework	34
2.6.5. An asset based model of sustainability in agriculture.....	35
2.6.6. Sustainability indicators.....	39
2.6.7. Sustainable Livelihood Frameworks (SLF) for the Tanzania smallholder tea sector.....	42
2.6.8. Household as a unit of assessment in SLF.....	43
2.7. The Concept of Value Chains Assessment (VCA)	45
2.7.1. Overview of the concept of value chains	45
2.7.2. The Generic Value Chain Model (GVCM)	46
2.7.3. International Production Networks (IPN).....	48
2.7.4. Global Commodity Chains (GCC).....	48
2.7.5. French <i>filiere</i> chains.....	50
2.7.6. Global value chains (GVC).....	50
2.7.7. Value chain analysis in agro-food industries	51
2.7.8. The characteristics of the Agro-Food Value Chains.....	52
2.7.9. The Structure of the Tanzanian Tea Value Chain.....	52
2.7.10. Integrating ABMS and VCA for the Tanzanian Smallholders Tea Sector	54
2.8. Chapter summary	57

CHAPTER 3: THEORETICAL FRAMEWORKS AND THE METHODOLOGY OF THE STUDY	59
3.1. Introduction.....	59
3.2. Formulation of the research methods	59
3.2.1. Overview of the methodologies and the theoretical frameworks	59
3.2.2. Data needs and information sources	62
3.2.3. Data collection methods.....	68
3.2.4. Selection of the study area and case studies	69
3.2.5. Selection of the respondents	71
3.2.6. Organisation of the field data collection (operational aspects).....	72
3.3. Information on the value chains for the tea industry	73
3.4. Data Analysis /Analytical Framework	74
3.4.1. Qualitative Information.....	74
3.4.2. Quantitative Survey Data	75
3.5. Critique of the methods.....	77
3.5.1. Literature review and secondary sources	77
3.5.2. Information gathering errors	77
3.5.3. Limitation on the type of information.....	77
3.5.4. Autocorrelation and database relationship.....	78
3.6. Chapter Summary	78

CHAPTER 4: RESULTS OF THE QUALITATIVE EXPLORATORY SURVEY	81
4.1. Introduction.....	81
4.2. Key stakeholders in the Tanzanian smallholders tea sector	81
4.3. The factory owners /estates sector	82
4.3.1. Unilever Tea Tanzania Limited (UTTL)	83
4.3.2. Mufindi Tea Company (MTC).....	86
4.3.3. Wakulima Tea Company (WTC).....	89
4.4. Interviews with Service Providers (Research and Extension)	91
4.4.1. The Tea Research Institute of Tanzania (TRIT)	92
4.4.2. The District Agricultural Extension Offices (DALDO's)	96
4.5. Interviews with Tea Farmers Organisations.....	97
4.5.1. Rungwe Smallholder Tea Growers Association (RSTGA)	98
4.5.2. Mkonge Village Tea Block Farm (MVTBF)	101
4.6. Interviews with Policy Makers and Regulatory Institutions	104
4.6.1. Ministry of Agriculture and Food Security (MoAFS)	104
4.6.2. The Tea Board of Tanzania (TBT)	105
4.7. Interview with the Representative Smallholder Farmers	106
4.7.1. The Smallholder Tea Growers (Mufindi District)	107
4.7.2. The Smallholder Tea Growers (Rungwe District)	114
4.7.3. Medium Scale Growers (Mufindi).....	120
4.8. Chapter Summary	124

CHAPTER 5: RESULTS OF THE QUANTITATIVE HOUSEHOLD SURVEY	127
5.1. Introduction.....	127
5.2. Components of the Asset Based Model of Sustainability in Agriculture	128

5.2.1.	The contextual factors	128
5.2.2.	The Household assets/Capitals	129
5.2.3.	The Tea Based Livelihood systems	129
5.2.4.	The Livelihood outcomes	129
5.3.	The stocks of household assets and flows of goods and services.....	130
5.3.1.	Comparison of stocks of assets and flows of services between tea and non tea farmers.....	130
5.3.2.	Stocks of household assets and flows of services in non-tea growing households.....	149
5.3.3.	Factors influencing the productivity of the smallholders tea production systems	155
5.3.4.	The relationship between farm productivity and input use across the three case study areas	157
5.2.	Chapter Summary	166
 CHAPTER 6: ASSESSMENT OF THE TANZANIAN TEA VALUE CHAINS		
.....		169
6.1.	Introduction.....	169
6.2.	Description of the key stages and participants in the tea value chain.	169
6.2.1.	Greenleaf production	170
6.2.2.	Greenleaf collection and transportation to the factory	173
6.2.3.	Tea processing, grading, packaging and wholesaling.....	177
6.3.	Framework for assessing the tea value chain	183
6.3.1.	Assessment of the effectiveness of the tea value chains.....	183
6.3.2.	Assessment of the efficiency of the tea value chains.....	193
6.3.3.	Assessment of the equity/fairness of the tea value chains	200
6.3.4.	Assessment of the robustness of the tea value chains.....	206
6.4.	Chapter Summary	211
 Chapter 7: Conclusions and recommendations		213
7.1.	Conclusions.....	213
7.2.	Recommendations	222
7.2.1.	Recommendations for the Policy makers	222
7.2.2.	Recommendations for the factory owners	223
7.2.3.	Recommendations for the service providers (research and extension)..	224
7.2.4.	Recommendations for the medium scale tea growers.....	226
7.2.5.	Recommendations for the smallholder tea growers.....	226
7.2.6.	Implications for further research.....	227
7.3.	Closing Statement	228
 REFERENCES.....		229
 APPENDICES		243
8.1.	Appendix 1 Household Assets Questionnaire for the Smallholder Tea Farmers	243
8.2.	Appendix 2: Household Assets Questionnaire for the Non-Tea Farmers	249
8.3.	Appendix 3: Checklist for farmers informal interviews	251
8.4.	Appendix 4: Estimated yield vs Fertiliser use Scatter plot for three case study areas	253

8.5.	Appendix 5: Correlation matrix for variables associated with the greenleaf yield.....	255
8.6.	Appendix 6: Selected statistical results for the quantitative household survey	257
8.7.	Appendix 7: List of interviewed people/institutions during exploratory survey	263
8.9.	Appendix 8: List of variables included in the quantitative survey.....	265

LIST OF TABLES

Table 1.1: The structure of the Tanzanian economy 1983- 2003 (% GDP)	2
Table 2.1: Area under Tea Production – Tanzania 1961 – 2000 (in ha)	11
Table 2.2: Scale of sustainability assessment	40
Table 3.1: Research objectives, data needs, sources and collection methods.....	62
Table 3.2: Categories of stakeholders and data information collected	64
Table 3.3: Collected data based on key households' assets as influenced by tea production.....	67
Table 3.4: The case study areas and the basis for choice.....	70
Table 4.1: Selected basic statistics for the three case study tea processing companies during year 2003.....	83
Table 5.1: Summary of selected indicators for household assets for the three case study areas	132
Table 5.2: Comparison of mean greenleaf yield in the three case study areas according to soils types (kg GL ha ⁻¹)	133
Table 5.4: Comparison of mean greenleaf yield (kg GL ha ⁻¹) and fertiliser use (kg N ha ⁻¹) according to farmers' attendance to formal training.....	137
Table 5.5: Distribution of the respondents based on the quality attributes of the houses owned (%)	138
Table 5.6: Distribution of the respondents based on the type of means of transport owned (%)	139
Table 5.7: The proportion of respondents owning domestic and farm assets for the three case study areas (%)	140
Table 5.8: Perception of the smallholders on the benefits accrued from being members of the tea farmer's organisations (%)	143
Table 5.9: Comparison of mean greenleaf yield according to distances from the nearest tea estates (kg GL ha ⁻¹)	144
Table 5.10: Major sources of household income for the sampled households in the three case study areas	147
Table 5.11: Major components of household expenditure from tea income for the sampled households in the three case study areas.....	148

Table 5.13: Methods of acquiring land for the non tea households in Mufindi and Rungwe districts	150
Table 5.14: Major sources of household income for the sampled non-tea growing farmers in the study area	151
Table 5.15: Main components of the household expenditure for the sampled non-tea growing farmers in the study area	152
Table 5.16: The status on whether the farmer ever grown tea for the sampled non-tea growing households in the study area	153
Table 5.17: The reasons for stopping tea growing for the sampled non-tea growing households in the study area.....	153
Table 5.18: The reasons for not engaging in tea production for the sampled non-tea growing households in the study area	154
Table 5.20: Regression coefficient predictors for the annual greenleaf yield for all case study areas (N=301).	159
Table 5.21: Regression coefficient predictors for the annual greenleaf yield for the typical smallholder's case study areas (Mufindi and Rungwe).....	163
Table 5.22: Regression coefficient predictors for the annual greenleaf yield for the medium scale growers Mufindi.....	165
Table 6.1: Average revenue, costs and margins per hectare of tea for case study areas	172
Table 6.2: Cost structure for greenleaf transportation for the three case study areas	177
Table 6.3: Processing cost structure for three factories serving the case study areas for year 2003 (TZS /kg MT)	180
Table 6.4: Potential indicators for assessing the performance of the key stages of the tea value chain	184
Table 6.5: Selected assessment indicators for the effectiveness of the tea value chain for the three case study areas.....	185
Table 6.6: Selected assessment indicators for the efficiency of the tea value chain for the three case study areas	195
Table 6.7: Selected assessment indicators for the equity/fairness of the tea value chain for the three case study areas.....	201
Table 7.1: List of proposed research topics	227

LIST OF FIGURES

Figure 1.1: principal institutions involved in the Tea Industry in Tanzania	4
Figure 2.1: the main tea growing areas of Tanzania.....	10
Figure 2.2: Tanzania tea production from large estates and Smallholders (1994/2003) tonnes	14
Figure 2.3: Inter sectoral interactions in the context of the Tanzanian tea sector	15
Figure 2.4: Price trends in world major tea auctions	22
Figure 2.5: The sustainable Livelihoods Framework	32
Figure 2.6: A generic livelihood model	34
Figure 2.7: DFID's Sustainable Livelihood Framework	35
Figure 2.8: Asset based model of agricultural systems-flows and outcomes in modernised agriculture.....	36
Figure 2.9: The generic value chain model.....	46
Figure 2.10: Major functions and players in the Tanzanian tea industry.....	51
Figure 2.11: Typical Value Chain for the Tea industry showing key players and the product value transformation stages	56
Figure 3.1: Logical Flow Diagram of Methodological Framework	61
Figure 3.2: Criteria for multistage sampling procedure.....	69
Figure 4.1: Annual green leaf production from smallholders in Mufindi District: 1980/81 - 2002/03 (Tanzania Tea Authority)	87
Figure 4.2: Proportionate main land use categories for Kamwenes' household (%).....	111
Figure 4.3: Proportionate main land use categories for Tupokigwes' household (%)	117
Figure 5.1: Asset based model of agricultural systems-flows and outcomes in the tea based livelihood systems.....	128
Figure 5.2: Trend of average tea productivity between estates and smallholders 1971/2-2001/2(kg MT ha ⁻¹)	134
Figure 5.3: Exploitation of Technological Potential: Yields/ha	167
Figure 6.1: The main export marketing outlets for the case study tea companies.....	212

Figure 6.2: Activity categories within the farm/GL production level generic value chain	212
Figure 6.3: Activities within the greenleaf collection and transportation level generic value chain.....	212
Figure 6.4: Production and transportation of the green leaves for the case study areas	212
Figure 6.5: Activity categories at the tea-processing level generic value chain	212
Figure 6.6: Key processing stages within a CTC based tea factory	212
Figure 6a: Southern highlands without irrigation	212
Figure 6c: Mismatch between capacity and GL supplies	212
Figure 6.7: Proportionate allocation of margins along the tea value chain for the three case study areas	212
Figure 6.7: Phases in the productivity of the tea estate in the southern highlands (Adapted from Stephens & Mathews, 1999).....	212
Figure 6.8a: Tea sales volume and price trends at Mombasa auction (2000 – 2005)	212
Figure 6.8b: Average price trends for the Tanzanian tea in Mombasa auction 1995 – 2002	212

LIST OF PLATES

PLATE 1: Smallholder tea field in Rungwe, poor management practices especially low level of input use lead to lower yields.....	13
PLATE 2: A well maintained tea estate in Mufindi, high input management ensures high yield.....	13
PLATE 4.1: Meteorological station at Ngwazi Tea Research Station an example of how TRIT provides growers with technical support to improve productivity	95
PLATE 4.2: Extension staff receiving training on rehabilitation of the abandoned tea fields in Rungwe District.....	95
Plate 4.3: Smallholder tea gardens in Mkonge village	111
PLATE 4.4: Iron roofed buildings in rural areas indicate a wealthy household.....	113
PLATE 4.5: Harvesting tea using family labour in a smallholder tea farm Rungwe	118
PLATE 4.6: The quality of farm structures(manmade capital)indicate the extent of accumulation of household assets	119
PLATE 4.7: Shortage of hired pluckers can occurs during peak production period .	122
PLATE 4.8: Visitors from various sections of the tea industry visiting Makabila farm	122
PLATE 6.1: A tea garden belonging to a typical smallholder tea grower in Rungwe district.....	212
PLATE 6.2: Reliable and well organised greenleaf collection is a very important component of the tea value chain.....	212
PLATE 6.3: Inside the tea processing factory, green leaf is being fermented ready for drying and sorting into market grades.....	212

CHAPTER 1: INTRODUCTION

This chapter presents the background and the context of this study, giving an overview of the Tanzanian economy, and emphasizing on the role of agricultural sector and specifically the tea industry. The chapter highlights the key changes in agricultural policies in Tanzania and their perceived effects on the Tanzanian tea industry. The chapter also presents the justification for this study in the wake of those policy changes and outlines its aim and objectives.

1.1. Overview of the Tanzanian economy and agricultural policies

According to the World Bank (2004), Tanzania is one of the poorest countries in the world with average income estimated at US\$ 290 in 2004. This is below the 2004 average for sub-Saharan Africa estimated at US\$ 490, and certainly further below other African developing countries within the sub Saharan region such as Botswana (US\$ 3,440), South Africa (US\$ 2,780), Kenya (US\$ 400), Zambia (US\$ 380), Ghana (US\$ 320) and Swaziland (US\$ 1,350).

With an estimated area of 945,000km², Tanzania has a population of over 36 million people of which 51% are female and about 46% consists of children under the age of 15 years. Over 70% of the Tanzanian population live in rural areas where agriculture is their major occupation. The population structure (mostly rural based) as well as a huge natural resource base in the form of arable land makes an agricultural led economy (that includes the tea sector) a favourable option for Tanzanian economic development strategies.

Over the last two decades the agricultural sector has continued to be the driving force of the Tanzanian economy contributing on average over 42% of GDP (Table 1.1) and over 54% of the nation's foreign exchange earnings. It is clear therefore, that the sector plays a very important role in the Tanzanian economy and has a significant potential to contribute to economic growth as well as alleviating poverty

Table 1.1: The structure of the Tanzanian economy 1983- 2003 (% GDP)

% of Gross Domestic Product	Years				20 years
	1983	1993	2002	2003	Average
1. Agriculture	51.4	48.1	44.6	42.3	42.3
2. Industry	12.0	15.6	16.2	15.0	15.0
– <i>Manufacturing*</i>	(8.0)	(7.5)	(7.3)	(7.2)	
3. Services	36.6	36.3	39.2	38.6	37.7

** Manufacturing is part of the industry contribution to GDP*

Source: World Bank Group Tanzania (2004)

According to **UNDP (2002)**, the Government of Tanzania has since 1997 developed a set of agricultural development policies and strategies to guide the performance of the agricultural sector particularly on adapting to broader issues of modernisation, commercialisation, productivity and sustainable use of natural resources. This set of policies is embedded in the Agricultural and Livestock Policy of 1997 as well as the Cooperative and Livestock Policy Act of 1997. The two documents, among other things, propose the following specific policies:

- modernisation and commercialisation of the agricultural sector,
- privatisation, with the reduction of the government's role to support research, policy development, regulation and supervision,
- liberalisation of all agricultural markets,
- transformation of subsistence farming into commercial farming, and
- provision of financial services to households, smallholder farmers and small and micro enterprises.

Further reforms were introduced on the framework of Agricultural Sector Development Strategy (ASDS, 2003). The ASDS aims to create an enabling environment for improving agricultural productivity and profitability, for improving farm income, reducing rural poverty and ensuring household food security. The strategy considers agriculture, which is the main occupation of the majority of rural population, as a driving force towards poverty reduction. According to ASDS (2003),

the transformation of subsistence oriented agriculture into profitable commercial agriculture is seen as a priority. One of the seven conditions identified in the ASDS which needs to be fulfilled if agricultural development is to move forward is the exploitation of the comparative advantage, which Tanzania is endowed, for traditional and non-traditional export crops as well as food commodities. These measures may seem to have potential to boost and support the performance of traditional export crops such as tea.

Already the implementation of some of these measures has gradually lead to expansion of the private sector due to a relatively favourable economic and policy environment. The Tanzanian tea industry is a classic case where these reforms seem to have some beneficial impact, particularly in reconnecting the smallholder outgrowers to the global trade opportunities through the mainstream tea value chain. (Simbua and Ndunguru, 2000)

1.2. Structure and institutional set-up

The structure of the Tanzanian tea industry comprises public and private sector institutions working in tandem. Before independence, the only mode of production in the tea industry was the private estates. The smallholders sector was established after independence, following the Government's decision to promote the smallholder tea growers. During the formative stages of the tea industry therefore the smallholders operated under the management of public sector whereas the estates operated under the management of the private sector.

Initially the government established the Tanzania Tea Authority (TTA) in 1968 as a statutory corporate body that replaced the Tea Board, which had operated since the 1950s as a public organisation responsible for the development of the tea industry. In this capacity TTA controlled and directed all matters that affected the development of tea in the country such as identifying and allocating land for tea growing, licensing tea growers, blenders and exporters, pests and diseases control, promoting tea sales and compiling tea statistical data (Ndunguru, 2001).

During 1994/95, the TTA began to face financial problems leading to a failure to pay smallholders for their greenleaf. These demoralized most of the smallholders who opted to abandon their tea fields in favour of other income generating options. In order to reverse the poor performance of the public corporations and as part of structural adjustment programme, the Tanzanian Government embarked on massive reforms during the early years of 1990's. The main thrust of the reforms included the privatisation of the ailing public businesses, including the tea factories and estates owned by TTA. In the process, the Government dissolved TTA and re-assigned its roles to other mandated institutions (Baffes, 2003).

The current institutional arrangements (Figure 1.1) are structured to facilitate the integration between the estates and smallholders sectors in the Tanzanian tea industry. This is crucial in ensuring that policies set by the government are adequately informed by key stakeholders in the tea industry, particularly the private sector which is now the driving force for the industry. The Central Government through the Ministry of Agriculture and Food Security has the responsibility of policy formulation.

The reforms introduced changes that brought more involvement of the private sector in policy formulating institutions. In the field, the organizational structure effectively reverted to pre-TTA era with private companies and smallholder tea growers working in collaboration.

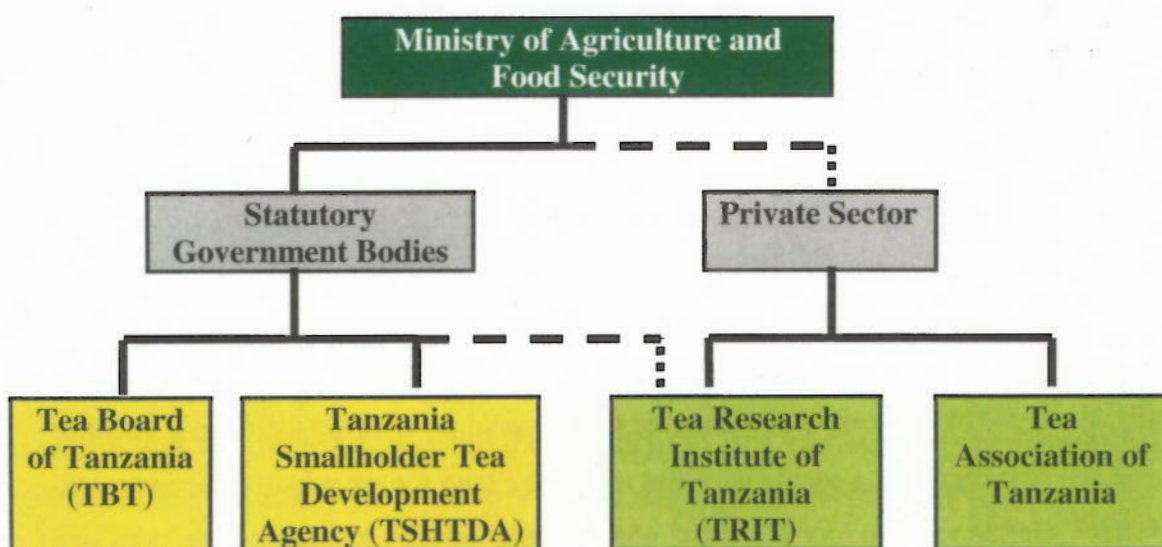


Figure 1.1: principal institutions involved in the Tea Industry in Tanzania

Under this structure, the smallholder farmers sell their green leaf to the large estate operators who are the new factory owners. The factory owners provide credit for inputs to the smallholder farmers consolidating the existing partnership among them.

Approximately three categories of smallholder tea systems exist in Tanzania. These systems are based on the arrangement for service provision by the respective factories i.e. marketing outlets, input supply and provision of other support services.

a) Independent medium scale growers:

These are few and exist mostly around Mufindi District (Figure 2.1) close to large multinational tea companies such as Unilever Tea Tanzania Limited (UTTL). They have their own production and arrange their own transport for green leaf to the processing factory gate. They own much larger farms (mean=16ha) and possess relatively more advanced farm infrastructure (farm tools, machinery and buildings) compared with the typical smallholder.

b) Contract or participating Smallholder (Typical smallholders):

This is an arrangement where the factory (mostly those formerly owned by TTA) relies on participating farmers for the greenleaf. This system exists in Rungwe, Lushoto and Njombe districts. The factory may provide inputs to ensure allegiance of suppliers. The factory retains the role of maintaining quality standards for incoming greenleaf as well as manufactured tea.

c) Nucleus estate with smallholder out-growers:

These are smallholders located near the estates. A nucleus estate produces its own tea crop (usually the major share of the total processed crop) and accepts green leaf from out-grower smallholders located near the estates. The factory provides input on credit, technical assistance and management, and processing and marketing facilities. Tiffen and Mortimer (1990) argue that the inclusion of smallholders with the nucleus estate guarantees at least a minimum required volume of raw materials for the processing unit and generates skills and awareness of modern methods amongst the participating outgrowers.

The three aforementioned groups of smallholders provide a representative cross section of the Tanzanian smallholder's tea sector and therefore have been considered while choosing case studies for this research work.

1.3. Justification for this study

It is apparent that the current trend in the Tanzanian tea industry favours expansion of the smallholder outgrowers, as factory owners prefer to concentrate more on processing and marketing functions of the tea value chain rather than greenleaf production itself. On the basis of that, the following are current drivers which justify this research work:

- changes in the organisation and performance of the smallholder tea sector as the outcome of reforms to engage private sector in the tea industry;
- increased importance of the concept of sustainable development and sustainable rural livelihoods in studying the livelihood strategies of rural people;
- increased commercialisation of smallholder sector as an engine of development in the agriculture sector; and
- increased reliance on private sector for economic development strategies.

There is a need therefore to explore the extent to which the smallholders' production systems can contribute to development process in the wake of those emerging changes in the Tanzanian smallholder tea sector. There is also a need to explore the link between the smallholder tea production systems and the policymaking process in order to determine what might be done to improve performance of the smallholder tea sector. For this process to happen there is a need to understand the current and potential challenges facing smallholder tea growers in Tanzania hence the need for this study.

1.4. Aim

In this context the main aim of this study is to identify the current and potential contribution of the smallholder tea sector towards economic sustainability of the Tanzanian tea industry and rural livelihoods and inform policy accordingly.

1.5. Objectives

With respect to the sustainable development of the Tanzanian tea sector, with particular reference to economic aspects the following objectives were pursued:

Objective 1:

To define the sustainability in the context of the Tanzanian smallholder tea production systems.

Objective 2:

To determine the key sustainability indicators for the existing smallholder tea production systems.

Objective 3:

To develop and apply an analytical framework in order to assess the sustainability of the Tanzanian smallholder tea production systems.

Objective 4:

To identify the major opportunities and constraints affecting sustainability of the smallholder tea production systems.

Objective 5:

To propose ways in which the sustainability of the existing smallholder tea production systems can be improved.

1.6. The structure of the thesis

This thesis is divided in seven chapters. This chapter has presented the background, aim and objectives of the study and the structure of the thesis. Chapter 2 reviews the concepts of sustainable development, sustainable livelihoods and value chain models in the context of the Tanzanian tea industry. The theoretical frameworks and methodology for this study are presented in Chapter 3. Chapter 4 discusses the findings of the stakeholder analysis and the exploratory survey conducted of representative tea farmers, service providers (research and extension), factory owners and policy makers regarding the sustainability of Tanzanian smallholder tea production. Chapter 5 presents the results of the quantitative farm and household surveys conducted in three case study areas focusing on the stocks of household assets and flows of services emanating from them and their impact on the sustainability of the Tanzanian smallholder tea production systems. The structure and key issues of the Tanzanian tea value chain are analysed in Chapter 6, whereas chapter 7 presents the conclusions and recommendations emerging from the study.

CHAPTER 2: TEA PRODUCTION IN TANZANIA AND SUSTAINABLE DEVELOPMENT

2.1. Introduction

This chapter deals with the conceptual framework of sustainable development within the context of the Tanzanian smallholder tea sector. The chapter provides the background of the Tanzanian tea industry paving the way for defining the boundaries of this study whereby the three pillars of sustainability are recognised. On the basis of the traditional linkages of tea to global markets, the review has focused more on the economic dimension as it is perceived to be particularly relevant in determining the sustainability of the smallholder tea based production systems especially given the greater emphasis placed on the role of cash crops in supporting the rural livelihoods. The models and methods used to study the structure and performance of agro-food value chains and its subsequent contribution to livelihood strategies are reviewed in the context of the Tanzanian smallholder tea industry. The chapter ends with confirmation of the validity of the research topic.

2.2. An overview of the Tanzanian tea industry

The tea industry in Tanzania started in 1902 when Germans brought in tea seeds and produced it under experimentation at Amani in the East Usambara Mountains located in North Eastern Tanzania. The commercial tea production gained pace during the 1920s when tea was produced mainly from small-scale farms in Rungwe, Njombe, Mufindi, Lushoto, Korogwe, Muheza, Bukoba and Muleba districts (Figure 2.1).

The structure of the Tanzanian tea industry was further changed in 1945, whereby all tea estates were consolidated by the British Government and handed over to Brooke Bond, a British Company. Under the British colonial rule between 1945 and 1960 the total area under tea production expanded significantly from about 2,720 to 7,340 ha with the annual production of processed tea averaging 3,720 Tonnes. Until this time all the tea was produced from the tea estates owned by foreign settlers. Smallholders were not allowed to grow tea. Hence the involvement of the local indigenous population was restricted to working in these farms as hired labourers.



Figure 2.1: the main tea growing areas of Tanzania

According to Goldthorpe (1985), an estate is a collective term used to describe the mode of agricultural production with industrialised management systems. These typically comprise specialised management methods, single ownership, systems of production control, well defined responsibilities, close delineation of purpose, hierarchical authority relationship and a supervised disciplined labour force. Prior to 1980's the estimated minimum economic size required to support a processing factory for tea was 600 ha. But recent advances in factory designs which enabled smaller scale processing coupled with management and husbandry practices have improved productivity to the extent that even 200 ha may now be adequate to supply a medium sized tea processing factory.

In contrast, the smallholder's mode of production is characterised by production by individual households from their own land holdings. Though there is no universally accepted definition of the term smallholders, but broadly the term is commonly linked to the size of the land holdings or number of livestock owned. However Narayanan and Gulati (2002) point out the difficulty of standardising the holdings size as they tend to vary depending on many factors such as the type of crops involved, level of management intensity and location of the farm. The only definition, which omits the

aspect of holding size, identifies smallholders as farmers (crop or livestock) practising a mix of commercial and subsistence production, or either, where the family provides the majority of labour and the farm provides the principal source of income (Narayanan and Gulati, 2002). However the smallholders in the context of the Tanzanian Tea Industry can mainly be identified through the small size of their holdings and particularly the size of their tea fields.

Smallholders' involvement in the tea industry as growers' dates back to the 1960's when the Government of Tanzania through the Tanzania Tea Authority (TTA) provided planting materials, inputs and other necessary technical support for smallholders to establish their tea farms. This move led to a further expansion of the smallholder tea sector. Since then there has been gradual increase in the tea area from 60 ha in 1961/62 to 10,654 ha in 1990/91. Currently the total area under tea production is estimated at 22,700 ha of which the smallholder area is approximately 11,400 ha (50% of the total) (Table 2.1)

Table 2.1: Area under Tea Production – Tanzania 1961 – 2000 (in ha)

Year	Total Area (Hectares)	Private Estates (Hectares)	Smallholder Farms (Hectares)	Smallholder Contribution as % age of total area
1961/62	7,857	7,797	60	1
1972/73	15,165	9,248	5,878	39
1980/81	19,492	9,258	10,234	53
1990/91	20,827	10,173	10,654	51
2000	21,303	11,192	10,111	48
2002	21,634	11,195	10,439	48
2003	21,800	11,195	10,685	49
2004	22,701	11,270	11,431	50

Source: Tea Board of Tanzania Fact sheet & Records

2.3. Size and importance of the Tanzanian smallholder tea sector

Tea is one of the six important export crops produced in Tanzania, other crops being coffee, cotton, tobacco, sisal and cashew nuts. Tea exports bring an estimated annual average revenue of US\$45 million to the Tanzanian economy. At peak production in 1992 before the decline of smallholder sector under TTA, Tanzania had about 28,700 smallholder tea growers with an average holding of 0.3 ha, who produced around 5,000 tonnes of tea annually from an area of about 9,000 ha (Carr et al, 1992).

Approximately 30,000 households are currently involved in tea sector as smallholder producers who rely on income from tea for their food requirements, housing, children's education and other basic requirements. A further 10,000 people are employed by the estate sector for harvesting work alone, making the tea industry a very significant provider of livelihoods to rural communities in Tanzania.

The average farm size in Tanzania's six tea producing districts ranges from 0.2-0.9 ha with a mean of 0.5 ha. The yields which average 440 kg ha⁻¹ of made tea per annum, are way below the potential as demonstrated by the estate sector whose production averages 3,630 kg ha⁻¹ (Carr, 1999). The Tanzanian smallholders achieve yields of made tea which are considerably less than the average for their counterparts in Kenya, who average 1,700 kg ha⁻¹ of made tea per annum (Nyanga et al 2000).

The low productivity of the smallholders sector is evidenced by the low contribution of this sector to the total Tanzanian tea production. Despite that the total area under tea is split equally between smallholders and the estate sector, contribution of smallholders sector to the total production accounted for less than 10% in 1999 having declined from the maximum of 27% attained in 1994 (Figure 2.2).

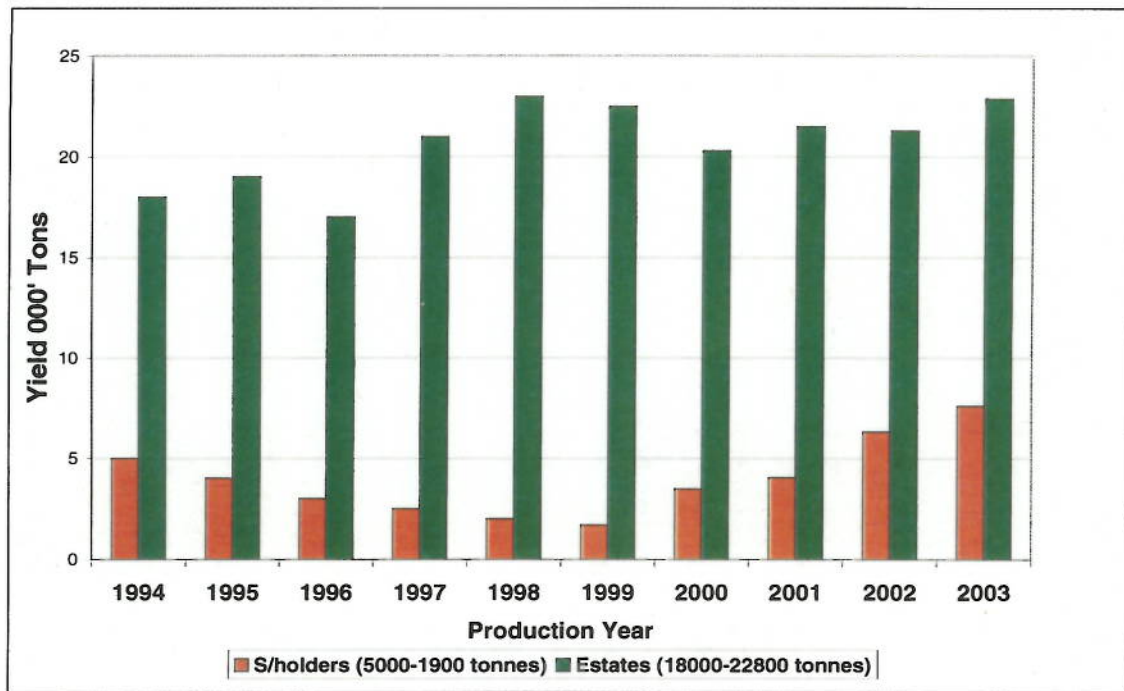
A study conducted in Rungwe district where over 40% of the smallholders are located, showed that income from tea contributes to over 45% of the total household earnings for the 650 interviewed households (TRIT, 2002). The proportion of total household income from tea in other tea growing districts, especially where opportunities for diversified production are limited, may be far higher than in Rungwe.



PLATE 1.1: Smallholder tea field in Rungwe, poor management practices especially low level of input use lead to lower yields



PLATE 1.2: A well maintained tea estate in Mufindi, high input management ensures high yield.



Source: Tea Board of Tanzania Fact Sheet

Figure 2.2: Tanzania tea production from large estates and Smallholders (1994/2003) tonnes

2.4. The context

It is important to define the contextual setting of the Tanzanian tea industry in order to determine relevant issues affecting different components. Figure 2.3 shows the contextual setting of the Tanzanian Smallholders Tea Sector. The sector interacts with both the Smallholder Sector (SHS) and the Estates Tea Sector (ETS) within the overall rural and national economies. In this respect it is affected by a range of factors beyond the smallholder tea sector itself.

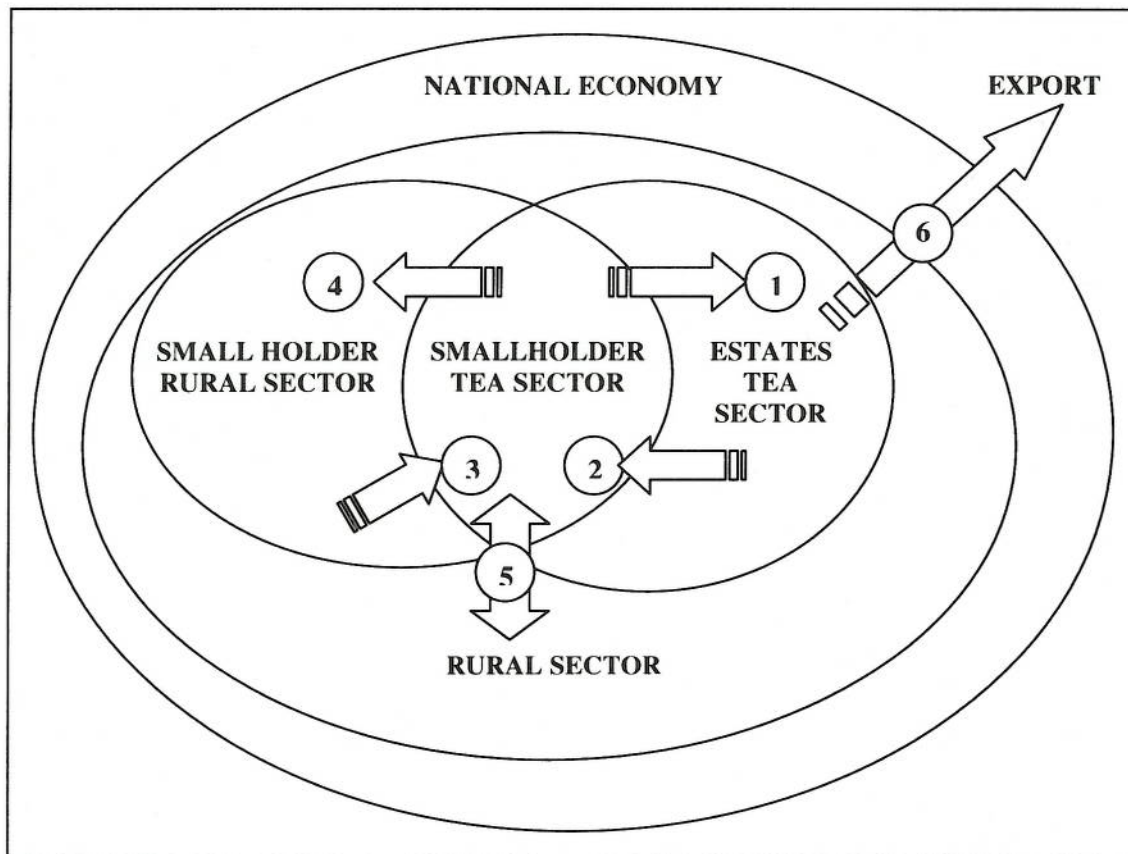


Figure 2.3: Inter sectoral interactions in the context of the Tanzanian tea sector

Key interactions include:

- 1. Smallholders (SH) to Estate Tea Sector:** Greenleaf delivered to the factory from outgrowers. Also smallholders provide labour to neighbouring estates.
- 2. Estates to SH Tea Sector:** Estates provide processing facilities and marketing for the outgrower smallholders, who in turn get income and credits for input from the estates.
- 3. The Rural SH to SH tea sectors:** The rural sector provides resources such as land, labour and support services for the smallholder tea sector.
- 4. SH Tea to SH Rural Sector:** Tea provides a stable source of income to people involved in growing it, and working as hired labourers.
- 5. The tea sector (estates and SH):** Provides income and supports infrastructure development for the rural sector in Tanzania. Similarly the rural sector supplies the tea industry with farm labour, land and social capital needed to sustain the tea industry.
- 5. The tea sector to Export markets:** Provides foreign exchange earnings to Tanzanian economy, facilitating import of goods and services necessary for the tea industry and the national economy.

The scope of this study is limited to the smallholder sector and part of the activities of the estates sector that appears to have direct impact on the performance of the Tanzanian smallholder tea industry.

2.5. The concepts of Sustainable Development

2.5.1. Origin and definitions

The concept of sustainable development has been defined and characterised in many different ways – from the resilience of individual agro-ecosystems to food security in the face of global climate change (WCED, 1987, Atapattu 1997). According to (Rigby and Cáceres 2001), the word sustainable is derived from the Latin, *sustinere*, meaning to keep in existence, implying permanence or long-term support. The World Commission on the Environment and Development (WCED) offered the most widely used definition of sustainable development in its published report, “Our Common Future”. This report, often called the Brundtland Report, identifies environmental issues as the key concern on the ongoing sustainability debate.

However since the Brundtland definition, there has been a burgeoning literature on the concept of sustainable development. Three schools of thought appear to emerge from the debate:

- Those who favoured the preservation of natural areas in what was perceived to be pristine (i.e. underdeveloped) form (Robinson, 2004);
- The second group are those who took a conservationist position but with view that the conserved resources is for future human use including extraction in a balanced way; a typical example of this view is the modern day version of eco-tourism; and
- The third views are rooted in utilitarian approach based on goals like greatest good for the greater number which promotes access to natural resources for exploitation for all human kind.

The three views describe the spectrum of diversity on the way different people perceive the concept of sustainable development. Obviously the individual's position

on this debate is likely to be influenced by the relevant context from this spectrum. In the context of the Tanzanian smallholder tea production systems, an explicit definition of sustainability needs to be drawn-up taking these views into perspective.

Along the same context of the balanced use of natural resources, Munasinghe (1994) describes sustainable development as a process for improving the range of opportunities that will enable individual human beings and communities to achieve their aspirations and full potential over a sustained period of time, while maintaining the resilience of economic, social and environmental systems. This definition provides yet another example of the diversity on the way people perceive sustainable development. It is therefore imperative that one of the most striking characteristics of the term sustainable development is that it means so many different things to so many different people and organisations. According to Robinson (2004), the effort to define the term sustainable development appears to lead into three categories of definitions;

1. Those who prefer the three pillars approach (emphasizing on Economic, social and Environment/ecological dimensions of sustainable development),
2. Those who prefer a more dualistic typology (emphasizing the relationship between humanity and nature), and
3. Other minority views like those criticizing development as a source of unsustainability as it contradicts with the environmental concerns

There are also emerging views that possibly the lack of definitional precision on the concept of sustainable development should not be regarded as a serious problem (Robinson, 2004). This view stems from the argument that if the attempt to define the term precisely is successful, it would have the effect of excluding those whose views were not expressed in the definition.

2.5.2. The paradigm of weak and strong sustainability

Despite the wide acceptance on the three pillar definition of sustainability, the search for operational definition have lead to divergent views particularly on how the three pillars of sustainable development interact with each other. The diverging views are

based on the treatment of the natural capital whereby there are those who accept substitutability between natural capital and man made capitals and those who do not.

The weak sustainability definition considers the economy to be sustainable if the savings rate is greater than the combined depreciation rate on natural and man made capital (Pearce and Atkinson, 1993). According to proponents of the weak sustainability paradigm (Gutèz, 1996), manmade capital can be substituted for natural goods, services and resources, so aggregate capital remains constant over time. Commercial agricultural production is an example of a case which can be considered to be offering sustainable production system if it leads to the net benefit to the community over time without compromising future potential to deliver those benefits.

The other view advocate strong maintenance of the natural capital base and do not allow substitutability between natural and manmade capital. According to Rao (2000), strong sustainability requires every capital vector to remain intact and to be maintained at a critical minimum level over time. In simple terms strong sustainability maintains a strict interpretation of the Brundtland definition of sustainable development that requires, the present generation to leave the future generation a stock of natural capital not smaller than the one enjoyed by the present generation (Gutèz, 1996). For the scope of this study which involves assessment of an economic activity (tea production) that utilises natural resource capital (land, water) to generate income to the community (manmade capital), the weak sustainability definition appears to be compatible with the theoretical frameworks for this study.

2.5.3. Sustainable agriculture

According to Hansen (1996) the concept of sustainable agriculture emerged in response to concerns about the adverse environmental and economic impacts of agriculture. Rasul and Thapa (2003) further clarified that the excessive imbalanced use of agro-chemicals has led to increased financial costs and dependence on external inputs and energy, a decline in soil productivity, contamination of surface and ground water, and adverse effect on human and animal health.

One obvious issue for the concept of sustainable agriculture is the presence of diverse definitions attributed to the difficulties to find a single definition of the concept of sustainable development as described above. However, most of the literature that defines sustainable agriculture, agrees on the inclusion of three key elements namely: food sufficiency, environmental stewardship, socio-economic viability and equity (Smith and MacDonald, 1998).

Ikerd (1993) defines sustainable agriculture as;

"... capable of maintaining its productivity and usefulness to society over the long run..... it must be ecologically sound, resource conserving, economically viable and socially supportive, commercially competitive and environmentally sound".

The definition by Ikerd stems from the three pillars version of Sustainable Development debate that somehow has now become a widely used definition of sustainable agriculture, whereby three main elements of sustainability that essentially covers the broader aspects of sustainability as seen from different perspectives are proposed.

The three-pillar approach, which was also used, by Yunlong and Smit (1994) offers three dimensions of sustainable development. The first is the ecological definition of sustainability, which focuses on biophysical processes and continued productivity of the functioning ecosystems. The second is the economic definition of sustainability, mainly concerned with the long-term maintenance of the benefits of farming to agricultural producers. The final distinction is the social definition of sustainability which tackles the issue of continued satisfaction of basic human needs for food and shelter, as well as security, equity, freedom, education, employment and recreation. The Yunlong and Smit's definition falls along the three pillars approach to sustainable development debate. This view has increasingly become dominant and seems to bring consensus to many views as evidenced by many authors who have contributed to this debate; Pearce (1993); Hansen (1996); Smith and MacDonald (1998); Andreoli and Tellarini (2000); Rasul and Thapa (2003); Pacini et al. (2003); Gundimeda (2004); Johnson (2004).

The Tanzanian smallholder tea industry being export-oriented features all of the three key pillars of sustainability with varying degree of magnitude. Tea is produced by smallholders mostly for the income it provides through the sales of green leaf to the processing factories. The relatively evenly distributed income over time from tea ensures growers access to services throughout the year as opposed to farmers involved in non perennial or crops with single or fixed harvesting periods. This in itself provides an opportunity for better social environment in all tea growing communities. The commercial nature of the tea industry reinforces further the argument that the economic dimension of the sustainable development agenda appears to be most relevant as opposed to social and environmental dimensions.

Regarding environmental concerns; the following potential environmental threats in the tea producing areas need to be considered (MoAFS, 2002);

Pre – planting threats

The effect of clearing of natural forests and conversion of land from use for other crops and livelihood systems into tea based production systems needs to be understood. There are suggestions that indicate that tea production limits degrading practices, as the tea bushes normally provide dual protection of the soil cover by extensive root distribution as well as sod production providing the topsoil cover. It can be argued that tea, which is a perennial crop with dense ground cover, therefore is not associated with problems of land degradation, and soil loss which is a typical characteristic of most of the annual and some perennial crops. However the long term impact of the use of agrochemicals such as nitrogenous fertilisers and herbicides on the water quality and biodiversity needs to be understood and this is an area where research needs to be done.

Greenleaf transportation

With the greenleaf /made tea ratio estimated at 1:5 greenleaf is a very bulky material which require substantial logistics for ferrying it from farms to the processing factory. The effect of the movement of greenleaf trucks on local infrastructure needs to be

assessed. On the positive side it can be argued that local communities in tea growing areas benefits from the improvement of roads by the tea estates in order to facilitate faster movement of the greenleaf. However the negative effects such as fuel consumption on the nation's import bills exhaust emissions from the greenleaf trucks, dust and other types of pollution such as noise need to be considered when assessing the environmental impact of the tea industry on the livelihood of local communities.

Tea processing

The tea processing involves use firewood in factories as the source of energy. Currently there is no evidence to suggest environment damage caused by felling trees for firewood, as tea companies in Tanzania have developed their own sources of regenerative woodlots for supplying firewood in the tea factories. Legislative measures are also in place for the purposes of promoting the best practices. For example, the tea growers are obliged to adhere to the environmental protection act of 1997 which defines the best practices in tea production.

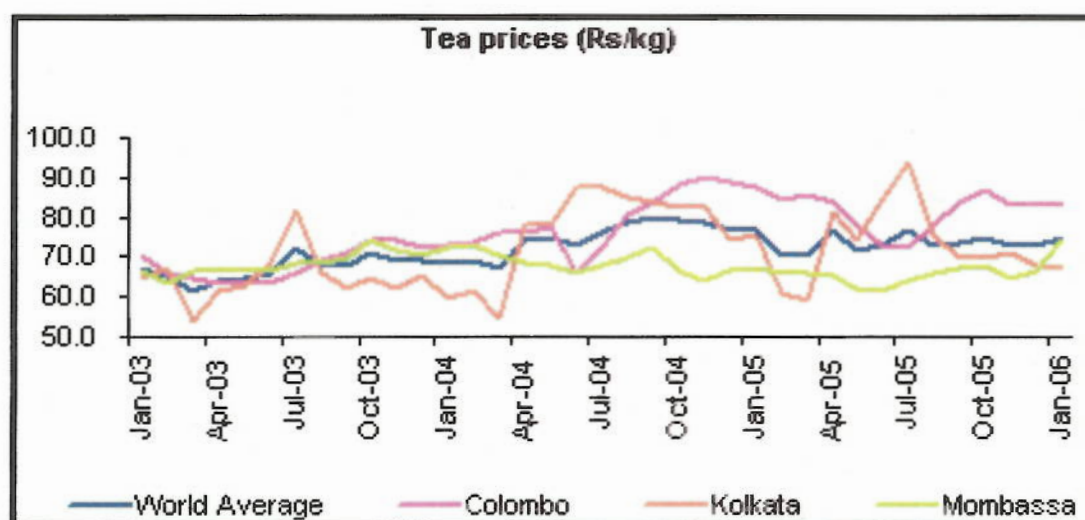
As a pre-requisites for tea production, producers of tea cannot sustain production for many years without keeping aside suitable forestland for renewable fuel wood production. Producers also must perform best practices on soil and water conservation in order to maintain soil fertility and to protect water sources. On the evidence of these measures taken by the tea industry, it can be argued that the tea industry is operating in a relatively non-environmental degrading practices compared with other cash crop production systems in Tanzania. An example is the tobacco industry which (Ramadhani, 2002) mentions that environmental degradations is reaching the alarming stages and the management of the environment is now a primary concern,.

Critical threats to agricultural sustainability have been identified by Hodge (1993) who raises doubts on the long-term viability of the current modern production systems. Hodge argues that;

"Agriculture has come to draw the inputs which it uses from more distant sources, both spatially and sectorally, to derive an increasing proportion of its

energy supplies from non renewable resources, to depend upon a more narrow genetic base and to have an increasing impact on the environment. This is particularly reflected in its heavy reliance on chemical fertilisers and pesticides, its dependence upon subsidies and price support and its external costs such as threats to other species, environmental pollution, habitat destruction and risks to human health and welfare."

Some of these concerns by Hodge appear to be relevant in tea, obvious one being the extent of dependence on chemical fertilisers. The economic dimension of the sustainable agriculture appears to be relevant in the context of cash crop or export oriented crop like tea, although some key challenges relating to international trade especially declining terms of trade for export crops need to be considered. The World Summit on Sustainable Development held in Johannesburg, South Africa in 2002 identified the difficulty of how to strike a balance between trade and sustainable development. This challenge impacts on the agricultural sector particularly where the commodity involved is exported such as tea. The World Summit advocated the need to harness trade and economic growth so that they support the fundamental principles of sustainable development, greater social equity and the sustainable use of natural resources (Borreggard, 2001).



Source: <http://www.indiainfoline.com/nevi/teah.html> (accessed on 13th Feb 2006)

Figure 2.4: Price trends in world major tea auctions: (2003 – 2006)

The smallholders are also concerned with global tea trade issues as they are connected to the tea value chain through estates that own and provide processing facility. Measures such as minimum price which are used in other commodities to stabilise prices, are impractical for tea due to the nature of the tea trade, which tends to be centralised with major regional auctions being the predominant market place for processed tea. Buffer stocks which have operated successfully with coffee are impractical for tea due to shorter shelf life of the product. Thus most of the tea producing companies' end up being price takers; a situation that limits their options for profit maximisation.

National policies (particularly on taxation and those impinging on cost of production) play a very decisive role in the competitiveness of the tea growing companies such as Mufindi Tea Company, Unilever Tea Tanzania Limited and Wakulima Tea Company. Companies operating in a favourable policy environment have competitive edge over other countries companies selling on the same regional auctions. The variation in cost structures attributed to taxation imposed to the Tanzanian tea companies, as compared with Kenyan, Ugandan and Rwandese companies that sell tea at the Mombasa auction is an example of how national policies can affect the competitiveness of the tea industry. The competitiveness of the large-scale companies in the market has an influence on the performance of the smallholder sector that relies on estates for processing facilities.

2.5.4. The cash crop versus food crop debate

The debate on cash and food crop oriented development initiatives have been at the forefront in the national policies of developing countries. The debate is intensified by the need to prioritise between food security concerns and need for agriculture based income. Poulton et al. (2001) acknowledge the growing intensity of the debate which increasingly recognises the role of cash crops in supporting the livelihood of rural people. Poulton et al. (2001) define cash crop as those intended entirely or primarily for the market as opposed to food crops, which are mainly destined for household own consumption.

However, the distinction between the two may not be easy, as some of the crops (particularly grains, legumes and roots/tubers) change status under different circumstances such as different type of household, season of the year and location of the farming system. However, export oriented crops like tea, and other non-food commodities, are regarded universally as cash crops. Hence, households have a clear objective from the onset when choosing to produce such crops. Perennial cash crops such as tea pose an additional challenge for household decision making, as a decision to plant always tie significant proportion of the household assets (land, finances and human capitals) to a long term or permanent commitment.

The debate appears to be relevant to the Tanzanian smallholder tea industry, as tea is regarded as the source of livelihood for the 30,000 smallholder and their dependants. In Tanzania, tea like cotton, coffee, tobacco and sisal is categorised as a traditional export crop grown primarily for foreign exchange earnings (also known interchangeably as cash crops).

With household or community scale, the main concern is on how to optimise use of limited resources such as land and labour to achieve both food security and household income. On the other hand, at the national or international scales the focus of the debate is on policy priorities that will ensure promotion of foreign currency earnings through cash /export crop while ensuring self-sufficiency in food requirements of the population.

In most resource limited rural households, getting the proper balance between producing for the market and achieving food self sufficiency from own production is a dilemma for the farmers. Various factors influence households' decision-making, the most critical being the presence of reliable markets for the cash crop under consideration.

A recurrent criticism levelled against policies to promote export crop production in developing countries is that *“export oriented agricultural development is less environmentally sustainable than food production for domestic consumption”* (Barbier, 1989). Barbier also argues that there is concern that cash crops are being grown on the most fertile lands and are therefore pushing food crops, particularly

subsistence crops cultivation to marginal areas. This argument by Barbier does not appear to be relevant in the context of the Tanzanian smallholders tea sector where tea is mostly grown in marginal acidic soils where other food crops usually do not perform well. Moreover tea bushes have been known to prevent soil loss due to their extensive root system which prevents environmental degradation caused by soil erosion. In the contrary tea appears to add value to land as growers are able to utilise the land which would otherwise deteriorate if any other crop was grown on it. This argument takes consideration of the fact that with an average population increase of 2.7% in Tanzania, demand for agricultural land is likely to increase even in these marginal areas.

Poulton et al. (2001) argue that promotion of cash crops like tea may enable farm households to obtain more food and income than they could get by choosing to produce their own food. They use the following issues to support this argument:

- Market oriented crops like tea tend to have higher value than crops intended for domestic consumption;
- Involvement of a household in market oriented crops imparts specialisation which brings along more efficiency in the utilisation of resources;
- The rising rural population tends to reduce the average farm size over time forcing smallholder producers to aim for high returns per unit of land. Most smallholders will opt for choices of high value (market-oriented crops) as well as high productivity of the limiting resource (land);
- Increased demand for cash in rural communities for livelihood requirements such as school fees, health care, clothing and other upkeep requirements appear to encourage smallholders to give preference to market oriented crops over food crops;
- Devaluation of exchange rates on the local currencies often makes production of internationally tradable crops relatively more profitable than production of locally consumed crops; and
- Long term changes in the relative prices (on global markets) of crops that are grown by the household for both cash and food sufficiency appear to encourage more household market orientation particularly where these changes are transmitted at local scale. Maxwell and Fernando (1989) predicted that price

changes in the global market were likely to be transmitted to smallholders as the result of structural adjustment measures by most of the developing countries including Tanzania.

These views by Poulton et al. are supported by Collier (2001) who considers Africa's substantial market share of perennial crops as a potential for contributing to African economic growth. However Collier highlights taxation as a major drawback to achieving full potential of the perennial crops for the economy and livelihoods of producing countries. According to Collier, because investment is almost uniquely costly to reverse (asset fixicity), once a country has a large perennial acreage, governments have a strong incentive to tax the output and the damage done by such taxation builds up slowly but also substantially.

For the case of Tanzanian tea industry, tax burden has been one of the contentious issues that locked the government and key stakeholders in a lengthy discussion to try to harmonise the tax regime to match with those of other participating countries in the regional tea auction at Mombasa, Kenya.

The notion of agriculture induced growth or development has recently gained favour by a number of development organisations, DFID being front runner in this category. According to DFID, agriculture is seen as source of pro-poor growth for over three quarters of the 1.2 billion poorest people whose livelihoods depended on agriculture (DFID, 2002). In this respect, agriculture plays four key roles in poverty eradication:

- Through its direct contribution to economic growth;
- As a key basis for livelihoods of most of the world's poorest people;
- As a provider of locally available staple foods; and
- Through its potential for sustainable management of natural resources.

Though this study focuses more on farm scale issues, the role of other components in the tea value chain such as the international tea market which appear to have significant impact at farm scale has to be taken into perspective. The distributional issue from the cash crop based economy is another challenge that needs to be addressed. The biggest incentive for households to engage on production of a

commercial crop like tea is primarily the financial benefit anticipated from it. This will also be influenced by the availability or non-availability of other competitive income generating activities within the area. It is therefore important to assess the contribution of the tea industry at the individual household scale in order to determine the economic sustainability of the tea based production systems.

2.6. The concept of sustainable livelihoods (SL)

2.6.1. Overview and origin

According to Chambers and Conway, (1992) a sustainable livelihood is defined as:
".....the one that comprises the capacities, assets (stores, resource, claim and access) and activities required for a means of living: a livelihood is sustainable if it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term"

The concept has gained importance amongst researchers as well development organisations across the world. The concept also has become popular in the debate on world poverty alleviation during the last decade. According to Ashley and Carney (1999), sustainable livelihoods approaches have evolved from three decades of changing perspectives on poverty, how poor people construct their lives, and the importance of structural and institutional issues. The concept has become increasingly popular in development thinking as a way of conceptualising the economic activities poor people undertake in their totality. This has been necessary in the wake of poor effectiveness of the past development approaches sponsored by international development agencies.

Ashley and Carney (1999), identify three main ways in which Sustainable Livelihoods Approaches have been used and found to be useful:

- Holistic approach to supporting the systematic analysis of poverty and its related issues;

- Promoting wider and better informed views of opportunities for development activities and their likely impact; and
- Placing people and the priorities they define firmly at the centre of analysis and objective setting.

The sustainable livelihoods approach hold significant potential for providing an analytical framework to assess the sustainability of cash crop based systems like the smallholder tea production systems, and hence the need to review the approaches in order to explore the perceived potentials.

Chambers and Conway (1992) provided a definition widely used by researchers and development agencies, often with minor modifications e.g. Carswell (1997), Hussein and Nelson (1998), Scoones (1998), Carney (1998), Ashley and Carney (1999), Goodrich (2001) and Ellis (2000).

Chambers and Conway highlight the combination of capabilities, equity and sustainability in the concept of sustainable livelihoods. The three components are the consensus resulting from the debates that occurred between 1970s and 1990s regarding priorities and prescriptions for development. The three components that evolved from the social and biological sciences form the cornerstone of the Chambers and Conway definition of sustainable livelihoods.

The three components are also linked in the sense that each is both an end and a means. In the context of livelihoods, capabilities denote the ability to cope with stress and shocks and being able to find and make use of livelihood opportunities (Chambers and Conway 1992). In the same context of livelihoods, equity implies not just the conventional definition, which refers to income distribution, but the term denotes less unequal distribution of assets, capabilities and opportunities and especially enhancement of those most deprived. Sustainability links up with the livelihoods through its three main pillars namely environmental, social and economic.

Having defined the social and environmental dimensions of sustainable livelihoods, Chambers and Conway (1992) went on to describe the economic dimension of

sustainable livelihoods to denote self –reliance, institutional capacity to raise its own revenue and processes which are self-supporting without subsidy.

In the context of the Tanzanian smallholder tea sector, all three aspects of the Sustainable Livelihood Framework are important in ensuring the sustainability of the system. Tea, which is grown purely for commercial purposes, needs a reliable and attractive market that will provide farmers with opportunity to realise their livelihood outcomes. On the other hand, tea is a labour intensive crop that requires a substantial amount of labour for harvesting work, which is spread out throughout the year. On the other hand, stable rural societies within the tea growing areas are critical to ensuring that social sustainability is achieved.

Inorganic fertilisers mostly constituting nitrogen, phosphorus and potassium (NPK) and herbicides are the major farm inputs used extensively for tea production in Tanzania. Although there is a notion amongst researchers and large scale tea growers that tea is one of the crops that contributes to environmental protection particularly in preventing soil loss, still it is not clear if there are any side effects of the chemicals that are used in tea on the soils and environment. However, tea being among one of the older plantation crops, its management practices have evolved over many decades to incorporate the best management practices that try to minimise the impact of environmental degradation caused by the use of chemicals. However the long term impact of these chemicals on soils and environment in general is not known hence this is an area where further research is needed to determine that.

Scoones (1998) also building on the definition by Chambers and Conway summarises five key elements of the definition of the sustainable livelihoods that appear to feature widely in the existing literature. According to Scoones all five elements contribute to the established ways for assessing the livelihood outcomes in differing magnitudes.

- **Creation of productive working days:** relates to the ability of a particular combination of livelihood strategies to create gainful employment for a certain portion of the year. Employment in terms of income (wages for the employed), production (producing consumable outputs) and recognition. This can be perceived as the biggest contribution of the tea industry to sustainable livelihoods as it provides income to growers, employment for hired pluckers, factory workers,

transporters and other service providers who benefit from the local economy which evolves around the tea industry.

- **Poverty reduction:** poverty is recognised as a key criterion for the assessment of livelihoods. A number of measures both quantitative and qualitative can be used to measure poverty. These measures are based in both income and consumption levels. Scoones emphasizes the need to combine the quantitative measures to assess poverty with qualitative indicators. This view is supported by DFID (2001); Goodrich (2001); Bebbington (1999); Orr and Mwale (2001).
- **Well-being and capabilities:** the notion of well-being and capabilities recognises and allows people themselves to define the important criteria for assessing their livelihoods. The process ultimately may result in a range of sustainable livelihood outcome criteria, including diverse factors such as self esteem, security, happiness, stress, vulnerability, power, exclusion, as well as more conventional measures of material concerns (Chambers 1989). Pretty (1999) points out that economic systems at all scales from farms, livelihoods, communities and national economies rely for their success on the value of services flowing from the total stock of natural, social, human, physical and financial capitals. This assumption is the cornerstone of an asset based model of sustainability for agricultural systems which considers mediating environment as critical to the functioning of any livelihood systems. The detailed description of the model will be given later.
- **Livelihood adaptation, vulnerability and resilience:** this denotes the ability of the livelihoods to cope with and recover from stresses and shocks. This is a central aspect on the definition of sustainable livelihoods. Davies (1996) underlines the fact that sustainable livelihoods cannot be attained by those who are vulnerable and incapable of coping or adapting to changes and disturbances.
- **Natural resource base sustainability:** this refers to the ability of a system to maintain productivity when subjected to disturbing forces. The magnitude of sustainability differs with the nature of the disturbance be it stress or shock. However, the difficulty of measuring natural resources sustainability is recognised.

The first three elements focus on livelihoods by linking concerns over productivity and income with poverty reduction and broader issues of adequacy, security, well-being and capability. The remaining two elements focuses on the sustainability dimension, looking, at the resilience of livelihoods and the natural resource base on which in part they depend.

Scoones demonstrates how the sustainable livelihoods approach provides logical links between livelihood resources (different types of capitals), institutional processes and organisational structures (institutions and organisations), livelihood strategies (agricultural intensification /extensification, diversification or migration) and the ensuing outcomes. The linkages demonstrated by Scoones add more weight to the argument that sustainable livelihood models are relevant for the assessment of the smallholder tea production systems.

According to Scoones (1998), within the *context under consideration* (policy setting, agro-ecology social or economic conditions) the approach seeks to determine a combination of *livelihood resources* that result in the *ability* of the people to follow or adopt a combination of *livelihood strategies* in that produce a particular *outcome*. Scoones brings in the issue of the role of institutions and processes that mediate the ability to carry out such strategies and to achieve or fail to achieve such outcomes.

Figure 2.5 summarises the Sustainable Rural Livelihoods Framework for analysis, proposed by the Institute of Development Studies that forms basis for the definition used by Scoones.

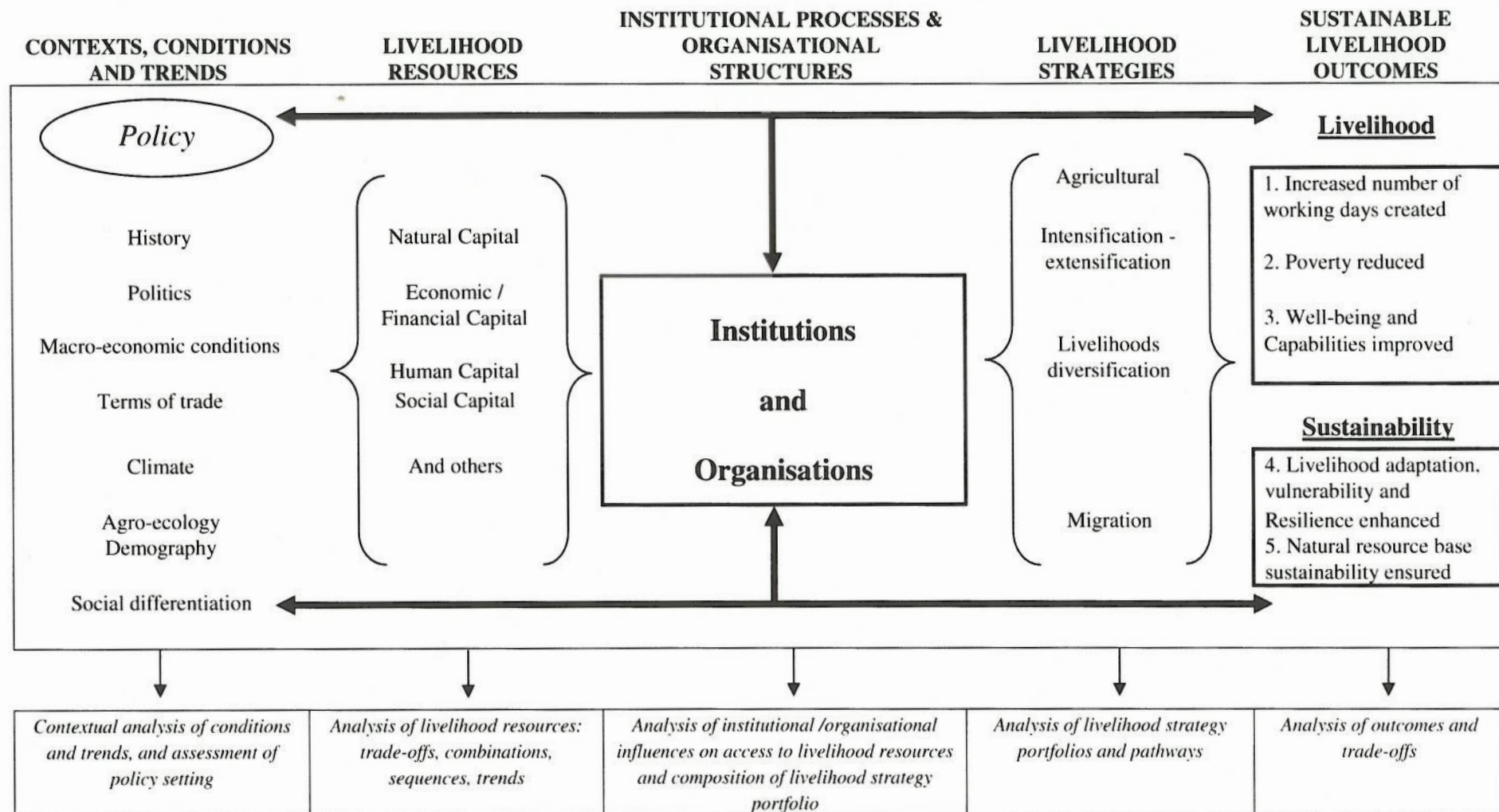


Figure 2.5: The sustainable Livelihoods Framework (Source: Scoones, 1998)

Ellis (2000) introduced a different consideration in terms of the aspect of claims and access to the sustainable livelihood framework proposed by Chambers and Conway (1992). Ellis emphasises the impact of social relations and institutions that mediate an individual or family capacity to secure a means of living. This is an important aspect for the smallholder tea industry, where the role of social institutions and organisations such as tea growing estates and organisations that provide technical support influences the performance of the respective production systems.

Ellis's definition is a modification on the proposition by Scoones regarding the role of institutions in mediating the processes within the context of sustainable livelihoods namely; *"A livelihood comprises the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household"* (Ellis, 2000).

2.6.2. Basic livelihood models

Several types of livelihood models have been put forward over the years. The core of these livelihood models can be traced back to Sen (1981), Chambers (1989), Swift (1989), Scoones (1998), Carney (1998) and Ellis (2000). The most consistent similarity among these basic models is the relationship between assets (also termed as capitals by some authors), factors, activities (livelihoods strategies, production, exchange etc) and outcomes (entitlement, consumption bundles, well-being, utility and income) within a mediating environment (formal or informal institutions).

2.6.3. The Generic livelihood model

The generic livelihood model presented in Figure 2.6 provides a foundation for the later models developed by various researchers and organisations such as DFID, DSI, CARE and OECD. In the generic livelihood model the external mediating environment represented by block arrows has a direct influence on the relationship between the three core aspects of the livelihood namely assets, activities and outcomes. The modifying contextual factors provide the setting within which the household's decision making process unfolds, they also mediate the access to

household assets and their subsequent use. Most important the modifying contextual factors tend to influence the strategies that an individual household chooses to adopt to realise the aspired livelihood outcomes.

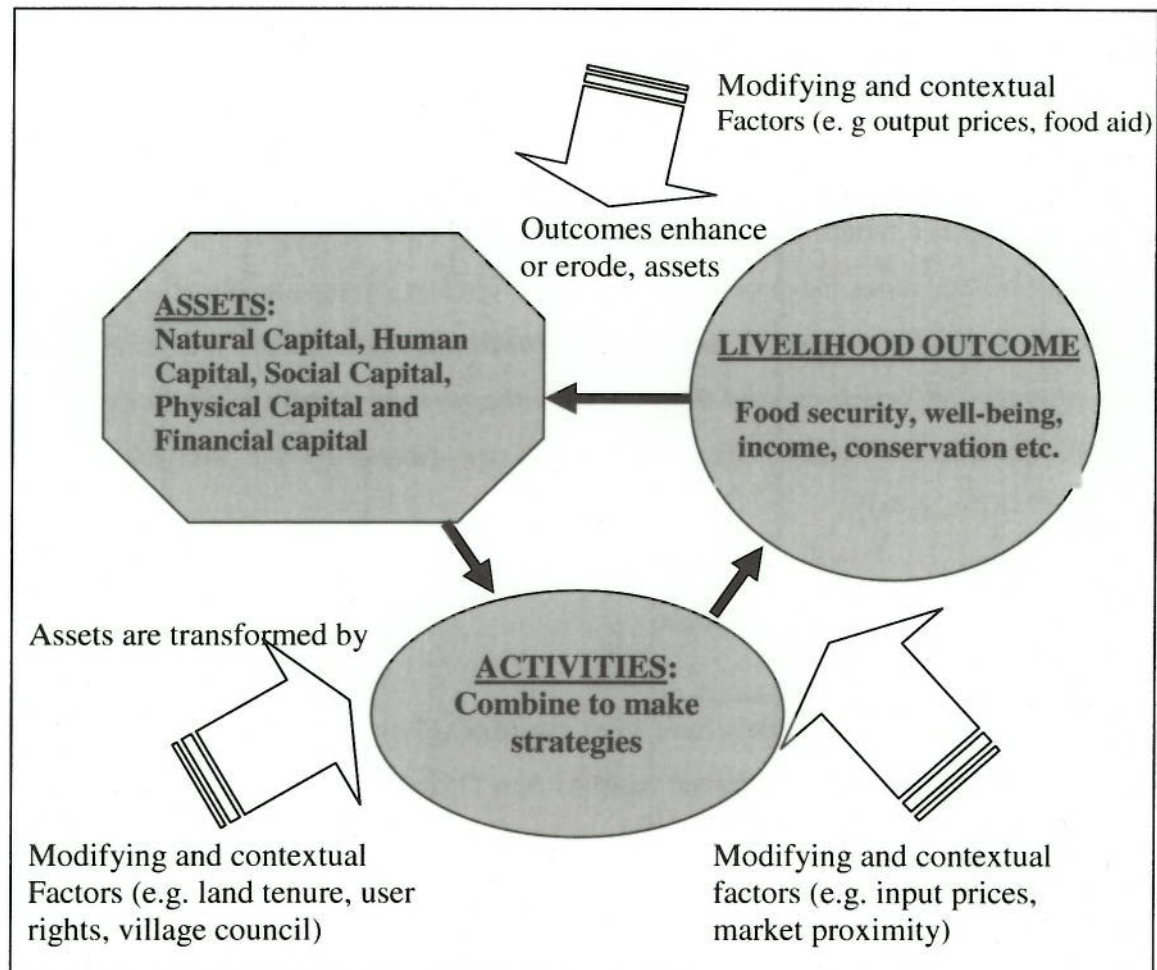


Figure 2.6: A generic livelihood model (Source: NRI, 2000)

2.6.4. The DFID sustainable livelihoods framework

The DFID sustainable livelihoods framework (Figure 2.7) is a conceptual framework for analysing causes for poverty, people's access to resources and their diverse livelihoods activities and relationships between relevant factors at the micro, intermediate, and macro levels. It is also a framework used to prioritise possible intervention measures. Ellis (2000) however raises an operational limitation imposed

by a two dimensional representation of a process as complex as rural livelihoods formation in the current models of sustainable livelihoods.

However, Ellis recognises the strength of the framework as a way of organising ideas into manageable categories, identifying entry points and critical processes, and assists with prioritising catalysts for change that can improve people's livelihoods chances. One aspect where the DFID Sustainable Livelihoods Framework has shown versatility is in its potential to deal with the assessment of the livelihoods circumstances of individuals, households, villages, communities, even districts or larger geographical zones that share some important common features (Ellis, 2000). So this framework is more suited to institutional issues particularly those related to provision of external support for poverty eradication at the community or national scale.

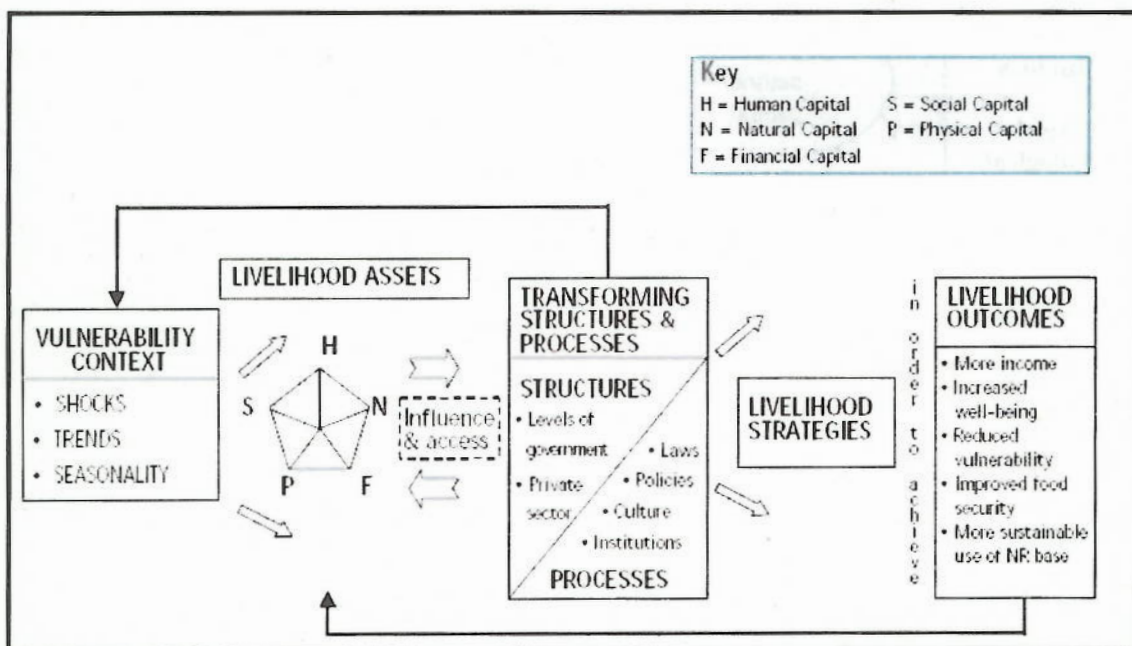


Figure 2.7: DFID's Sustainable Livelihood Framework (Source: Carney, 2000)

2.6.5. An asset based model of sustainability in agriculture

From an agricultural point of view, an Asset-Based Model of Sustainability in Agriculture (Pretty, 1999) provides answers to some of the limitations of the previous Sustainable Livelihood Frameworks as pointed out by Ellis. The asset-based model

(Figure 2.8) adds a dynamic component in the framework as it deals with flows of capitals both negative (depletion of capitals) and positive (accumulation of capitals). The diverse nature of agricultural production systems, unlike other economic sectors, requires a dynamic model capable of capturing not only the production function of agriculture but also the ancillary impacts on the society at various scales (local, regional, national and global) in terms of economies and ecosystems.

The presence of feedback loops from the outcomes of the sustainable livelihood strategies means that it will be possible to use the asset based model of sustainable agriculture to perform a comprehensive assessment and monitor the livelihoods systems of people involved in a particular agricultural based system.

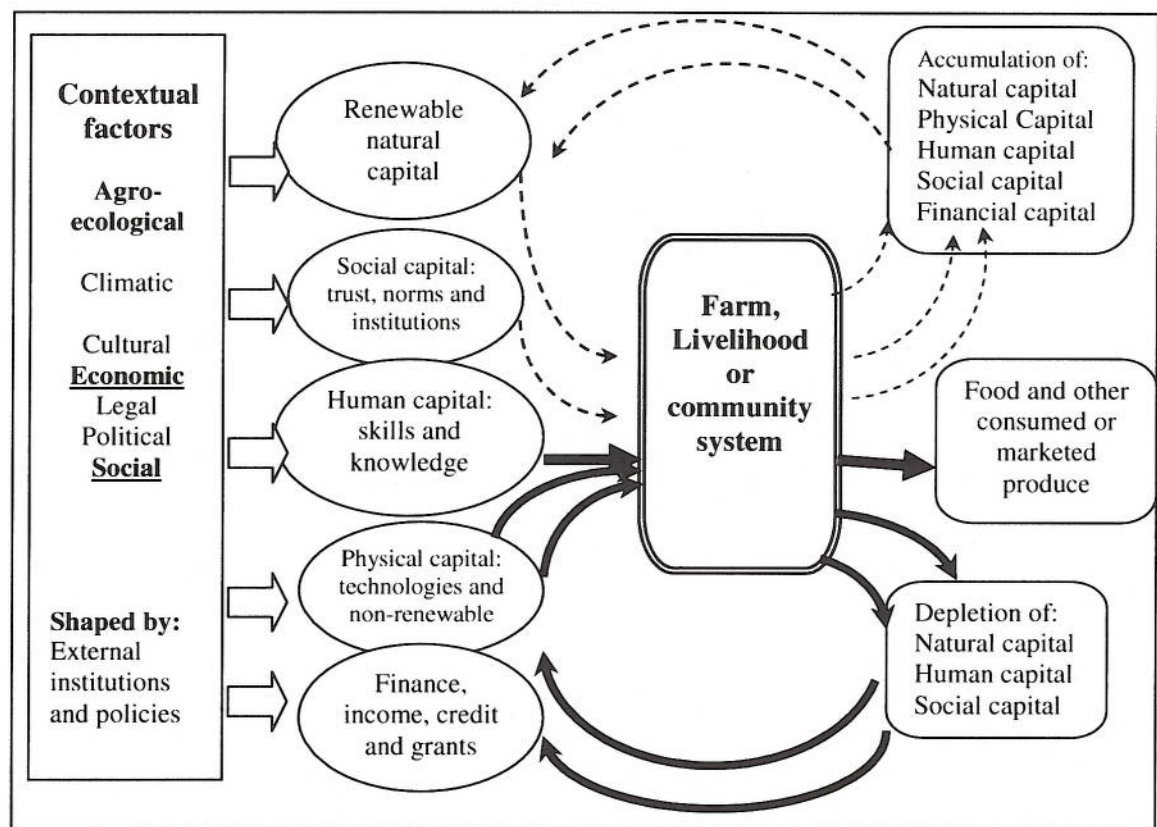


Figure 2.8: Asset based model of agricultural systems-flows and outcomes in modernised agriculture (Adapted from Pretty, 1999)

It is an appropriate model for assessing the sustainability of the agriculturally based livelihood systems like the smallholder tea production systems in Tanzania. The core assumption on the asset based mode of sustainability according to Pretty (1999) is that

“the success of agricultural systems at any one level relies on the value of services flowing from the total stock of assets that they control”. Agriculture which uses the stock of natural assets to accumulate other manmade assets fits the weak sustainability model.

This view is also supported by other proponents of Sustainable Livelihoods Models, (Chambers and Conway, 1992; Scoones, 1998; Ellis, 2000). The asset-based model is based on five types of capitals (Natural, social, human, physical and financial) that have been addressed extensively in the literature.

Natural Capital: This includes the natural resources stocks from which resource flows useful for livelihoods are derived (land, water, wildlife, bio-diversity, environmental resources). For the case of smallholders tea production systems natural capital includes land holdings, tenure system, quality and hence value of land and presence of other natural resources that support various components of tea production systems.

Social Capital: This includes social networks, membership of groups, relationship of trust, access to wider institutions of the society. Social capital tends to provide a base where collective action is needed to access social assets. The benefit accrued from access to social capital often tends to be of mutual benefit amongst members of the society under consideration. The role of tea based farmer's organisations like the Rungwe Smallholder Tea Development Association (RSTGA) is an example of how member farmers can benefit from social capital.

Physical capital: This is sometimes called manmade capital. It includes the basic infrastructure (transport, shelter, energy and communications) and the production equipment and facilities that allow people to pursue their livelihoods. The synergy between tea estates which provides greenleaf transportation processing facilities to smallholders is an example of flow of services accessible to farmers that enhance the performance respective production systems.

Financial Capital: This includes the financial resources available to people. This can be in the form of savings, supplies of credit or regular remittances or pensions. Financial capital is often the most limited type of capital to rural people though this

may not necessarily mean it impairs the opportunities for rural people to improve their livelihoods. The flow of financial capital is a key indicator for assessing the financial sustainability of the production system.

Human Capital: This includes, the skills, knowledge, ability to labour and health status that guarantee ability to pursue different livelihoods strategies. Tea which has a characteristic evenly distributed demand for labour throughout the year relies on human capital for its performance. Tea production is one of the high labour demanding activities; a fact that underlines the importance of human capital in the tea based production systems.

The asset based model for sustainability assumes that the availability and access to the five capitals is shaped by contextual factors, such as agro-ecological, climatic, cultural, economic, legal, political and social which are in turn mediated by external institutions and policies. The contextual factors provide an entry point for shaping and influencing agricultural systems through policy intervention at different levels, market regulations and trade. There is an element of similarity in the key components of this model with the generic livelihood model and the DFID sustainable livelihood framework. They all comprise three key components namely; assets, livelihood strategies and outcomes. However the asset based model of sustainability has a more refined analytical framework for assessing the livelihood strategy at a household scale which is compatible with most of the identified indicators to measure sustainability.

On the practical application of the Sustainable Livelihoods framework, Orr and Mwale (2001) used the framework to analyse changes in livelihood strategies for selected group of households in the Blantyre Shire Highlands, southern Malawi. The study explored the linkages between policy changes and their impact on smallholders, and the consequences for household income. The analysis focused on two key aspects of the sustainable livelihood framework namely; livelihoods strategies and livelihood outcomes, and paid less attention to structures and processes, and capital assets. They showed that the framework can be used to analyse any other livelihoods systems based on only part of the framework components depending on the objective of the analysis. For the case of the Tanzanian smallholder tea production systems, capital

assets are a very important component of the sustainability assessment hence they need to be incorporated in the analytical frameworks.

2.6.6. Sustainability indicators

The issue of indicators for sustainability has gained importance alongside the core debate on sustainable development in the wake of the launching of the Brundtland report. However since the Rio Earth Summit in 1992, the effort to develop standard indicators to measure sustainability has gained momentum. The involvement of national governments and organisations such as United Nations, OECD and World Bank has given this effort more impetus with the ever-increasing literature on the use of sustainability indicators such as Coughlan (1995), who points out that it is not only the scale of application, which distinguishes sustainability indicators, but also the directness of measurement and time scale of measurement.

The indicators used may either be lead indicators that measure the potential effects of the context being assessed or they may be lag indicators that measure the past effect of phenomena such as an increase in an input price as an outcome of withdrawal of a subsidy. Smith and MacDonald (1998), single out agricultural sustainability indicators as the most frequently used method of sustainability evaluation, pointing out that they can be perceived at different levels depending on the scale at which evaluations are made (Table 2.2). Within the context of the Tanzanian smallholder tea sector, the farm scale indicators seem to be relevant as the involvement of the smallholders in the tea value chain is mostly confined to the farm level.

Table 2.2: Scale of sustainability assessment

Scale of assessment	Typical characteristics of sustainability	Typical determinants
(1) Field	– Productive crops and animals; conservation of soil and water; low levels of crop pests and animal diseases	– Soil and water management; biological control of pests; use of organic manure; fertiliser, pesticides, crop varieties and animal breeds.
(2) Farm	– Awareness of farmers; economic and social needs satisfied; viable production systems	– Access to knowledge; input and markets
(3) Country	– Public awareness; sound development of agro-ecological potential; conservation of resources	– Policies for agricultural development; population pressure; agricultural education; research and extension
(4) World	– Quality of natural environment; human welfare and equity mechanisms; international agricultural research and development	– Control of pollution; climatic stability; terms of trade; distribution

(Source, FAO, 1989)

Rigby et al. (2001) give a comprehensive review that shows the ambiguity in the effort to develop commonly acceptable indicators for sustainability, mainly attributed to lack of consensus on the precise or operational meaning of the definition of sustainability given by the Brundtland Report.

Along the same lines, Tait and Morris (2000) highlight a danger that the concept of sustainable development could be discredited, where it appears vague and ill defined and cannot readily be measured in a manner which is precise, repeatable and value-free. They suggest that if sustainable development is to become useful management concept for farming systems then indicators are needed to enable rational discrimination among the various management options under a range of circumstances.

Atapattu (1997) drawing on a review of literature, suggested that indicators should be representative, scientifically valid, simple and easy to interpret, show trends over time, and give early warning about irreversible trends where possible. Other criteria for a valid indicator include sensitivity to changes in the aspect being measured, based on readily available or affordable data, capable of being upgraded at regular intervals and finally it should possess benchmarks against which to compare it.

Bossel (1999) also outlined similar specific requirements for finding indicators of sustainable development. Further work was done by the UK Ministry of Agriculture, Food and Fisheries (MAFF, 2002) who prepared a list of 35 pilot indicators that focused on the key issues of sustainable agriculture taking account of data availability, policy relevance, analytical soundness, measurability, and appropriate level of aggregation.

The World Bank (2004) assembled a set of almost 1,200 indicators from a database that consists of economic, social and environmental aspects from the African continent. The indicators were aimed at presenting the broader picture of the state of development across Africa. Within the Agricultural sub-section, indicators were proposed such as: commodity trade figures; nominal producer prices; food price index; food production index; non-food production index; food production per capita index; volume of food output by major food crops; value of agricultural export; cereal production; crop production index; fertiliser use; fertiliser imports; area under permanent crops; agricultural yields by major crops and other issues like incidence of drought.

Not all of the assembled indicators are equally applicable within the context of this study, but most of the farm scale indicators as well as commodity trade indicators appear to be relevant as they cover issues related to the performance of the respective tea production systems. However it is useful to review the wider range of possible sustainability indicators in order to justify the use of the final selected indicators.

2.6.7. Sustainable Livelihood Frameworks (SLF) for the Tanzania smallholder tea sector

Within the limit of time and resources for this study, a decision was taken to focus on economic dimension of sustainability. This decision was further justified for the following reasons;

1. Smallholder farmers are primarily engaged in tea production for commercial reasons. This is in contrast to the subsistence crop production systems where farmers can adopt a less demanding subsistence mode of production whose major goals is to provide food for the household.
2. Tea is a globally traded commodity whereby the bulk of the Tanzanian produce (over 80%) is exported. The price paid to smallholders treated as “outgrowers” in a predominantly estate sector that controls the primary processing in their factories is also determined by global market forces. Financial sustainability is pivotal to the overall stability of the smallholder tea industry in Tanzania,
3. Tea being a global commodity is standardised and smallholders are compelled to adhere to these standards in order to access global market for their greenleaf. These standards create additional demands in household resources (particularly labour) and hence partly influence the sustainability of the tea based production systems.
4. Smallholders are bound by contracts with the factory owners whereby inputs are supplied on credit which is recovered through greenleaf delivered to the factory by individual farmers. These privileges are only accessible to tea growers who are selling greenleaf to that particular factory. This implies that tea growing households potentially have more access to financial assets for achieving their livelihoods strategies, compared with non-tea growing households.

The Asset based model of sustainable Agriculture provides a versatile framework for assessing the livelihoods of the smallholder tea growers at a household level. The model needs to be complemented by the Value Chain Analysis (VCA) in order to capture the flow of resource within the entire tea value chain (at least until the regional auction in Mombasa Kenya).

The strategy of promoting a cash crop based livelihood systems depends on successful commercialisation of that particular commodity and one critical element of commercialisation is the participation of farmers in the cash crop supply chain from the farm to the consumer. Economic aspects are captured in value adding activities throughout the value chain (different stages, agents). It is critical for sustainability of the respective livelihoods that all stages of the chain add value so that aggregation of individual participants in the chain leads to a sustainable system overall.

2.6.8. Household as a unit of assessment in SLF

Most of the basic livelihood models focus on a household as a most appropriate social group for the investigation of livelihoods (NRI 2001). However, an assessment at household level should take into consideration the inter-household dynamics that shape the social structure of a community. In most of the farming systems research, a household has often been defined as a group of people sharing a common residence, meals, and undertaking joint or co-ordinated decision-making.

According to NRI (2001) there is now a broader consideration on the definition of a household to allow for overlapping social groupings, including family or other members who may be physically dispersed but socially interdependent. This view by NRI is further elaborated by Ellis (2000) who lists five key considerations about household diversity as a unit of assessment of sustainable livelihoods:

- 1. Recognition of livelihoods diversity requires an extended concept of the rural household, beyond the resident social unit to include spatially dispersed contributors to household welfare (Bruce and Lloyd, 1997);*

2. *Rural –urban links in the livelihoods of both rural and urban dwellers in poor countries, transfer of money, goods and individuals especially in extended families scenarios;*
3. *Household level livelihoods diversity is not necessarily synonymous with sectoral diversity within the rural economy;*
4. *Rural communities are not homogeneous social entities in which all families can be supported to share similar livelihoods. Households and individuals are differentiated by their assets (especially land and education), income and social status in their local communities (Barnstein et al., 1992); and*
5. *Individual and household livelihoods are shaped by local and distant institutions (e.g. local customs regarding access to common property resources, local and national land tenure rules) and by social relations (gender, caste, kinship etc.) as well as economic opportunities.*

In the Tanzanian smallholder tea growing areas, seasonal (and sometimes permanent) migration of individuals and households is a prominent phenomenon though migrating members always maintain contact with the core household through periodic remittances of money earned from employment.

In the context of the Tanzanian smallholder tea production systems, the household level presents an appropriate social group for investigating the livelihoods of smallholder tea growers. However, other aspects of inter-linkages between individual households and the community as outlined by Ellis need to be taken into consideration. The household assessment can be combined with other analytical frameworks such as the value chain analysis to determine the sustainability of the smallholder tea industry in Tanzania.

2.7. The Concept of Value Chains Assessment (VCA)

2.7.1. Overview of the concept of value chains

It is important to trace all the processes involved in the Tanzanian tea industry in order to determine how wealth and income are created and distributed within the industry. Tea, which is a commercially grown crop, is connected to the global market through the export component of the value chain. This implies the sustainability of the Tanzanian smallholder tea industry could be influenced by the activities beyond the smallholder farm. It is important to develop a conceptual framework for studying the performance of the tea industry throughout the process of product transformation. Value chain analysis provides a potential framework capable of handling such an assessment.

Several definitions of value chain have been proposed by various researchers mainly in the context of management science and strategic management during the 1980s (Porter, 1985; Johnson and Scholes, 1999; Kaplinsky, 2000; Hobbs et al. 2000; Gereffi et al. 2001; Gibbons, 2001; IDS, 2003). According to Kaplinsky and Morris (2000), value chain analysis is a framework used to describe the full range of activities required to bring a product or services from conception, through the different phases of production (involving a combination of physical transformation and the inputs of various producer services), delivery to the final consumers and disposal after use.

Confusion has reigned on the use and definition of the concept of value chains and as a result several concepts have been used interchangeably by different researchers to describe what seems to be the same value analysis for the global activities. Gereffi et al. (2001) identify five concepts that have been used by researchers to characterise global value chains. They all possess specific focus and therefore they need to be considered when analysing the globally integrated industries such as the Tanzanian smallholder tea industry. In the following paragraphs the five concepts will be reviewed with the purpose of identifying strengths and deficiencies of each as well as the potential to be adopted for assessing the smallholder tea production systems in Tanzania.

2.7.2. The Generic Value Chain Model (GVCM)

Porter (1985) presented the value chain as a generic model of product or service transformation displaying total value, and consisting of value activities and margins (Figure 2.9).

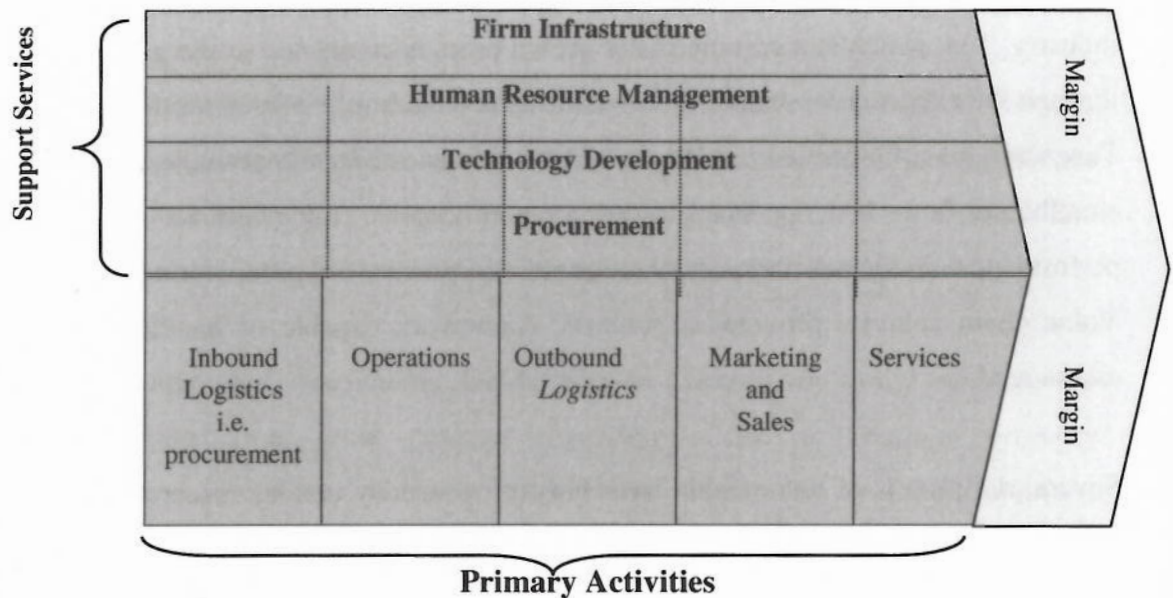


Figure 2.9: The generic value chain model (Source: Porter, 1985)

The model distinguishes various activities, performed in particular links in a chain. It provides a framework for analysis of various activities performed by individuals or organisations to design, produce, market and distribute the products and services. From the viewpoint of a profit seeking firm, Porter argues that it is through distinct assessment of these components of the value chain that the comparative advantage of the firm can be identified and appropriate strategies to optimise those strengths can be formulated to create superior advantage for the firm.

Porter's generic value chain model consists of three key components namely;

- Primary activities
- Support services, and
- Margins

The Generic Value Chain Model provides a useful framework particularly suited for assessing the performance of the large tea estates in Tanzania. Unlike the smallholders, the estates are commercially organised entities connected to a number of other service providers such as transporters, input suppliers, and marketing consultants or brokers. The typical primary value activities associated with the tea industry ranges from choice of the planting materials and nursery establishment, field management, harvesting, transport of green leaf and subsequent processing, grading and packaging in the factory.

The third main component of the generic value chain model is the margin. Porter (1985) defines margin as *"the difference between total value and the collective cost of performing the value activities"*. Ideally all value activities (primary and support) contribute to the total margin of any particular firm. The margin is a useful indicator of the competitive advantage of the firm over rivals in the same industry. In the tea sector, major operations are organised in a discrete manner that make it possible to analyse or determine margins at each of the discrete operation or stages of tea production.

A tea nursery for instance is a fully independent entity comprised of various operations that lead to production of planting materials, which is the primary value good. The nursery unit performance can be evaluated by looking at the level of margin accrued from sales of the planting materials to other units of the estate. The estate for its part can treat every plant supplied by the nursery as farm inputs sourced outside the estate.

Similarly other major operations like field establishment, husbandry practices, and harvesting can be considered as another category of value adding activity where the value good produced is the green leaf. All the operations conducted in the estate or family farm attract a cost of production that needs to be recouped from green leaf. From the perspective of large tea estates, probably at this stage green leaf may not be adequate to generate revenue that can recoup costs and still produce profitable margins. But for smallholder out growers this is a stage where the value for their entire tea production is realised. The price the factory pays farmers will tend to

influence the performance of the smallholders, whose incentive for growing tea is primarily for income generation.

2.7.3. International Production Networks (IPN)

International Production Networks is another concept used in the globally connected industries. This term is more common when dealing with multinational corporations whose business interests span across boundaries of different countries. Borrus et al. (2000) describe such multinational corporations as “global network flagships” a term suggesting the dominating role of such companies in a particular industry. Though one of the tea growing companies (Unilever Tea Tanzania Limited) is a subsidiary of Unilever, a multinational corporation in agro-food industries, the tea industry itself is not shaped along any particular international networks.

2.7.4. Global Commodity Chains (GCC)

Introduced during the 1990s, the concept of global commodity chains focuses more on the roles of governance structure of the supply chains (Gereffi and Korzeniewics, 1994). The governance in the supply chain is dependent on whether the chain is buyer driven or supplier driven. The concept also deals with the role of leading firms in shaping the globally integrated production chain incorporating a network of sourcing firms. The Global commodity chain focuses on power relations embedded in value chain analysis. According to Gereffi et al. (2001) GCC has been used by researchers and a number of development organisations as a framework to analyse the processes associated with globalisation.

The driving force has been the fact that an important part of global trade involves multinational enterprises or systems of governance that link firms together in a variety of sourcing and contracting arrangements. Under these circumstances there is the presence of the dominant party in the globally dispersed, but linked production systems. The dominant parties or actors in the particular global value chain play a crucial role of governance, which is another important aspect of the modern value

chains. Humphrey and Schmitz (2001) describe governance in the value chain as the inter-firm relationship and institutional mechanisms through which non-market coordination of activities in the chain is achieved. However it should be noted that governance is not a necessary feature in some of the industries as business does not involve more than one related firm. Humphrey and Schmitz (2001) identify four parameters that define the production process along the value chain. These parameters which set the reference points for the governance to work in any particular chain are;

- **What is to be produced:** This is also referred to as product definition (Sturgeon, 2000),
- **How is it to be produced:** Involves description of production processes, that includes elements such as technology to be used, quality control mechanisms, labour use standards and environmental quality requirements,
- **Time frame:** Timing on when to be produced, and
- **The quantity:** to be produced.

The Tea industry is a case where standardisation in the form of product grades forms the basis for the tea trade world-wide. The compliance to these industry-based standards governing the tea trade is built on assumption that final value of the product (made tea) is determined by quality. The incentive for companies to comply with standards therefore is driven by the search for profit even in the absence of specific institutions to enforce the process. With respect to governance the distinction is made between buyer driven commodity chains and producer driven commodity chains.

Most agricultural products from developing countries, such as tea and coffee, fall into the category of buyer driven commodity chains as buyers dictate prices, quality and other aspects of governance. The size of the Tanzanian tea industry, which accounts for only 1% of the world production, prevents it from influencing global tea markets. The global commodity chains framework appears to be unsuitable in the context of this study which focuses on value chains within Tanzania tea industry.

2.7.5. French *filiere* chains

Filiere, which featured prominently on the French colonial policies on agricultural sector, is another perspective used by researchers to describe the value chains. *Filiere* is a more diverse framework as it encompasses the interaction of more than one firm engaged in activities that constitute a similar chain (Kaplinsky and Morris, 2000). According to (Bernstein, 1996); and (Mather, 1999) the application of *filiere* does not only end with studying the structure and the set up of the value activities only as the case with generic value chains, but it can also be used to reconstruct the industry. However, Kaplinsky and Morris (2000) point out some shortcomings associated with it, mostly centred on lack of versatility to address more dynamic issues that characterise the modern global markets; including the static character of the framework to reflect relations at certain point in time, lack of indicators to show growing or shrinking flows either of commodity or knowledge and failure to capture the rise and fall of actors constituting the framework itself. These shortcomings again limit the potential use of *filiere* to assess the Tanzanian smallholder's tea value chain.

2.7.6. Global value chains (GVC)

There is little to be distinguished between Global commodity chains and global value chains (Gereffi et al, 2001). GVC is similar to value chain but the framework covers global scale. The Tanzanian tea industry involves three major functions with specialised players (Figure 2.10); whereby three critical points where tea acquires a sellable form can be identified; Plucked greenleaf from smallholders (Ex-farm gate), Graded and bulky packaged made tea (Ex-factory) and finally blended and retail packaged (Ex-blenders & packers). These three key stages can be distinguished further depending on the number of players involved in the field operations as tea changes ownership and value at the end of each subsequent function. The detailed explanation of these stages is given on the structure of the Tanzanian Tea value chain to follow.

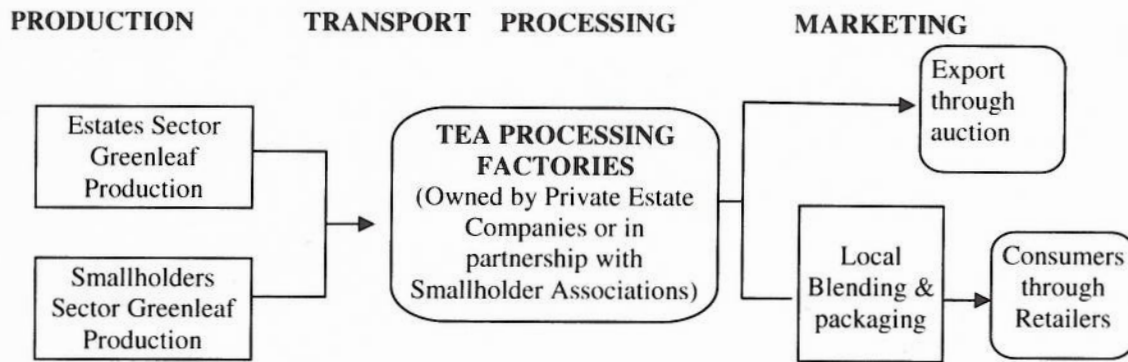


Figure 2.10: Major functions and players in the Tanzanian tea industry

2.7.7. Value chain analysis in agro-food industries

The emergence of agro-food commodity chains can be traced way back in the 1930s when tropical agricultural crops constituted the dominant volume of the traded commodities (Gibbons, 2001). Prior to and during that period, the main source of the tropical agro-commodities was the large plantations located in various tropical locations. This trend changed gradually with smallholders getting involved in the production of agricultural export crops (Tiffen and Mortimore, 1990). Gibbons (2001) highlights this change as the turning point that effectively connected smallholders in tropical developing countries into the global network of trade, international development initiatives and the global economy.

In the context of the Tanzanian tea industry, this connection featured in two distinctly recognisable phases; the first phase during the establishment of the Tanzanian tea industry by the German settlers 1910–1935. The second phase was between 1960 – 70 when the Tanzanian Government expanded the smallholder's involvement in tea production by providing inputs and technical support. Gibbon (2001) emphasises that even today when the terms of trade have deteriorated for tropical producers and when the focus of development assistance from the west has remained on food crops, agro-food commodities still remain the sole strand linking the world's rural poor with global product markets.

2.7.8. The characteristics of the Agro-Food Value Chains

Four key market drivers have been identified as the factors responsible for the formation of the agro-food value chains. According to Toma and Bouma, (1998) value chains are formed in agro-food industries as a response to Food Safety issues, Product quality issues, when new product innovation and differentiation is needed, and when there is pressure to lower system costs. In the case of the Tanzanian tea industry, the quests to reduce costs have prompted tea companies to abandon their traditional self contained approach in favour of sub-contracting functions such as green leaf transport, repairs and maintenance of machinery to specialist contractors.

2.7.9. The Structure of the Tanzanian Tea Value Chain

Following the divestiture of the Tanzania Tea Authority (TTA) in 1996, all tea-processing factories are now being operated by private companies. Prior to that TTA had six factories that processed green leaf exclusively from smallholders. The factories were: Katumba and Mwakaleli based in Rungwe district; Mponde Tea Factory based in Lushoto district; Lupembe Tea Factory based in Njombe district; Kagera Tea Factory based in Bukoba; and Dabaga Tea Factory based in Iringa Rural District. Smallholders in Mufindi, Muheza and partly in Njombe district did not have exclusive factories for processing their greenleaf hence they used facilities owned by private tea companies as outgrowers. This arrangement means that the tea value chain is shaped by the number of players in any particular catchment area as proposed in Figure 2.11. Generally three recognisable traditionally stages where tea acquires commercial value can be identified;

a) **Plucked Greenleaf from smallholder outgrowers (Ex-Farm gate):**

For the smallholders as outgrowers, the greenleaf delivered to the factory represents the relative value of tea as commodity before processing in the factory. For smallholders, the price paid for the greenleaf together with yields determines their returns from tea. Nyanga et al. (2000) links the collapse of the smallholder tea industry in Tanzania during the mid 1990s as being caused by low prices and late payment to smallholders by the Tanzania Tea Authority. However it should be emphasised here that the price paid to smallholders for their greenleaf is also dependent on price transitivity from the market to producers.

b) **Graded and bulky packaged made tea leaves (Ex-Factory):**

This is the second stage of the tea value chain where the value of the tea can be determined after processing. The significant proportion of the Tanzanian made tea (black tea) is sold at the auction in Mombasa Kenya. Although the final product from a tea processing factory consists of various grades of tea, the auction value of the tea is not based on these standard grades, but is determined by the different quality attributes and the balance between supply and demand for the various grades. Professional tea testers and brokers play a significant role in determining the final auction price of the tea. This process is repeated for each consignment of tea brought for sale in the auction.

c) **Blended and packaged tea for retailing/export:**

The third stage where value is added to tea is when the blending and packaging process is accomplished. This function accounts for only a fraction of the tea industry average annual output. Although seven local blending and packaging companies have been licenced by the Tea Board and are operational, their gross turnover however accounts for less than 20% of the total production in Tanzania.

So the transformation of the processing and marketing systems for the smallholder tea industry means also that there are three main scenarios operating in Tanzania.

First Scenario:

Involves independent estates that rely entirely on their own tea estates for the supply of raw materials (greenleaf). This scenario depicts a traditional set-up of the private tea producing companies. With the escalating costs of production particularly wages for farm labour most companies are moving towards the "second scenario" arrangement hence creating more greenleaf marketing opportunities for smallholders around the respective companies processing facilities. Companies such as Herkulu, Marvera, and Tukuyu Tea Estates fall under this scenario.

Second Scenario:

Involve estates tea producing company with its own tea estates and processing factory(s) expanding its operations by involving smallholders from the surrounding

areas to grow and sell their tea greenleaf to the company. Currently the companies operating in this scenario get the majority of their produce from their own tea estates. The crop coming from smallholders is usually less than 25% of the total turnover. Unilever Tea Tanzania Limited, Mufindi Tea Company, East Usambara Tea Company (EUTC) and to some extent Kibena Tea Company and Luponde Tea Factory falls under this category.

Third Scenario:

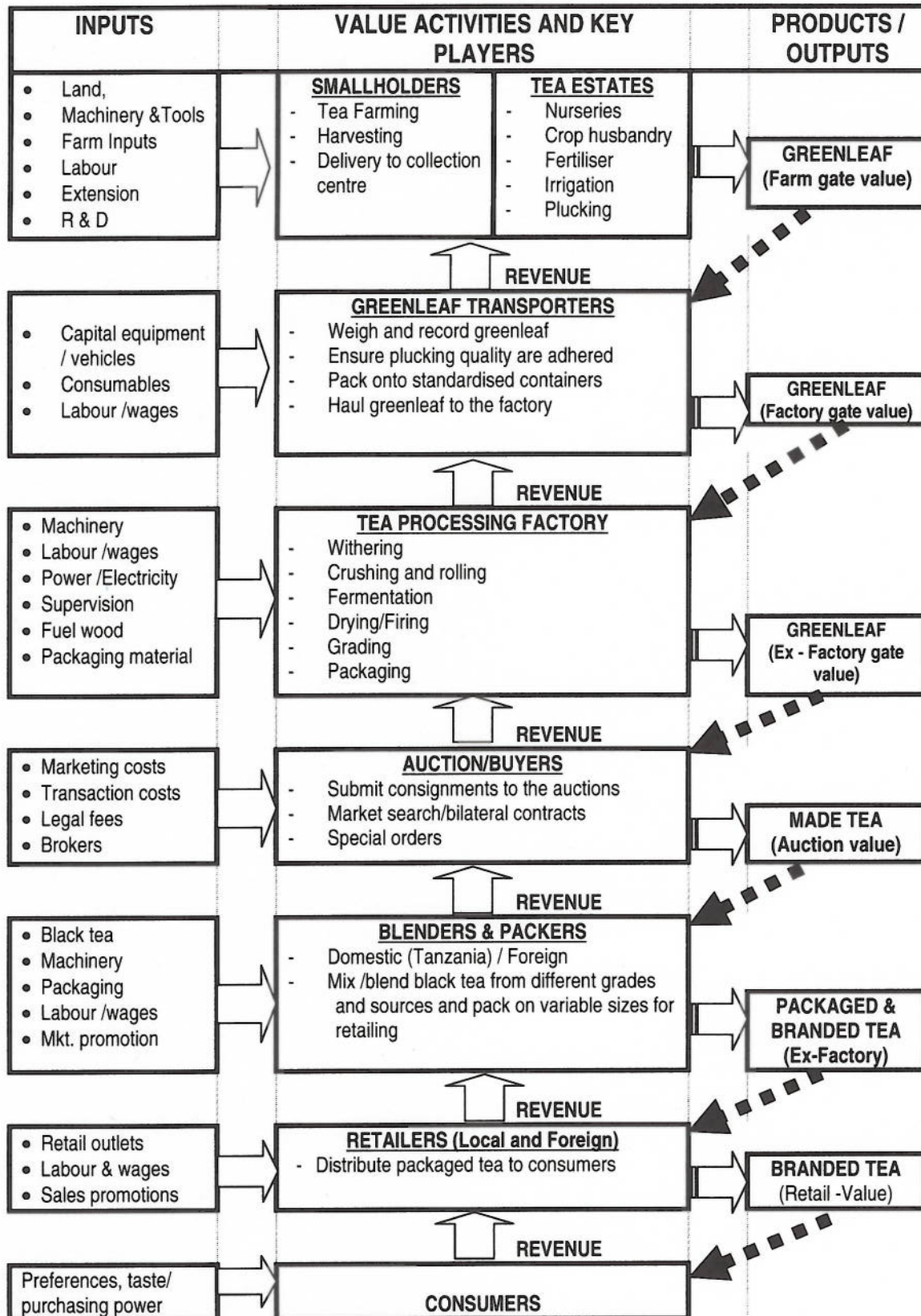
This applies mostly to the former TTA factories now under the ownership of private companies. The company does not have its own tea estate and relies entirely on outgrowers (mostly smallholder tea growers) for the supply of greenleaf. The companies owning these factories have a joint ownership of the factories with smallholders through local Smallholder Tea Growers Associations or Co-operatives.

These scenarios represent the diversity existing in the Tanzanian tea sector, hence it is crucial for any study covering the performance of this industry to include at least a representative sample from all three scenarios in order to get a cross section picture of the industry.

2.7.10. Integrating ABMS and VCA for the Tanzanian Smallholders Tea Sector

The Asset Based Model of Sustainability provides a framework for assessing stocks of assets and flow of services within the tea-growing households. Within the tea-growing households various assets (five capitals) are deployed in tea production processes to produce greenleaf which is the main product coming from the smallholder based systems. At the household scale, the value chain framework blends well with the asset based model of sustainability in the sense that both frameworks trace the patterns on the use of household resources to create wealth at different stages of tea based production systems. However a few challenges such as the difficulty of identifying and quantifying the feedback loops need to be overcome.

Beyond the household scale, various stages in the tea product transformation path are traced whereby costs and revenues are successively mapped to reveal the value adding and income distribution along the entire tea value chain. Given the broader development issues, markets are now perceived as pathways for rural development. It is assumed that development of stable markets for the greenleaf will open up new avenues for sustainable livelihoods of rural communities with tea the driving force to these livelihood systems. It is the intention of this study to explore these links in order to establish the contribution of the tea sector in supporting the livelihood systems in respective case study areas.



Note: Open block arrows show flow of services, inputs and revenue, whereas dashed lines show movement of the product through various transformation stages

Figure 2.11: Typical Value Chain for the Tea industry showing key players and the product value transformation stages

2.8. Chapter summary

Overall the literature review (Chapter 2) has identified the following key aspects with respect to this study;

The lack of clear definition of the concept of sustainability which raises the need to derive an explicit definition based on the context under consideration. For the Tanzanian smallholder tea industry, sustainability is therefore defined in terms of ability of the household to accumulate assets through tea production.

In the context of the three-pillar definition of sustainable agriculture (Social, Environmental and Economic) it has been demonstrated that issues more relevant to the Tanzanian smallholder tea production systems are those rooted to economic viability of the production system as opposed to environmental or social dimensions. The focus on the economic dimension of sustainability is justified by tea being a cash crop whereby farmer's incentive to grow tea stems from their perceived anticipation that they will be able to base their livelihood on income from tea.

The food crop versus cash crop debate supports the assumption that smallholder tea production in Tanzania can potentially support the livelihood of farmers and their dependants. The debate as demonstrated through this review has given further endorsement for the choice of cash crop based livelihood systems over food crop (food sufficiency) livelihood strategies.

The review has demonstrated the potential of two different analytical frameworks, an Asset Based Model of Sustainability and the Value Chain Assessment, to provide an analytical framework for the Tanzanian smallholder's tea sector. A unique analytical framework that combines these two frameworks is proposed. From the literature it has been demonstrated that these frameworks have only been used separately, hence combining them as an integrated framework forms a unique framework for assessing cash crop based livelihood systems. The review therefore, confirms the validity of the research questions and justifies the use of the proposed analytical frameworks for assessing the sustainability of the Tanzanian smallholder tea production systems.

CHAPTER 3: THEORETICAL FRAMEWORKS AND THE METHODOLOGY OF THE STUDY

3.1. Introduction

This chapter presents the methods used to collect information and data required for this study and their respective data sources and the associated sampling strategies. The procedures for the development of the conceptual analytical framework (presented in the logical flow diagram of methodological framework), techniques for data analysis, interpretation and the subsequent linkage to formulation of policy recommendations for improving the sustainability of the smallholder's tea based production systems are also described. The chapter also presents the critique of the methods used highlighting the limitations and how those were addressed. Finally, the summary of the chapter is presented drawing key messages and how these link with the preceding chapters.

3.2. Formulation of the research methods

3.2.1. Overview of the methodologies and the theoretical frameworks

Figure 3.1 summarises the logical methodological framework showing research steps taken to achieve the key objectives of this study. A review of literature was the initial stage of this study. This revealed a wide application of methodologies used to assess the livelihoods of households based on the stocks of assets and flows of services both negative (depleting the household) as well as positive (accumulating into the household). The Asset Based Model of Sustainability (ABMS) (Pretty, 1999) provides a versatile theoretical model for capturing the stocks and flows of assets (capitals) into and outside the tea based livelihood systems. The key assumption in this model is that the system is adjudged sustainable if it results in the accumulation of household assets, whereas unsustainable systems lead to net depletion of household assets. The trends in individual households are then aggregated to reflect the situation at community level.

However, because tea is a cash crop with a unique value chain that extends beyond the household and community level, it was necessary to explore the aspects of the tea production and supply system beyond the household and community level. This was done by assessing the allocation of activities (with their associated value adding and costs components) for various players in the chain. For a cash crop based production systems such as tea, a robust and comprehensive analytical framework to capture both the cost structure as well as the benefits accrued by various players in a local chain, where several value adding functions are identified was required. The Value Chain Assessment (VCA) was therefore identified as the suitable model for determining the sustainability of the cash crop production and supply systems such as tea.

However, both theoretical frameworks are inadequate if applied in isolation as the ABMS deals with flows and stocks at household and community levels whereas for a cash crop based livelihood systems other aspects of the market, which are beyond the scope of individual households, also influence the performance. The VCA captures the allocation of costs and benefits for various players and at different stages of tea production process. However, when combined the two models provide a comprehensive analytical framework that integrates both the flow of resources at individual households involved in tea production as well as the local chain.

The next stage which is the identification of data needs and the design of data collection, including sampling for data sources, were based on the potentials highlighted from the literature review about these combined theoretical framework. In order to confirm the relevance of the objectives of this study as well as the proposed methodologies a brief exploratory survey was conducted. The survey confirmed that the objectives were attainable and key issues sought by this study were relevant to all the interviewed stakeholders in the Tanzanian tea industry.

The next section presents the details of data needs and their respective sources.

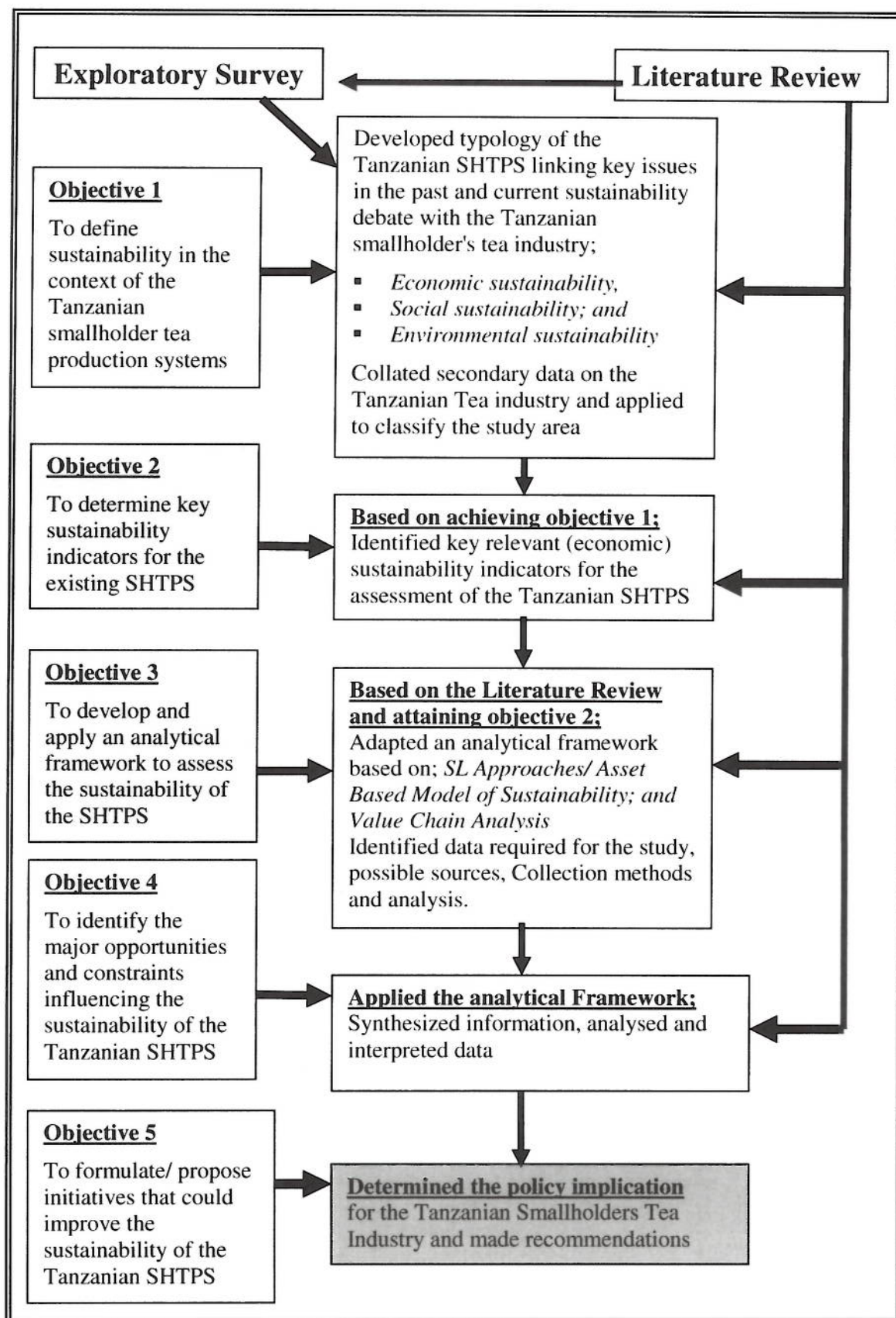


Figure 3.1: Logical Flow Diagram of Methodological Framework

3.2.2. Data needs and information sources

Following the identification of the theoretical framework for assessing the sustainability of the SHTPS, the next stage was to determine data needed for the study their sources, and collection methods. Table 3.1 presents the detailed description of the type of data, their sources, collection methods, analytical techniques for each of the corresponding research objectives.

Table 3.1: Research objectives, data needs, sources and collection methods

Sn	Objective / Issue	Data needs	Data sources	Collection methods	Analysis
1.	Defining sustainability in the context of the Tanzanian smallholder tea industry	Descriptive information on tea area, production figures for the key stakeholders. Reviews sustainability in the context of SHTPS	TBT records, TRIT reports. MoAFS Reports, Libraries and electronic sources.	Review of secondary data sources Exploratory survey & key informants interviews Literature review	Descriptive analysis
2.	Determining key sustainability indicators.	SD indicator framework, Economic indicators Social indicators Environmental indicators	Literature review, Representative sampled estates Representative sampled smallholders	Review of secondary sources Stakeholders analysis Key informants surveys Socio-economic surveys	Descriptive analysis Qualitative analysis SPSS
3.	Develop and apply an analytical framework to assess sustainability of the SHTPS.	Structural set-up of the tea sector. Inputs used in production process. Outputs from the processes	Sampled estate sector Sampled smallholder sector	Qualitative farm survey (PRA) Quantitative Survey (Questionnaires).	SPSS
4.	Identify major opportunities and Constraints facing the sustainability of the SHTPS	Opportunities for the smallholder tea sector, Constraints facing the smallholder tea sector in Tanzania	Sampled smallholders farmers Sampled estate sector growers Other stakeholders in the tea sector	Review of secondary sources Stakeholders analysis Key informants surveys Socio-economic surveys	Descriptive analysis Qualitative analysis SPSS
5.	Formulate/propose ways or initiatives that could improve sustainability of the existing SHTPS.	Current Policy Statements Potential development options	Result of the data analysis		

Various sources were used to collect information and data for this study. The Tea Board of Tanzania provided production records which were used to describe the overview of the Tanzanian tea industry. Other sources of information included the Ministry of Agriculture and Food Security, the representative tea growing companies UTTL and MTC (based in Mufindi District), and WTC (based in Rungwe district). Although getting information from commercial companies is very difficult due to the confidentiality tendencies of these companies, this problem was less significant during data collection due to good rapport that TRIT (my employer who backed this study) has established with respective institutions.

The representative service providers (research and extension) also provided useful information regarding farm level potentials and constraints for the smallholder tea production systems. Finally, the representative smallholders provided useful information regarding tea production, key constraints affecting their productivity and opportunities and potentials available for improving the performance of the tea production systems.

Literature Review

From the literature review information regarding the concepts of sustainable development, sustainable agriculture, sustainable livelihoods approaches, value chain analysis was collated. The information was used to define of sustainability in the context of the Tanzanian smallholder's tea industry. Neuman (2003) justifies the use of literature review as a first step in any scientific research. According to Neuman, "*a literature review is based on the assumption that knowledge accumulates and that people learn from and build on what others have done*".

Identification of the stakeholders

The second stage of the research process was the identification of the stakeholders. This was done by during the exploratory survey conducted in Tanzania between June and August 2003. Five categories of stakeholders were identified (mainly based on

their roles in the Tanzanian tea industry). The review of the Tanzanian tea industry which was carried out during the exploratory survey provided a basis for identifying individuals and institutions (stakeholders) who are involved or responsible for various functions in the tea industry as presented in Table 3.2.

Table 3.2: Categories of stakeholders and data information collected

Sn.	Stakeholders category	Specific people /institutions interviewed	Information /data collected
1.	Factory/Estate owners	<ul style="list-style-type: none"> Unilever Tea Tanzania Limited (UTTL) Mufindi Tea Company (MTC) Wakulima Tea Company (WTC) 	<ul style="list-style-type: none"> Estates & factory main cost Estates production figures Prices and market trends Tariffs, taxes and overheads Estates - smallholders linkages Prospects for smallholders in each factory catchment areas Services provided by factories to smallholders
2.	Service providers	<ul style="list-style-type: none"> Tea Research Institute of Tanzania (TRIT) District Agriculture and Livestock Development Offices (DALDO), Field extension staff (Mufindi and Rungwe Districts) 	<ul style="list-style-type: none"> Research and development potentials and constraints in the tea industry, Access to information on tea production by the smallholders Mechanisms for delivery of extension services to farmers. Constraints and potentials in delivery of services
3.	Tea Farmers Organisations	<ul style="list-style-type: none"> Rungwe Smallholder Tea Growers Association (RSTGA) Mkonge Village Tea Block Farm (MVTBF) Tanzania Smallholders Tea Development Agency (TSHTDA) Tea Association of Tanzania (TAT) 	<ul style="list-style-type: none"> Social Capital issues (farmers mobilisation, collective bargaining), Service provision /facilitation, negotiation and contracts with factories Constraints and opportunities facing smallholder tea farmers
4.	Policy makers and regulators	<ul style="list-style-type: none"> Tea Board of Tanzania (TBT) Ministry of Agriculture and Food Security (MoAFS) 	<ul style="list-style-type: none"> Current policy statements on SH tea sector Policy setting mechanism in the tea industry
5.	Representative farmers	<ul style="list-style-type: none"> Medium scale tea growers (Mufindi) Smallholder tea farmers Non tea farmers 	<ul style="list-style-type: none"> Critical success factors in the tea production systems Prospects Constraints

- The first category of stakeholders is the Tea Estates Growers Companies who own processing factories. For the scope of this study, three tea estates companies (UTTIL, MTC and WTC) were selected based on how they organise their linkages with smallholder outgrowers. The factories are the key component of the tea value chain whereby important information regarding processing costs, linkages between smallholders and the respective factories, prices and sales figures were obtained.
- The second category of stakeholder is the institutions that provide technical support services (research and extension) for the Tanzanian smallholder's tea industry. TRIT is responsible for developing research and testing it under farm environments, whereas the District Agricultural Development Offices (DALDO) are responsible for agricultural advisory services for all smallholders including tea farmers.
- The third category of stakeholder is the tea farmer organisations. The farmer organisations were included because of their role in uniting smallholders especially for negotiating with factory owners. Three levels of the smallholders organisations were included; the village level organisation (MVTBF), district level farmers organisation (RSTGA), and national level organisation (TAT).
- The fourth category of stakeholder was the policy making institutions. The Tea Board of Tanzania (TBT) and Ministry of Agriculture and Food Security (MoAFS) were consulted because of their roles in setting policies that guide the functioning of the Tanzanian smallholder's tea industry in Tanzania.
- Finally, the fifth category of stakeholder included the representative smallholder farmers. Samples of 20 representative smallholders from each of the two tea growing districts were interviewed. The group consisted of diverse farmers that included male as well as female headed households, medium scale and the typical smallholder farmers. Representative farmers were included during the exploratory survey because of their experience and understanding of the farm level constraints and opportunities facing the tea production systems.

Qualitative Data

Qualitative data were collected using informal interviews guided by a checklist of issues covering the household assets and the tea value chain (**Appendix 3**). The sampled stakeholders were visited at least once though in few cases a follow-up visit was made to clarify issues and information arising from a previous visit. Stakeholder analysis and informal interviews were used to collect specific detailed information on the identified sustainability indicators and other relevant issues in the Tanzanian smallholder's tea industry as presented in Table 3.2. This information was ultimately used to design the research gathering tools (checklists and questionnaires) for the quantitative survey.

Quantitative Data

Qualitative information collected during the exploratory survey helped to focus the research questions and inform the formal verification/quantitative survey. The exploratory survey confirmed the relevance of the proposed sustainability through feed back from various interviewed stakeholders. Confirmation of the sustainability indicators helped to design the quantitative survey for collecting data from the sampled smallholder tea-growing households. Key sustainability indicators were categorised within the context of the Asset Based model of Sustainability in Agriculture. Quantitative data were then collected from the sampled households in the selected study area using a structured questionnaire (Appendix 1). The collected quantitative data set is presented in Table 3. 3.

The quantitative data were based at the household level due to the general acceptance of the household as a convenient unit for data collection. NRI (2001) defined a household as a group of people sharing common residence, meals, and undertaking joint or co-ordinated decision-making. They also acknowledged that most of the basic livelihood models focus on a household as a most appropriate social group for the investigation of livelihoods systems. However, assessment at household for this study has taken into consideration the inter-household dynamics that shape the social structure of a community. Therefore, in the context of the Tanzanian smallholder tea

production systems, the household level presented an appropriate social group for investigating the livelihoods of smallholder tea growers.

Table 3.3: Collected data based on key households' assets as influenced by tea production

Sn	Key household Asset	Sustainability Indicators	Details of data /Information collected
1.	Natural Capital	Size of holdings (ha) Size of tea area (ha) Access to land Land quality (soils, weather & climate) Land use pattern	Wealth status /resource base Household dependence on tea Purchased or inherited,(Access) Crops grown and other uses by proportion
2.	Physical Capital (Man made)	Farm tools & equipment owned Household infrastructure (house, farm buildings) Means of transport Other farm /household structures	The stocks of household assets Source of resources to acquire these assets (Tea and non tea) Services offered to tea growers Stocks and flows as related to tea production
3.	Social Capital	Membership to tea growers association Benefits accrued Negative aspects of farmers organisations Inter households relations Land tenure system	Access to farmers association Services, representation & collective bargaining Costs, fee, overheads, and poor representations Hiring in /out labour, borrowing tools (costs/wages/exchanges) Leased, borrowed, (tenure system)
4.	Human Capital	Demographic structure of the household Members available for tea production Skills in tea production Education of hh members Total working in tea Imported Labour	Age and gender composition of household members People available for work in tea Experience or specific training and access to information on tea Labour requirement Hired labour (wages & extent)
5.	Financial Capital	Proportionate sources of household income Income from tea Farm operating costs Net tea cash flow (+/-) Access to credit for tea Tea production & Prices	Major source of household income Total revenue from tea Major costs for tea production Role of tea in accumulation or depletion of household income Type and quantity of credit for tea Total production per unit area, greenleaf price /kg

3.2.3. Data collection methods

Data were collected using both qualitative and quantitative techniques. Prior to collection, a sampling strategy was worked out to obtain representative cases as sources of the information. In order to capture a fair representation of the Tanzanian smallholder tea sector, a multi stage cluster sampling technique was used whereby one element of the population is selected at a time (Blaikie, 2000). This technique is useful when it is generally impossible or difficult to list all population elements. Multi stage cluster sampling technique is often used in household surveys like the smallholders household survey because it overcomes the effect of variations in the cluster size, which tends to affect community level surveys.

Secondary sources and company records and reports

Secondary sources consist of records and documented reports, which might have been produced for different purposes but contained useful information for this study. Specific information included definition of key sustainability concepts, indicators and current policies guiding the functioning of the Tanzanian tea industry. The secondary data from the participating companies provided an insight into the key trends and scale of smallholder's involvement in the tea production and the size of the respective factory catchment area.

Survey interviews

According to Fink (1995), surveys are systems for collecting information to describe, compare and predict attitudes, options values, knowledge and behaviour. Two phases of surveys were conducted for this study;

Qualitative exploratory survey: The qualitative exploratory survey aimed at gaining an understanding of how the smallholder tea industry operates. The survey also provided a basis for identifying key stakeholders in the Tanzanian smallholder's tea industry who helped to confirm the relevance of the sustainability indicators and feasibility of employing the proposed research gathering tools. The exploratory survey was used to identify key components of the Tanzanian value chain also used to collect information needed for the value chain assessment for the three case study areas.

Finally the survey helped to confirm the objectives of the study, which paved way for designing subsequent methods.

Quantitative sampled surveys: This aimed to quantify the stocks and flows of household assets. The survey explored the stock of five categories of household assets namely; Natural capital, Physical capital, Human capital, Social capital and financial capital for the three case study areas including the non-tea smallholder farmers.

3.2.4. Selection of the study area and case studies

A five tier multistage sampling procedure was used to select the study area and respondents for this study (Figure 3.2). In the first stage, the entire smallholder's tea growing areas of Tanzania was considered as the sampling frame, but due to limits in time and resources, a decision was made to sample two districts of Mufindi and Rungwe in the second stage of the sampling procedure as the case study areas. Both districts are located within the main tea growing area in the southern highlands of Tanzania, which account for over 70% of the Tanzanian production.

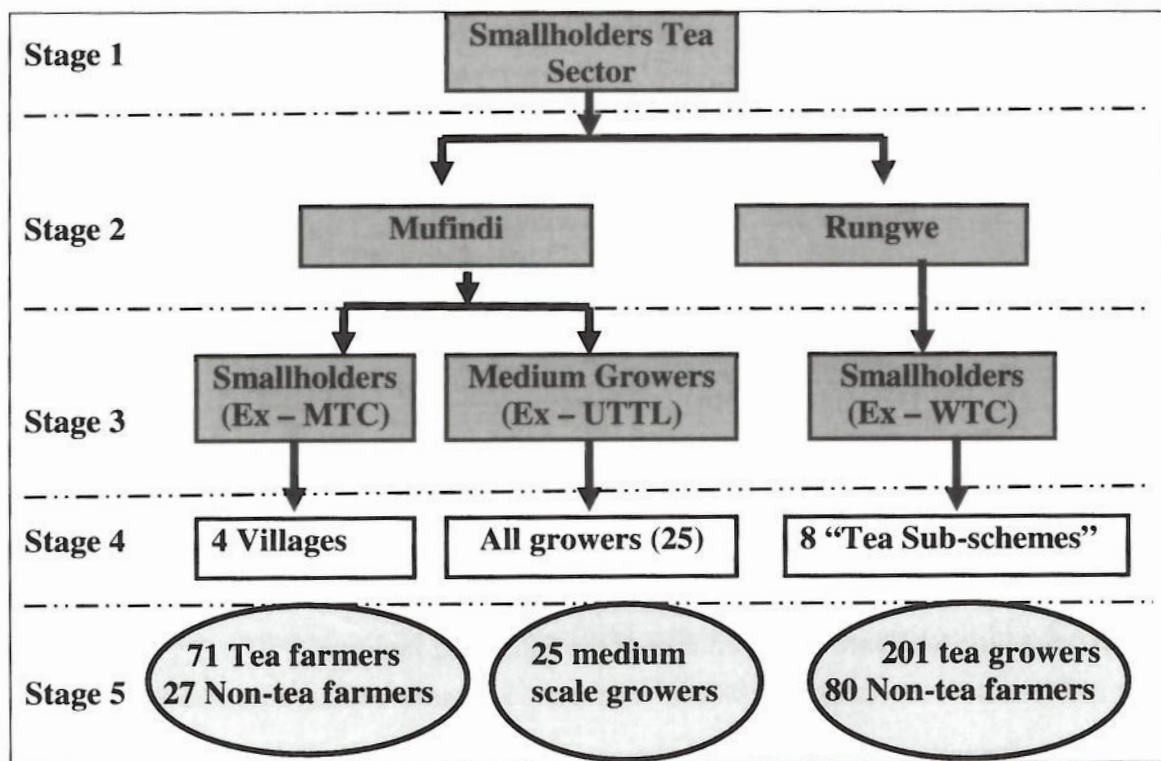


Figure 3.2: Criteria for multistage sampling procedure

The other reason for choosing the two districts is that they contain diverse cases of smallholder's tea production systems as well as representative modes of factory organisational structures that reflect reformed policies in the Tanzanian tea industry.

The third stage of the sampling strategy involved selection within each district, of all factories serving smallholders catchment areas. This was due to the close integration between the smallholders and their respective tea processing factories. Three factory catchment areas were selected as the main case studies. The three factories were chosen due to their unique characteristics (reflecting the array of key scenarios found in the entire Tanzanian tea sector) in the way they relate with the smallholders supplying greenleaf to these factories. Detailed information about the three factories and the basis for their choice are presented in Table 3.4.

Table 3.4: The case study areas and the basis for choice

Sn.	Tea Factory	Catchments Area	Unique Characteristics of the factory	Agro-climatic conditions
1	UTTL	Own estates contributes to majority of the crop 26 Outgrowers mostly medium scale farmers (10-50ha)	Processes mostly its own crop (<90%) with few (26) outgrowers (Medium scale)	Marginal area for most crops except tea. Less mix of crops
2.	MTC	Process estates own crop and Majority of smallholders crop in Mufindi district	Provides input on credit to outgrowers Promotes expansion of smallholders outgrowers	Marginal area for most crops except tea. Less mix of crops
3.	WTC	Depends entirely on smallholders crop Recently bought its own tea estate	Smallholders are shareholders with 25% stakes Provides inputs credit	Fertile land with relatively more pressure More mix of crops hence competition

The strategy also took into consideration of the following factors:

- homogeneity and or diversity of the typical smallholder's tea based production systems;

- diversity on the ownership structure of the respective factories, i.e. factories owned by private multinational companies and factories owned jointly between smallholders and private investors; and
- potential to capture the impact of the tea-driven livelihood systems for various households involved in this study.

3.2.5. Selection of the respondents

Within each catchment area, sampling was employed based on administrative zones within the respective tea factory catchment area. The choice of these administrative zones (villages in Mufindi) and (sub schemes in Rungwe) were also influenced by the agro-ecological diversity. This strategy was aimed to get a representative sample of the tea growers from within each catchment area. **Ellis and Bahiigwa (2003)** describes the key gradients for the choice of the villages in their livelihood study in Uganda to include criteria like; intensive compared to extensive farming, small compared to larger farm size, variation in rainfall patterns and other agro-ecological conditions. Other criteria include proximity to or remoteness from public infrastructure, services, and variation in access to non-farm activities. This study adopted some of the criteria used by Ellis and Bahiigwa to select respondents for the quantitative survey.

Within each sampled area, a list of all farmers selling greenleaf to respective tea companies was obtained from the computerised databases of their respective outgrowers. Based on this database and due to large number of farmers (2,500 in Mufindi) and (13,000 in Rungwe District) it was decided that multistage cluster sampling be employed whereby four villages in Mufindi and eight operational zones called tea sub-schemes in Rungwe were used as sampling frames from which specific sampling strategy was employed. The decision was made to include all the existing 25 medium scale growers due to their relatively small total number. One hundred and seven non-tea smallholder farmers (27 Mufindi and 80 Rungwe) were included in the sample, as a control.

In each tea sub-scheme a list of all tea growing villages was obtained and from this list a random sample of four to six villages was chosen (depending on the size of the sub-scheme determined by the total number of farmers). In each village three categories of farmers were identified namely (1) farmers with predominantly bigger proportion of tea area on their total holdings (<50%), (2) farmers with mixed enterprises made of tea and other cash crops (3) farmers with mixed enterprises where tea is minor. The three categories were identified during the preliminary exploratory survey which revealed the presence of the diversity of smallholder tea based farming systems.

From this sampling frame a quota of 5-10 farmers was randomly chosen from each sampled village. The quota system was employed at this stage due to the limitation of time and resources to carry out a fully random sample of the 13,000 smallholder farmers recorded on the database. On the other hand, this multi stage cluster sampling strategy was adopted due to its advantages, particularly in dealing with geographically dispersed populations like smallholder tea growers in the sampled case study areas.

Under the limitations imposed by resources and time, it is argued that the sampling strategy employed for this study adequately produced a representative sample of the population. This approach was used by Bryman and Cramer (1994) who argued that a multi-stage cluster sample allows geographically dispersed populations to be adequately covered, while simultaneously saving interviewer time and travel costs. Similarly Carsley and Lurry (1981) mentioned economy of cost and time, accuracy attributed to quality of enumeration, adaptability due to coverage of many topics particularly those involving detailed transactions of individuals or households as some of the benefits of sampled surveys.

3.2.6. Organisation of the field data collection (operational aspects)

The field data collection started with the training for the enumerators who were involved in data collection. Ten enumerators were involved in data collection. The decision to use enumerators was prompted by the need to cover all the sampled case study area within the three months allocated for this work. Prior to proper data

collection begin; the questionnaires were pre-tested in order to check the relevance of the questions as well as feasibility of conducting the interviews. Important feedback regarding the time it took to administer one questionnaire, and consistency in the sequence of the questions was obtained during pre-testing and this was used to modify the questionnaire in order to improve it.

Initially the author worked with each of the ten enumerators in the first day of data collection in order to ensure the questionnaire is administered properly and answers are recorded accordingly. The enumerators then continued to work independently on their respective sampled areas after agreeing on the random list of tea farmers to be interviewed. Most of the selected farmers were very enthusiastic especially in Mufindi district and they promptly agreed to take part in the survey. However, in some few cases there was reluctance, especially from women headed households to take part in the interviews. Involvement of the enumerators who were based in these areas helped to minimise this problem and re-assure farmers that the research is useful for obtaining information that may help in putting in place appropriate policies for development of the smallholder's tea production systems.

During the course of data collection, the author was able to visit the enumerators randomly in order to ensure that data was being collected without problems. At the end of the interviews, farmers were given opportunity to ask questions and give their opinion regarding what measures should be taken to improve the performance of the smallholder tea sector in their respective tea factory catchment areas.

3.3. Information on the value chains for the tea industry

Information regarding the performance of the tea value chain was collected from the three case study factories. They included production figures; company accounts records, costs components for the various operations, and sales records. The information was collected through informal discussion with the executive officers of the sampled tea processing factories (managing directors, factory managers, and accountants). The discussion was conducted by following a checklist which highlighted key stages in the tea value chain and the type of information needed for

each stage within the respective case study area. The respective tea producing companies provided company sales records and accounts. It is very rare to get such records from commercial companies and the willingness of the Managing directors for MTC, UTTL and WTC to allow the use of the information for this study is highly appreciated.

The information was used to categorise value chain performance indicators based on four analytical criteria;

- Effectiveness (in delivering the anticipated outputs) for each stage of the tea value chain,
- Efficiency (in terms of input: output ratios) for various value adding activities of the tea value chain,
- Equity /Fairness (which addresses the distribution and allocation of costs and benefits) for various players in the tea value chain, and
- Robustness (which demonstrates the stability and resilience) of the value chain to withstand shocks and disturbances.

For practical purposes, the Tanzanian tea value chain was categorised into three key stages namely; Greenleaf production, Greenleaf transportation and Tea processing and Sales. In all three stages, key performance indicators were used to compare the three case study areas.

3.4. Data Analysis /Analytical Framework

3.4.1. Qualitative Information

Qualitative information was subjected to descriptive analysis aimed at outlining and describing information and establishing links between the various concepts being investigated. The information obtained was used to describe the size, characteristics and performance of the Tanzanian smallholder's tea sector compared to estates sector, smallholder's tea sectors, the neighbouring countries (Kenya and Uganda) and against the non-tea production systems. The descriptive analysis then paved the way for the interpretation of these issues particularly on how they relate to or influence the

sustainability of the smallholder tea based production systems in Tanzania. Qualitative analysis was very useful in understanding the linkages between various components of the Tanzanian tea industry and how they influence the sustainability of the smallholder's production systems.

3.4.2. Quantitative Survey Data

Data were processed initially by inspecting all the questionnaires to eliminate obvious enumeration errors. This process was followed by updating the prior constructed code list. This was necessary because some responses from the interviewees were not anticipated hence were not included in the original code list. Following the finalising of the code list, all the questionnaires were coded and data were entered in the computer using Excel[®] spreadsheet software. Due to lack of accuracy on the information collected for some variables, like estimated yield that farmers struggled to recall, the decision was made to improvise by combining the questionnaire database with the recorded actual yield from factory records.

Yield records covering four years for each respondent were entered alongside other responses from the survey. The same strategy was employed for other variables like farm size, fertiliser use, and herbicide use. After completion, all the excel databases from the three case study areas were merged and transformed into SPSS input files ready for analysis. Data were further cleaned by running scatter plots for all scale variables, in order to assess the effect of outliers in the data set.

Following a successful procedure to process and clean, the data were analysed using SPSS/PC[®] software to obtain descriptive statistics on key adopted sustainability indicators.

- Cross tabulations were used to summarise key nominal variables across the three case study areas. This analytical method allowed the use of statistical procedures such as Chi-square and ANOVA to measure the significance of the variability as well as extent of the variability.

- Comparison of means was another method used to measure scale variables across the three case study area, also with non-tea smallholders where applicable. This method allowed the use of statistical procedures such as the t-test to measure the significance of the differences of the means across the three case study areas.
- Another important component of the analysis of the quantitative data involved the exploration of the relationship between variables in the data base. The variables represent indicators for the key household assets that allowed exploration of relationship between the key household assets within and across the three case study areas. Initially, the correlation analysis was done for all variables likely to be associated with performance indicators such as the estimated greenleaf yield.
- The resulting output, the correlation matrix was used to shortlist variables which showed strong independent relationship with performance indicators such as greenleaf yield. The short listed variables were subjected to stepwise regression analysis that produced a regression model showing independent variables that contribute to greenleaf yield. A sample of the regression model output is presented in **Appendix 6**. In order to obtain the elasticity of the independent variables a Cobb-Douglas function was attempted, though it did not produce the desired level of prediction.

From sustainability standpoint, all key relevant household assets (Human, Social, Financial, Physical and Natural) were subjected to correlation and regression analysis to identify the relationship between key household assets and performance variables such as greenleaf yield per hectare. Comparison of the three case studies was made in order to draw inference on how the variability of the three cases influences the sustainability of the smallholder's tea production systems in respective study areas. Where applicable, comparison was drawn between tea and non-tea smallholder farmers.

3.5. Critique of the methods

Despite of effort to ensure that chosen methods are relevant and effective in measuring the sustainability of the Tanzanian smallholders tea production systems, there are limitations that need to be considered when interpreting the results of this research work.

3.5.1. Literature review and secondary sources

There was lack of relevant specific literature on the Tanzanian tea industry, and more notably lack of established framework for assessing the sustainability or generally farming systems in Tanzania. Although this limitation hampered the effort to identify proven sustainability indicators for the Tanzanian tea industry, it highlighted the potential of this research work to offer significant contribution towards filling that information gap in the Tanzanian smallholder's tea sector.

3.5.2. Information gathering errors

Due to the scale of data collection and the relatively large number of respondents involved, more than ten enumerators were used to collect the information. There were a few errors due to different interpretation of responses by individual enumerators. Efforts were made to reduce such errors within reasonable possible level as explained in section 3.4.2 above. Inspection of the questionnaire to verify the accuracy of the recorded responses, eliminating outliers after reviewing the scatter plots, were some of the strategies used to minimise errors. However despite the effort, there is still need for caution in interpreting the results. Where such errors have been perceived, they are highlighted when discussing the results.

3.5.3. Limitation on the type of information

While trying to reduce the variability and level of details during data collection, the questionnaire was pre-coded with range of anticipated responses from the respondents. Although this strategy was very useful in producing accurate and

consistent information from all enumerators, it leads to categorical variables. With hindsight, this proved to be one of the significant limitations of the quantitative survey, as the quality of data collected did not allow some of the potential analysis to be done.

However, there were efforts to improvise and improve the quality of data by linking questionnaire responses with recorded database from the factory for the same respondents whenever the databases were compatible.

3.5.4. Autocorrelation and database relationship

Autocorrelation was also a problem for scale variables, due to close relationship between the chosen variables. For example while the performance indicator was the estimated greenleaf yield, this was closely related to labour use, the level of input use and indirectly the size of the tea farm. This nature of the database created some problems especially while analysing the relationship between variables as independent variables appear to have a degree of association amongst each other. Although these problems are common in farm based surveys, the extent and intensity in this survey requires caution when interpreting the results.

3.6. Chapter Summary

The chapter presented the theoretical and analytical framework used for this study, including the methodologies used for data collection, analysis and interpretation. The combination of two analytical models; an Asset Based Model of Sustainability and the Value Chain Assessment was adopted as a unique analytical framework for assessing the sustainability of the Tanzanian smallholder tea production systems.

The presentation of the methodology contributed to attaining the third objective of this research work; to develop and apply an analytical framework for assessing the sustainability of the Tanzanian smallholder's tea production systems.

The chapter also presents the critique of the methodologies, which highlights shortcomings that may affect the interpretation of the results of this research work. The prominent critique includes errors in data collection attributed to different interpretation of responses by the enumerators, limitations imposed by the type of collected data that had categorical variables, which did not allow some of the potential analysis to be done, particularly autocorrelation which imposed limit on assessing associations and relations amongst some variables.

Although efforts have been made to minimise the effect of these limitations, caution is needed when interpreting some of the results of this study. However, it is considered that here the limitations and cautions do not unduly compromise the general outcome and subsequent recommendations drawn from this research work. Indeed some recommendations include those to help future research to overcome the limitations experienced here.

CHAPTER 4: RESULTS OF THE QUALITATIVE EXPLORATORY SURVEY

4.1. Introduction

This chapter reports the findings of the exploratory survey conducted with various stakeholders in the Tanzanian tea industry. The survey was conducted mostly to gain an understanding of how the smallholder tea industry operates, providing a basis for stakeholder's identification, confirming the relevance of the sustainability indicators and feasibility of employing the proposed research gathering tools. The survey was also used to identify key components of the Tanzanian value chain. Finally, the survey helped to confirm the objectives of the study, which paved the way for designing data collection methods.

The exploratory survey involved qualitative in-depth interviews focused on key livelihood and value chain aspects relevant for the Tanzanian tea industry and in particular, the smallholders sub-sector. The views and perceptions of the various stakeholders regarding the critical sustainability issues relevant for the Tanzanian tea industry were obtained. In addition, the description of the circumstances under which these stakeholders operate in the Tanzanian tea industry is given.

4.2. Key stakeholders in the Tanzanian smallholders tea sector

Stakeholders are defined as any group of people organised or unorganised who share a common interest or 'stake' in a particular issue or system (Grimble and Wellard, 1996; Johnson and Scholes, 1999). The process of identifying key actors in a system and the subsequent assessment of their interest, the way they exercise these interests and the ways in which the latter affects the performance of the system is referred to as Stakeholder Analysis (SA). For the smallholder tea based production systems, The Asset Based Model of Sustainability in Agriculture and the Value Chain Assessment models (Chapter 3) have been used to assess the sustainability of the respective systems. Stakeholders in the context of the Tanzanian smallholder's tea industry

include individuals, groups and institutions that are interested in the functioning of the sector and may influence its performance and outcomes. The specific stakeholders that were interviewed included management staff of the three tea processing factories, representative smallholder farmers, leaders of tea farmer's organisations, service providers (extension and research) and executive officers in the Government and policy setting institutions. The detailed description of these stakeholders and the relevant issues related to the sustainability of the smallholder's tea sector is summarised in Table 3.2.

4.3. The factory owners /estates sector

In this section, the organisational structure of the three case study tea factories is described with emphasis on the linkage with their corresponding out-grower farmers. The operational mechanisms for linking outgrowers with nucleus estates such as UTTL and MTC and likewise for a fully smallholders dedicated factory like WTC are discussed together with the implication of the performance of the respective smallholders. The information is based on the interviews with the management staff, some participating farmers, as well as secondary data provided by the three factories. The three tea-processing factories involved, namely UTTL, MTC and WTC, are among the top three tea producing companies in Tanzania by volume of production with a combined production in 2003 reaching 19,320 tons, which is approximately 66% of Tanzania total annual production. Each of the three factories has unique characteristics that prompted their inclusion in this study as described in Chapter 3. Table 4.1 below presents basic statistics for the three factories involved in this study.

UTTL, with an estimated 15% of the total planted area in Tanzania, depends primarily on production from its own estates for the greenleaf to supply to the processing factory. A small proportion of smallholders (regarded as medium scale growers by Tanzanian standards) also supply green leaf to UTTL. Similarly, MTC is a predominantly estates-based company but with a higher proportion (up to 23%) of greenleaf coming from smallholder outgrowers. These two companies are located in Mufindi District (which has different farming systems compared to Rungwe where the third factory, WTC, is based).

WTC was initially an entirely (100%) smallholder-based tea factory, owing to its background as a former Tanzania Tea Authority (TTA) managed factory before it was privatised in 1999. However, in 2003 WTC acquired 308 ha of tea from the Tukuyu Tea Estates Company. This changed WTC's status from a solely smallholder based tea processing factory to one with a relatively small nucleus estate but with most greenleaf supplied by smallholders.

Table 4.1: Selected basic statistics for the three case study tea processing companies during year 2003

	Basic statistics	MTC	WTC	UTTL
1.	Total planted area (ha)	1,430	3,638	3,025
2.	Total annual production (tons MT)	4,740	2,507	12,070
3.	Yield per unit area (kgMTha ⁻¹)	3,510	836	3,750
4.	Number of outgrowers served by the factory	1,500	14,000	29
5.	Proportion of outgrowers over total production (%)	23%	92%	05%
6.	Number and capacity of processing factories (Tons GL/day)	1(120)	2(160)	3(260)
7.	Greenleaf price (TZS per kg GL)	100	96	125

4.3.1. Unilever Tea Tanzania Limited (UTTL)

UTTL is a leading tea producing company in Tanzania producing over 41% of the Tanzanian total annual production of made tea. UTTL's productivity is among the highest in Tanzania, second only to MTC (see Table 4.1). UTTL irrigates all its estates during the drier months of the year (June – September) and this accounts for the relatively better productivity compared to other rain fed estates in Tanzania. The UTTL's estates superintendent mentioned that, *"the outgrowers farmers we are dealing with tend to improve their performance in comparison with non participating tea farmers as they benefit from support services provided by the company"* (Malavanu, 2003). This statement is supported by the relatively high average yields for the outgrowers supplying UTTL (10,681 kg GL ha⁻¹) compared to outgrowers supplying MTC (8,442 kg GL ha⁻¹) and WTC (4,567 kg GL ha⁻¹). Currently there are about 25 outgrowers who supply greenleaf to the company.

According to the managing director for UTTL (Kelly, 2003), although the company is currently relying on its own estates for greenleaf production, the company recognises the great potential of working with outgrowers as the way forward for the future expansion of the Tanzanian tea industry. According to Tiffen and Mortimer, (1990), several factors favour smallholder outgrowers over estates mode of production.

- The increasing labour costs of estates through higher wage related expenses renders the estates more expensive to run compared to smallholders who mostly use family labour. Over the last 10 years the proportion of farm labour wages as a percentage of total field cost in the tea estates has increased from 25% in 1993 to about 36% in 2003.
- Smallholders can be more flexible in their allocation of the factors of production than estates because the greater proportion of their costs are variable unlike estates, that includes a processing unit which entails a bigger proportion of fixed assets in terms of machinery, buildings and other physical assets such as vehicles, power lines and water supply,
- It is relatively easier for tea factories to enforce quality standards for outgrowers at the delivery point (where stricter measures including rejection of poor quality greenleaf are in place), these measures are difficult to enforce in the estates because if the greenleaf from own estate is rejected the loss will be to the company.

Estates provide employment for a substantial number of workers. UTTL alone employs about 6,500 workers making it one of the most significant employers in the country. Most of these employees are provided with accommodation by the company, though a significant proportion of the workers lives in the neighbouring villages where the smallholders also grow tea. There is a crucial synergy between the estates and these smallholders as income acquired from working in the estates has enabled some farmers to establish businesses in their respective villages. Also, some estate workers have used their savings from working in the UTTL estates to set up their own tea gardens in the neighbouring villages.

During 2003, it was estimated that the company was injecting over 300,000USD to the local economy around Mufindi district every month (Kelly, 2003). The company also runs a network of health centres (dispensaries) in each of its 10 estates. A full-fledged hospital facility capable of treating most of the emergency and routine medical cases is part of the company infrastructure, which benefits not just company workers but also local people based close to these facilities.

UTTL works with outgrower farmers who are more advanced than the typical smallholder tea growers in Tanzania with more business orientation depicted by their bigger stocks of assets which are deployed to facilitate efficient farming operations. Within the UTTL catchment area, the outgrowers are responsible for transporting their greenleaf to the factory where it is received, inspected for quality before being weighed and taken for processing. The acceptable quality standards have been set by the company and all outgrowers are aware of these. In case of poor standards, the greenleaf lot is rejected at the factory gate. This quality control mechanism ensures that only the crop of an accepted standard is delivered to the factory. Common agreement during quality checking mechanism is an important component of the relationship between the estates and outgrowers as any misunderstanding can easily erode trust, which is crucial for the sustainability of the system.

UTTL helps outgrowers to obtain materials through the company procurement and stores system including fertilisers, herbicides and tea plants from the company operated nurseries. This arrangement ensures that farmers are able to obtain inputs at very competitive prices compared to alternative commercial outlets as evidenced by almost 15-20% higher prices from commercial sources. Other services provided by the company include training on aspects of sustainable agriculture which is part of the wider Unilever Sustainable Agriculture initiative for tea launched during the mid 1990s (Unilever, 2002).

Under the sustainable agriculture initiatives by Unilever, ten sustainability indicators have been identified and they provide a basis for specific good agricultural practices recommendations by UTTL. The indicators include soil fertility, nutrient biodiversity, energy, social and human capital, soil loss, pest management, product value, water and local economy. For the scope of this study, which focuses on the economic

dimension of sustainability three indicators namely social and human capital, product value and contribution of tea to local economy will be considered in detail. The three indicators that are related to the economic dimension of sustainability confirm the relevance of using sustainable livelihoods approach and specifically an Asset Based Model of Sustainability in Agriculture to determine the sustainability of the smallholder tea production systems in Tanzania.

4.3.2. Mufindi Tea Company (MTC)

MTC is the third biggest tea producing company in Tanzania after UTTL and TATEPA (Tea Board, 2003) Group. Originally MTC was a predominantly estates company though over the years the company has expanded the share of the smallholders outgrowers to over 23% (Table 4.1). MTC together with UTTL are among the top three companies with the highest productivity per unit area. MTC has a long history of working with outgrowers in Mufindi since they started growing tea in the early 1970s, first in collaboration with TTA who by then organised the planting and marketing of greenleaf for smallholders. Since the mid 1990s, MTC started working directly with smallholders through the village based farmer organisations. This facilitated smooth and regular collection of greenleaf from farmers and distribution of inputs to respective tea growing villages. There was a significant increase on smallholder's greenleaf production in Mufindi district as shown in Figure 4.1 low. Currently there are 17 villages supplying greenleaf to MTC, they constitute approximately over 1,500 smallholders.

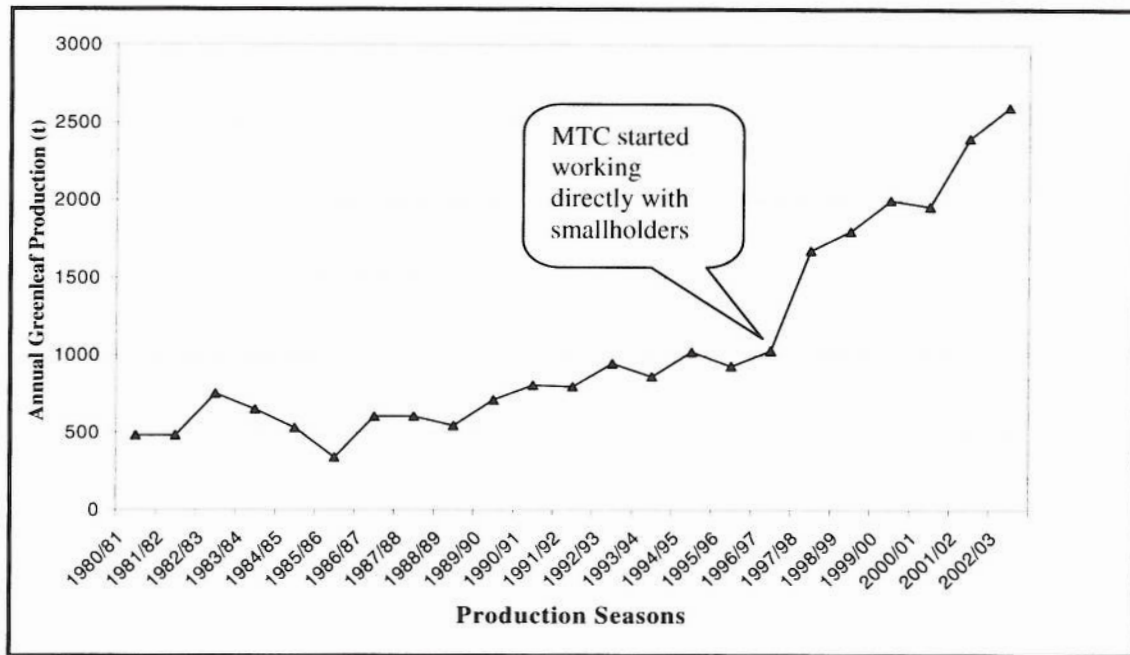


Figure 4.1: Annual green leaf production from smallholders in Mufindi District: 1980/81 - 2002/03 (Adapted from Nyanga et al. 2000)

In year 2003, MTC paid smallholders 100TZS per kilogram of greenleaf delivered to the collection centres based in the village. The company then provides transport for the greenleaf to the factory. Although the company claims to provide this transport “free of charge”, in reality the actual cost of transportation seem to be charged already from the price paid for each kilogramme of greenleaf. Comparison with UTTL who pay outgrowers up to 125TZS for a kilogramme of greenleaf delivered at the factory, imply that the difference in greenleaf paid by the two factories accounts for the “hidden transport costs” for the smallholders.

Other services offered by the company include procurement of fertilisers which is provided on credit at the beginning of the season. MTC also have employed a senior manager responsible for extension and liaising with smallholder’s outgrowers. The managers in collaboration with farmers’ groups coordinate greenleaf collection schedules and assists farmers to improve management practices on their tea fields. This arrangement however is not adequate for advisory services, as it is difficult for one factory employee to reach all farmers (estimated to be 2500). However the arrangement works well for input distribution as the same trucks that collect greenleaf from the villages deliver fertiliser from the factory.

According to Smith (2003), the company has embarked on infrastructure expansion whereby a separate processing line with a capacity for 7,000 kg of greenleaf per day has been constructed for exclusively processing smallholder outgrowers tea. This decision by the company to invest on fixed infrastructure dedicated for smallholders indicates the growing scale of the smallholder share of the greenleaf in the factory.

According to MTC outgrower's manager (Nyagawa, 2003), the relationship between MTC and outgrowers is based on trust and mutual interest. However, these claims contradict statements from some participating farmers, who mentioned that they do not have direct access to the information used by the company to arrive at the greenleaf prices. Despite smallholders not being joint shareholders in the company, their increased share of the crop being processed by MTC means they are increasingly becoming an important factor in the company business plans. This situation creates an incentive for both parties to foster a stable business partnership that ensures that the expectations of the outgrowers are met without compromising the financial status of the company.

The area where potential disagreement can occur is on setting a price for the greenleaf. The current practice is not formally known to smallholders' representatives, as the company management only sets prices for the greenleaf following reviews of selling prices at the auction and the company production costs.

One important aspect perceived from the interview with MTC is the clear commitment of the company to continue working with smallholders by integrating them into the long-term company development strategies. This is an important condition for boosting confidence of the smallholder tea growers to invest more in tea production. The other aspect that emerged was the need for the company to support the outgrowers to access necessary services that facilitate efficient production. This takes consideration of the remoteness of most of the tea growing areas and lack of reliable input suppliers. Finally, the fact that smallholders are not shareholders in the factory, calls for dialogue between processing factories and smallholders to ensure their continued participation in this business arrangement.

4.3.3. Wakulima Tea Company (WTC)

WTC is currently the biggest company that processes tea sourced predominantly from the smallholder production systems. The company is based in Rungwe district where it is estimated that 14,000 smallholder tea farmers (approximately 40% of the Tanzanian smallholder tea growers) are located. WTC is a joint venture company owned by TATEPA Group, (a private company) and the smallholder farmers who are represented by their organisation, the Rungwe Smallholders Tea Growers Association (RSTGA). WTC was formed in 2000 following the privatisation of the state owned Katumba and Mwakaleli tea processing factories. The two factories were part of the six mainly smallholder based tea processing factories managed by the defunct Tea Authority of Tanzania (TTA), the organisation that was largely responsible for the development and promotion of the smallholders tea sector in Tanzania.

WTC is led by a seven member Board of Directors consisting of five representatives from TATEPA Group and two representatives from RSTGA. The number of representatives of the board reflects the representative votes of the two shareholders (75% TATEPA and 25% RSTGA) during decision-making process by the board. This set up is intended to ensure that all decisions made by the board represent the interest of all shareholders.

During its formative stages, WTC opted to outsource key functions of the company operations. The task of transporting greenleaf from the highly scattered collection centres was contracted out to a professional transportation company, CASPIAN Limited with conditions set such that payment for the services are based on the volume of greenleaf delivered at the factory according to acceptable quality standards. This arrangement has been pioneered by WTC in Tanzania and the initial success recorded by this project has prompted other companies like UTTL to adopt a similar strategy for hauling greenleaf from its own estates in Mufindi.

According to WTC's general manager (Rowland, 2003), research and extension services are important factors for a successful smallholder outgrower system. Extension services are particularly important for the tea factories that rely on smallholders for the greenleaf, mainly due to the high level of logistical organisation

required as well as communication requirements for ensuring that quality standards are followed by all participating outgrowers. In recognition of these challenges, WTC contracted the Tea Research Institute of Tanzania (TRIT) to provide extension services on behalf of the company. The extension work involves five core logistical responsibilities for TRIT;

- i) liaise with transporters for timely collection of green leaf from respective collection points;
- ii) conduct pre-season assessment of demand for all inputs by tea growers and compile the figures for procurement purposes;
- iii) supervise the distribution of inputs and subsequent proper usage by farmers;
- iv) assist with the reconciliation of payments; and,
- v) facilitate the delivery by farmers the agreed minimum volume and surplus quantity of greenleaf to the collection points and further on to the factory(s).

These five logistical responsibilities are complemented by normal extension work aimed at improving yield per unit area in the farming systems through systematic farmer training programmes.

Key issues that emerge from the interview with WTC management staff are the importance of transparent forum for discussing the existing partnership between shareholders who constitute both the large private investors with majority (75%) shares and smallholders represented by their own associations with minority shares (25%). Again, as it emerged with MTC, the factory needs to facilitate the production, collection and delivery of greenleaf to the factory by the outgrowers. It is important from the perspective of the value chain that the role of outgrowers as producers of raw material is appreciated by the factory and measures are taken to ensure that outgrowers continue to operate profitably.

The three factories involved in this study offer a variety of management contexts where

- The extent of outgrower's involvement in decision-making varies in extent from minimum within UTTL to moderate (MTC) and to being an integral part of decision making process (WTC).

- The scale of smallholder's organisation also increases with their involvement in their respective companies.
- In all three set-ups, provision of inputs and basic extension services have been given priority by the factories.
- Whereas the typical smallholders are more dependent on the factories for key services, including transportation of greenleaf, the medium scale growers appear to be less dependent with their own transport and capability to access inputs through their own means of transport.
- The interviews with the three factories have shown that in order for a smallholder out-grower scheme to be successful, the factories need to support them to organise themselves and to facilitate easy access to agronomic inputs and extension services.

4.4. Interviews with Service Providers (Research and Extension)

In this section the views of the service providers regarding the opportunities and constraints facing the smallholder tea sector are presented. Two categories of service provider institutions were interviewed; the Tea Research Institute of Tanzania (TRIT) for research support and the District Agricultural and Livestock Development Offices (DALDO) for extension services. The importance of support services such as extension and research in the smallholder production systems such as the Tanzanian smallholder's tea sector has been widely demonstrated. Kelly (2003) argues that a farmer who has no knowledge about inputs or training on how to use them will be unlikely to adopt them. Böhringer and Ayuk (2003) further describe that the type of support needed by smallholder farmers varies widely in most of Sub-Saharan Africa. Support relates to the technology itself, to inputs, production means, infrastructure, marketing and credit, among others.

In the Tanzanian smallholder's tea industry, the respective tea processing companies usually facilitate provision of agronomic inputs. A limited level of extension services

is also provided directly by members of staff from the respective factories. In the past, the government was responsible for providing agricultural extension services for all commodity crops. The radical rationalization of the Ministry of Agriculture and Food Security in connection with the Civil Service Reform programme during the mid 1990's has resulted in the responsibility for research on export crops being devolved to the respective commodity industries led by the private sector (MOAFS, 2003). Research on major cash crops such as coffee, cotton, cashew, sugar and tea is now largely funded by a cess on sales.

4.4.1. The Tea Research Institute of Tanzania (TRIT)

For the case of the Tanzanian smallholder tea sector, TRIT was established in 1996 and started its operations in 1998 as an autonomous organisation representing the Government of Tanzania and the tea industry. Under the Tea Ordinance (CAP 291) a cess of 2.5% of the net sale value of made tea has been imposed. The Ordinance provides for 1% to be paid to the Tanzania Tea Authority (now the Tea Board and TSHTDA) and 1.5% to TRIT.

The TRIT Board of Directors consists of representatives from the Government, the Tea Board, TSHTDA and TAT. This ensures that all key stakeholders are fully involved in directing the tea research activities in the country.

The aim of TRIT is to support the development of the tea industry in Tanzania, both small and large scale producers through appropriate cost effective, high quality research and technology transfers, to ensure long-term sustainability of the industry by adopting the following approach (TRIT, 1998);

- To provide answers to practical problems of immediate concern to the industry.
- To communicate the results of research to the industry in appropriate, unambiguous ways.
- To explain, where possible, the mechanisms responsible for the observed responses, so that the results can be applied with confidence to other locations.
- To subject this work to peer group review through scientific publications when justified.

- To identify the financial benefits of research recommendations.

Balancing the priorities between the estates sector which contributes majority of the cess funding and the smallholders sector is a very critical challenge for TRIT. The task of setting research priorities for TRIT is done by the TRIT advisory panel and the Board of Directors after reviewing the needs of the stakeholders and the relevance of the research proposals submitted by the scientists. Some of the priority areas for the estates sector include;

Crop improvement:

To develop or acquire clones which are capable of maximizing productivity and economic potentials under the Tanzanian growing conditions. Due to the lack of a previously established breeding programme, in the short term TRIT has adopted a strategy of adapting developed clones from neighbouring tea growing countries of Kenya and Malawi through collaborative work with the research institutes in these countries.

Soil Fertility management:

The priority aim pursued by TRIT in this research area is to develop recommendations for the optimum economic fertiliser application levels for key growing areas and advices stakeholders on specific fertility issues in tea production. Rising costs of inorganic fertilisers, which is the main farm input in tea production, add more urgency to the need to find efficient fertiliser use for the economic sustainability of the Tanzanian tea industry.

Crop Water Management:

The tea growing areas in Tanzania can be considered to be sub-optimal compared to equatorial regions in neighbouring Kenya, Uganda, Rwanda and Burundi, mostly due to prevalence of a characteristic long dry spell between June and November. This disadvantage has forced growers to use irrigation to optimise yield during the drier months. However, irrigation increases the relative costs for the estates tea production in Tanzania. According to figures provided by UTTL, it is estimated that the cost of irrigation is between \$0.05-0.07 per kilogram of made tea. TRIT therefore is working with growers to identify the combination of tea clones and management practices that

produce maximum returns per mm of water applied for various growing conditions in Tanzania.

Technology transfer:

Following the abolition of the TTA, the smallholder tea sector was left without an extension network. Lack of extension network was a setback for a research organisation like TRIT as it was difficult to communicate the research messages to potential users. TRIT realised that a research institution without an information delivery mechanism is very unlikely to bring any impact. The immediate challenge for TRIT therefore was on how to contribute to the revival of the industry in line with the prevailing policy reforms. In response to this challenge TRIT through its Technology Transfer Programme has since expanded its research communication role especially to the smallholder tea sector.

In a wider context TRIT, having the national mandate for Tea Research is indirectly contributing to policy related issues and institutional reforms. TRIT has a role in influencing the reforms by suggesting feasible measures for improving the performance of the Tanzanian smallholder tea industry by laying the platform for smallholders to respond to research recommendations.

Research is important for enhancing productivity of the Tea industry. Technologies that minimize the cost of production while increasing productivity per unit area need to be generated and efficiently disseminated by TRIT to assist growers to remain competitive. A private sector research organisation is a rare concept, as most agricultural research lies in the domain of the public sector. Agricultural research has always been regarded as a public good as the benefits of research go beyond the immediate end users, moreover mechanisms to exclude non-participants or charge them are very complicated. TRIT is funded through Cess charged from the sale value of made tea.



PLATE 4.1: Meteorological station at Ngwazi Tea Research Station an example of how TRIT provides growers with technical support to improve productivity



PLATE 4.2: Extension staff receiving training on rehabilitation of the abandoned tea fields in Rungwe District

4.4.2. The District Agricultural Extension Offices (DALDO's)

The District Agricultural and Livestock Development Office (DALDO) is one of the departments in both District Councils (Mufindi and Rungwe) responsible for agricultural development in respective districts. According to the interview with the DALDO Mufindi, the department is answerable to the District Executive Director (DED), the chief executive officer of the District Council. The district councils are key institutions in the Tanzanian local government set up. The local government system involves participation of councillors from various constituencies in the planning and decision making process of the respective District Councils. So the priority work for the DALDO offices is essentially determined by the representatives of the people the majority of whom are farmers.

Under the DALDO, village extension workers are posted in almost every village in the district. According to interviewed farmers and village based extension officers, regular contacts between farmers and extension workers are very crucial for an effective extension system. The village based extension workers are responsible for advising farmers on all agricultural crop and livestock keeping activities. Tea being one of the leading cash crops in the districts creates a unique challenge because in the past these village extension staffs were not dealing with tea which then had its specific extension workers under the TTA.

So despite of having relatively well placed extension staff on the ground, general extension workers lack experience in tea production and therefore they are unable to effectively assist farmers to improve productivity. TRIT in collaboration with the respective district extension staff has embarked on a staff training programme to improve the tea knowledge base in order to serve the tea farmers in their respective areas. The specific inputs from TRIT include;

- Organising training workshops for extension staff on priority topics on tea production
- Facilitating exchange visits for the extension staff and tea farmers to learn from more advanced areas,

- Providing modest material support for facilitating local movement of extension workers while they implement the tea related extension work.

Though currently some farmers are sceptical about the involvement of these village based extension workers due to lack of their involvement in tea related extension work in the past, there is significant potential of involving such staff to assist farmers to improve productivity which is very low (at 650 kg MTha⁻¹) compared to the estates sector which has reached 3,500 kg MT ha⁻¹.

The Tanzanian smallholder tea sector in Rungwe District provides a unique model of agricultural extension whereby the private commercial organisation (WTC), has contracted TRIT to coordinate extension work for the smallholders tea sector in the Rungwe District. Research and extension help farmers to achieve the biological production potential, achieving efficient use of inputs, which eventually reduces production costs. All this helps to improve profitability and overall sustainability of the tea production systems.

4.5. Interviews with Tea Farmers Organisations

In this section, the views of the tea farmers' organisations are presented. Leaders of the two categories of the farmer organisation (1) Rungwe Smallholders Tea Growers Association (District level) and (2) Mkonge Tea Block Farm (Village level) were interviewed. The large discrete production units feeding into a central tea processing factory, even for an organised estate production system, usually poses a big logistical challenge. In most of the tea growing areas in Tanzania, farmers have formed representative associations in response to these organisational challenges.

Various forms of farmer's organisation exist, all seeking to represent smallholder growers in their respective tea processing factories/companies. There are District level organisations formed partly due to the initiative by TSHTDA during the late 1990's. The move was intended to organise farmers into representative organisations to participate in the running of the newly privatised TTA factories. The move took into consideration of the government decision to reserve 25% of the shares values of these

factories to smallholders who were required to organise themselves and form joint venture companies with the private investors, who bought the majority (75%) shares (TIRDO, 1996).

In areas where the smallholders did not have a dedicated TTA factory, like Mufindi, farmers had already formed their own version of organisations, which were much smaller and specific at a particular village level. These village-based organisations are responsible for liaising with their respective factories for the following core needs, namely;

- Organising collection and subsequent transport of harvested greenleaf to the factory,
- Reconciliation of greenleaf sales by individual farmers to facilitate payments,
- Collating farmers' fertiliser requests to allow the company to purchase and supply ahead of the production season,
- Providing a forum for negotiation with the processing factories for issues related to greenleaf prices and other services required by farmers from the factory.

Interviews with the two farmer organisations indicate that they face different challenges and they also play different roles depending on the prevailing circumstances of the respective factory catchment area. According to Williams and Karen (1985), the smallholder based production system needs to be organised around a corporate core that offers them the necessary technology and personal stake in the production process. This is a similar condition for the smallholder tea growers, and their farmers organisations fit very well to this task of mobilising farmers. The performance of the farmer's organisations therefore may contribute to the sustainability of the tea based production systems in Tanzania.

4.5.1. Rungwe Smallholder Tea Growers Association (RSTGA)

The Rungwe Smallholders Tea Growers Association (RSTGA) is a district level organisation formed during the privatisation of the Katumba and Mwakaleli tea factories. RSTGA represents all smallholder tea growers in Rungwe who by the virtue

of selling their greenleaf to WTC becomes RSTGA members. RSTGA is led by an elected executive comprising the Executive Chairman, General Secretary and nine executive committee members. An administrative executive is responsible for overseeing all administrative issues within RSTGA including the upkeep of the shareholders register. RSTGA has to deduct 5 TZS from payment for each kilo of greenleaf delivered at the collection point by each individual farmer member. This is mostly used to fund the 25% share of total equity value.

The overall RSTGA share value has been divided into 536,000 discrete shares, each valued at 1000TZS, which farmers acquire depending on sales of greenleaf. RSTGA also allow farmers to purchase shares directly with cash payment obtained from sources of income other than tea. Shareholders are entitled to dividends paid out of profits. During 2003 WTC made a profit for the first time since it was established in 2000 and it paid out 31 million TZS to RSTGA as their 25% share of the profit. This sum, when equated to the existing total number of RSTGA sold shares, meant that every smallholder received an equivalent of 200TZS for each of the shares they owned.

As mentioned earlier, RSTGA is represented by two members in the WTC Board of Directors. This gives RSTGA access to otherwise confidential corporate information. This is a unique arrangement which does not exist for other factories like Mufindi where farmers are not the shareholders in MTC or UTTL. According to the RSTGA Executive Chairman, presence on the Board of Directors ensures that RSTGA is able to participate in the regular greenleaf price reviews, which are based on the prevailing factory operational costs, benchmark prices realised at Mombasa auction and transport costs. In this respect RSTGA are party to information on value added and margins in the tea supply chain.

RSTGA is also participating in the Fairtrade[®] scheme, whereby approximately 5-6% of the tea produced by WTC is marketed through the Fairtrade[®] marketing channel that guarantees premium price above the average auction price in Mombassa auction (the main marketing outlet for Tanzanian tea). This is achieved by paying a minimum price which is based on the current market (auction) price which is topped up by a

premium of € 0.5. Fairtrade marketing systems bypasses middlemen in the tea value chain, and strives to buy directly from the participating factories.

According to the interviewed representative smallholder farmers in Rungwe, the RSTGA role in mobilising smallholders to participate in tea production is well recognised, but some farmers feel that the charges being deducted from the tea price for funding RSTGA operations further increases burden on the smallholder tea sector in the district, which already faces other deductions such as WTC shares and farm input loans. Farmers said they needed to know the benefits they will gain by having shares in the WTC. In the absence of this knowledge, farmers tend to compare the price received for their greenleaf to what other smallholders elsewhere get for the same kilogram of greenleaf delivered to the factory rather than total income including dividend. In long run, if the factory is competitive and realises profit, farmers in Rungwe will be potentially better off as they will be able to earn part of that profit as dividends.

A review of prices across the two smallholder's case study areas of Mufindi (MTC) and Rungwe (WTC) showed that for a kilo of greenleaf delivered at the collection point, the price is 100TZS and 96TZS for Mufindi and Rungwe respectively. But deductions lead to farmers receiving only 80 and 64 TZS for Mufindi and Rungwe respectively. This means farmers in Rungwe receive almost 16TZS less than what their counterparts in Mufindi receive, though Rungwe farmers have a chance of earning more if the company makes a profit. The variation in prices between Mufindi and Rungwe can be attributed to lower field costs in Mufindi which allow greenleaf to be delivered to the factory at relatively lower cost. It is therefore crucial for RSTGA to demonstrate to farmers the justification for the extra charges deducted for the services offered to farmers. Farmers are likely to support their association if they see tangible benefits delivered to them at reasonable financial costs.

4.5.2. Mkonge Village Tea Block Farm (MVTBF)

Mkonge village is one of the few villages in Mufindi district where tea was planted in the individual family plots during establishment in 1970. In most of the other villages tea was planted in communal tea fields known in Swahili as *Shamba la Ujamaa*. With private individual ownership, Mkonge farmers were faced with organisational challenges as well as lack of forum to discuss jointly their welfare as tea growers. This prompted the establishment of the Mkonge Village Tea Block Farm (MVTBF), a tea farmers cooperative in 1971. All smallholder tea growers in the village and some growers from nearby villages are automatically members provided they sell their greenleaf through the appointed collection centres based within the village and on neighbouring farms around the village.

At the time of the interview in 2003, there were 387 members including 102 women. According to the chairman of MVTBF, (Nyunza, 2003), the rapid expansion on the smallholders tea sector in Mufindi may lead to further increase in the number of members as land is available for expansion and within the village; a tea nursery capable of propagating over 600,000 plants per annum has been established. The initial objectives of the MVTBF according to the Chairman were;

- To coordinate collection and consolidation of the greenleaf delivered by farmers to the collection centres,
- Facilitate liaison with the tea processing factory MTC for the marketing of greenleaf,
- Compile records of monthly greenleaf deliveries by individual farmers and facilitate subsequent payment by the company,

Over the years the role of MVTBF has expanded in scope in line with the expanding scale of business with MTC. Most of the field operations which were previously done by MTC staff are now performed by members of the MVTBF team, including;

- pre-weighing and quality adherence inspection of the greenleaf,

- follow-up on the recommended husbandry of tea fields (done by executive committee members) who have been given mandate to fine farmers who neglect their fields,
- providing guarantee on behalf of farmers in the village who require loans from commercial banks and Saving and Credit Cooperative Societies (SACCOS),
- acting as the sole guarantor for farmers' input loans provided by MTC. The association undertakes to provide hired labour to harvest tea to avoid loan defaulters where farmers themselves are unable to complete the harvest,
- dealing with disputes related to tea sector, ownership and inheritance, border disputes and disagreement between farmers and greenleaf weighing clerks when bad quality leaf is rejected.
- organising farmers into self help projects especially related to maintenance of feeder roads and other tea related infrastructure such as tea shades in the collection centres.

The leadership structure is relatively lean compared with RSTGA comprising the executive Chairman, the General Secretary and the Accountant. Occasionally the members of the executive committee assist these leaders. Regular meeting are held by the members of the executive committee to decide on issues related to the development of the tea sector in the village. Unlike the bigger district scale organisations such as RSTGA, MVTBF because of its smaller size, appear to be flexible as leaders are able to meet and make decisions even at short notice depending on the issues to be discussed. This flexibility has helped the organisation to respond relatively quickly to the farmers' needs.

The MVTBF has forged cohesion amongst smallholder tea growers in Mkonge. Some farmers in Mkonge have refused to join the umbrella district level organisation CHAWACHAMU in favour of the village based organisation. The association also has managed in collaboration with MTC to institute a very efficient greenleaf collection system whereby farmers themselves mostly provide quality control as they

seek to avoid penalties imposed if the greenleaf fails quality checks at the factory gate. The association also has helped to sensitise its members on the importance of use of recommended farm inputs and, as a result, the average yield at 1,200 kg MTha⁻¹ is one of the highest in the Tanzanian smallholder tea sector. The MVTBF has negotiated settlement for a number of disputes amongst individual farmers as well as those between farmers and the tea processing company, especially concerning the rejection of greenleaf from outgrowers by the factory. The role of the MVTBF underlines the importance of community assets such as social capital, as well as human capital in sustaining the smallholder based production system such as the tea sector.

The MVTBF is a classical case of how the smallholders can influence their own destiny through joint effort while dealing with stronger business partners in the tea supply chain (tea processing company) for a profitable tea production. The existence of MVTBF helps MTC to minimise field costs in buying greenleaf as overhead costs are avoided and this increases margins which allows payment of higher prices to farmers for their greenleaf. On the other hand, the two cases of tea farmer organisations discussed above show how the institutional setting can influence the performance of the smallholder tea industry through the way the respective farmer's organisations mobilise farmers to link up with other players in the tea value chain.

The situations in Mufindi and Rungwe highlight the importance of social capital and a collective approach for smallholders when dealing with profit oriented private companies such as the MTC. These organisations, if well integrated such as the case in Mkonge, can also be the source of cost saving and hence higher prices for the smallholders. In a way, the presence of the farmer organisations can help to minimise risk for the company as it allows farmers to handle all activities in the primary stages of the local tea value chain. The roles of the village based farmers organisation helps to clarify the link between the asset-based model of sustainable livelihood and the value chain assessment in the Tanzanian smallholder tea production systems. Tea farmer organisation is part of the social capital base owned by respective member households, which in turn influences the performance of the respective tea value chain as demonstrated above.

4.6. Interviews with Policy Makers and Regulatory Institutions

The wider reforms introduced in Tanzania during the 1990's signalled the emergence of the private sector as the driving force for the national economy. Since then the role of the government has mainly been confined to regulation and inspection to ensure that players in the specific economic sector operate within the stipulated policy and laws governing that particular sector. Apart from the Ministry of Agriculture and Food Security itself, the Tanzanian agricultural sector is regulated by the statutory commodity crop Boards incorporating representatives from wider spectrum of stakeholders.

In this section the views of the officials involved in policy setting institutions for the Tanzanian agricultural sector pertaining to sustainability issues for tea are presented. The focus of the interviews was on analysing the prevailing policies as well as mechanisms used to set agricultural policies that guide the functioning of the Tanzanian smallholder tea sector. The MoAFS and the Tea Board of Tanzania (TBT) are covered in this section because of the direct involvement of these two institutions in guiding and regulating the functioning of the tea industry.

4.6.1. Ministry of Agriculture and Food Security (MoAFS)

MoAFS is responsible for all matter pertaining to agricultural development in Tanzania. The broader mission of the MoAFS is to formulate policies, and provide sound regulatory frameworks and support services to farmers and the private sector in order to facilitate sustainable growth of the agricultural industry and poverty reduction. Generally the role of the MoAFS remains regulatory and supervisory. The MoAFS holds a vital role on the development of the Tanzanian tea industry especially on advising the government to rationalise taxation and other fiscal policies that affect the international competitive advantage of the tea sector.

It is important that the MoAFS remains impartial and neutral in order to regulate the functioning of the Tanzanian tea sector for the benefits of all stakeholders. Unlike other industries, the Tanzanian tea sector is highly influenced by cross border

competition with rival producers from rest of the East Africa, particularly as they sell at the same outlet (Mombasa Tea Auction). Currently local taxation and fiscal policies are not reviewed constantly to match with regimes in other countries. This creates disadvantageous fiscal environment for Tanzanian local companies as they lose out from rivals operating in a favourable commercial environment. Higher taxes and cost structures for the Tanzanian tea processing companies potentially lead to lower greenleaf prices for smallholder farmers and this eventually affects their income from tea production.

4.6.2. The Tea Board of Tanzania (TBT)

According to the Tea Act of 1997, the TBT is responsible for regulating tea cultivation and processing, licensing tea blenders and packers, licensing and controlling tea exports and imports, collecting statistics on the tea industry, and representing the Government in international tea forums.

Although the Government policies emphasise the need for the government to move away from the commercial activities in favour of entrusting these roles to the private sector, there are clauses in the tea act of 1997 which give powers for the Minister to allow TBT to carry out commercial activities. In section 5 of the Tea act, item number 3 states that “provided always the Tea Board may subject to prior approval in writing of the Minister, perform any commercial functions as the Minister may consider necessary”.

The involvement of the TBT in commercial activities may create conflicting interest on the part of the government as the credibility of the Board may be compromised. The concern is when the commercial activity undertaken by TBT happens also to affect the interest of the other stakeholders who are supposed to be regulated by the ministry. As was the case with the MoAFS, the TBT is still wielding significant power to intervene in the functioning of the market forces in the Tanzanian tea industry. Baffes (2003) quotes article 29 of the tea regulations of 1999 which states that; “the Board shall, in issues relating to quality in respect of domestic and export market, be the supervisor and final arbitrator”. An example of power wielded by the

Board which has enabled it to impose import restrictions for made tea in the expense of local consumers who might have benefited from lower consumer prices as a result of the anticipated competition. These examples show that, although the Tanzanian tea industry is a private sector led industry, the involvement of private sector stakeholders in the policy setting mechanism is not adequate and the existing structures do not provide for effective contribution of the private sector in defining policies that affect their investments, livelihoods and business opportunities.

A good example of how these discretionary powers can be misdirected can be cited where three members of the parliament from non-tea growing areas constituents were appointed to the board occupying slots meant for smallholder tea farmers and other industry representatives for what appeared to be politically motivated appointments. This denied smallholder farmers their legal representation on the policy setting institution that guide the performance of the industry. For the private sector led industries like the Tanzanian tea sector, it is important that the views of various stakeholders including Tanzanian tea consumers be taken into consideration while formulating the guiding policies. Lack of such representation limits the effectiveness of the Tea Board on perceiving and responding to issues facing various stakeholders in the industry.

4.7. Interview with the Representative Smallholder Farmers

Smallholder farmers are the most important group of stakeholders as far as this study is concerned. Two broad categories of tea growers were interviewed; the typical smallholders with an average farm size of 0.5 ha for both Mufindi and Rungwe district tea growing areas, and in Mufindi district, a unique category of growers that can be considered as medium scale growers on holdings of 15–50 ha. During the interviews, both the stocks of assets and flows of services in the tea-growing households were discussed. The interviews provided descriptive information on farming systems, outlining the constraints and opportunities facing tea production. The main objectives of the farmer interviews were to confirm the relevance of the asset based model of sustainability in agriculture and the value chain frameworks.

In order to draw relevant comparisons across different production systems in the study area, information representing four distinct groups of farmers is discussed. The groups include; (1) the typical smallholder growers (Mufindi), (2) the typical smallholders (Rungwe), (3) the medium scale growers (Mufindi) and (4) Non-tea smallholder farmers in both Mufindi and Rungwe District. The inclusion of the non-tea farmers allowed comparison between tea and non-tea producing households, focusing on the role of tea in the livelihoods at the household and community scale within the selected study area.

4.7.1. The Smallholder Tea Growers (Mufindi District)

The smallholder tea growers in Mufindi have a unique background which distinguishes them from other smallholder tea farmers elsewhere in Tanzania. They started tea production without a dedicated smallholder tea factory. They have always sold their greenleaf to factories owned by private multinational companies. The advantage for Mufindi smallholder growers is their long experience of working with the private sector, which has given them a unique discipline and business acumen compared to most of their colleagues elsewhere. However, this partnership has not always been smooth especially when some of the processing factories regarded smallholder crop as supplementary raw material.

Initially, there was indiscriminate rejection of the smallholder outgrowers' greenleaf especially during the peak production season when the factories were filled to capacity by crop from factories' own estates. However, since the mid 1990s the attitude of the estates and the processing factories has changed. The factories started to regard outgrowers as business partners. The climax of this upturn in the smallholder tea sector in Mufindi district was the decision by MTC to invest on the construction of a separate processing line in their Itona factory dedicated to smallholder outgrowers.

The long term partnership between smallholders and the estates sector in Mufindi has lead to the creation of a stable dialogue and mechanisms to facilitate smooth procurement of greenleaf from farmers and, in return, prompt payments from the

factories. This is a very important basic requirement for a successful outgrowers programme. Other services, which are accessible to smallholders in Mufindi include;

- Farm inputs (fertiliser and herbicides) for tea production. This is provided by MTC on credit, which is deducted from the sale of greenleaf by each individual farmer. In order to discourage farmers from diverting the fertiliser on other crops, MTC also provides credit for fertiliser used by farmers for other crops,
- Extension services which are provided by TRIT in collaboration with the DALDO office Mufindi. The factory also has employed a dedicated manager who coordinates the smallholder outgrowers operations,
- Greenleaf transportation is also organised by the factory using contactors, usually there is dialogue between farmers and the factory regarding the number of trips required for a greenleaf truck depending on the volume of the crop harvested on that particular day. The harvesting timetable is discussed and agreed between the factory and the farmers. This involvement of various players in a process of production, collection, transportation to the factory and processing outlines some key stages of the tea value chain which is reported later.

Except for Mkonge village, most of the tea farms in Mufindi district were established in communal farms. These farms were the property of the villages under the *ujamaa* policies pursued by Tanzania during the 1970's and early 1980's. These farms failed to operate effectively just as did other communal based investments elsewhere in Tanzania and most of them were temporarily abandoned. However, following the recent upturn in the Tanzanian tea industry, private farmers have taken over the ownership and the running of these farms. In areas where these large blocks of farms existed, smaller plots have been demarcated with an average size of 0.2 -0.5 ha and distributed to farmers.

In Mkonge village where the farms were established on a private ownership basis, the average farm size used to be 1 ha. However, over time, the average farm sizes have declined as new generations of younger farmers inherited fragmented plots from their

parents. Both communal farms and fragmented private farms have led to overall smaller farm sizes in Mufindi district, despite of having relatively ample land available.

However, in recent years following campaigns by TRIT through a smallholder nursery programme, more new farmers have joined tea production. The attitude of young men in tea villages has changed from looking at their parents' farm as their only entrance to tea production, to establishing their own new tea farm from vacant land. This has been partly attributed to limited job opportunities in the nearby tea estates. The impact of these changes is slowly being perceived by MTC where the share of the outgrowers crop have risen from 12-15% of the total greenleaf during the late 1990's to about 24% during 2003/04 production season. This proportion is set to increase as more newly planted fields mature and attain full production potential.

According to the interviewed smallholder farmers in Mufindi, six critical factors influence the profitability the tea production system.

- **The price of the greenleaf** paid to farmers, which along with yield determines the income farmers earn from tea production,
- **Greenleaf Yield** obtained from farmers fields, which along with price determines the total income farmers earn from tea production,
- **Access to farm inputs on credit**, this determines yield of the tea farms which along with price eventually influences the level of revenue that farmers receive from tea production,
- **Access to support services**; such as research and extension, which contributes to better management practices that result in increased yield and hence profit from tea production,
- **Labour availability** is crucial to sustainable tea production systems. Tea is a high labour demand crop that relies on manual harvesting and as more people are joining tea production in Mufindi district (where the negative impact of HIV

aids has eroded significant portion of the work force), the question of labour availability is emerging as a serious sustainability challenge for the smallholders tea industry in Mufindi,

- **Access to a reliable green leaf market**, this is a pre-requisite for a sustainable smallholder's tea sector. Farmers need the assurance of their long term access to the processing factory which pay satisfactory price at convenient time.

The six factors in a way influence the livelihood of the tea growing households as they determine the stock of household assets and flows of services through tea production. Tea appears to be an important source of livelihood for the tea growing households, accounting for between 55-70% of the total household income from the interviewed households. Other alternative sources of income include sales of agricultural products from other crops, farm labour, livestock products and forest products.

Evidence from the interviewed households showed that tea income contributed significantly to acquiring assets such as residential houses, buying more land and meeting key expenditures such as supporting children's education, household food needs, health care and procurement of farm inputs. The example of the typical smallholder tea grower in Mufindi presented in Box 1 below describes the key assets owned and accessed by the smallholder tea farmers in Mufindi, the constraints faced by them and their future ambitions.

BOX 1: Profile of a typical Smallholder Grower in Mkonge Village Mufindi

Kamwene (Not a real name) belongs to a generation of older tea farmers who established his tea garden when the crop was introduced to smallholders for first time in Mufindi district in 1972. Kamwene was 37 years old when he started growing tea. At 68 he has now over 32 years experience in tea growing. Kamwene recalls that villagers interested in growing tea were allocated approximately 1hectare of land. Currently the only way to get land for tea cultivation in prime areas (closer to the collection centre) is through buying an already established tea

farm. This is very difficult as currently farmers seldom sell their farms as most farmers treasure highly their tea plots.



Plate 4.3: Smallholder tea gardens in Mkonge village

Kamwene acknowledges that, his ability to cope with tea production is strongly influenced by the stocks of household assets he owns and flows of services he can access.

In terms of natural capital/assets Kamwene owns 3.75ha which he uses for growing tea (2.5ha), food crops (0.7ha), forestry (0.5ha) and residential purposes (0.25ha). Kamwene feels lucky to have such big land area in an accessible area, as the young new tea farmers are forced to seek land further away from the collection points.

Kamwene has a large family of 22 members consisting of four adults and 15 children. Out of the 22 members, five are available for farm work. For households that rely on family labour, number of members is a key aspect of household human capital base. Apart from household members, Kamwene employs between 7 and 20 pluckers at different times during the year.

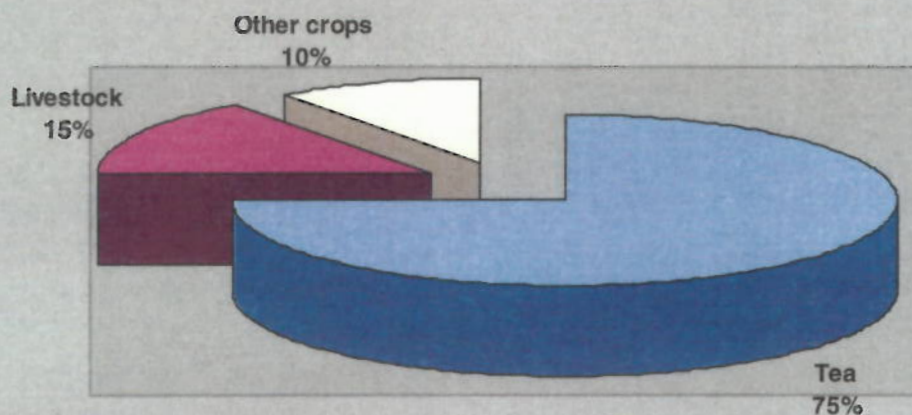


Figure 4.2: Proportionate main land use categories for Kamwenes' household (%)

Tea contributes to 75% of household income; hence it is a critical component of Kamwene's financial capital. Tea also provides Kamwene with an informal guarantee which allows him to access short and medium term loans from local sources such as the Savings and Credit Society (SACCOS). Such access widens Kamwene's financial base as he is able to cope with most of the farming operations using income from tea as well as additional resources obtained from borrowing. This flexibility is not possible for households without a productive tea farm.

Kamwene's tea yield levels are above average with 1,532 kg MTha⁻¹ per annum as the highest yield (2002/03 season). The biggest proportion of this yield is obtained during the four wet months of December through to March. This yield distribution pattern reflects also Kamwene's tea income pattern as he is paid on a monthly basis.

Kamwene enjoys other social and economic privileges available to the tea-growing households some associated with the status of being "the employer". A class of non-tea grower in the village respects and trusts Kamwene because he is connected with them through tea production process. Over time, Kamwene and other fellow tea growers have been able to offer "employment" to pluckers and pay promptly at the end of the month. This has created a trustful bond between them, and for a farmer of Kamwene's calibre who is an important employer in the village the social status grows as the number of pluckers he employs increases.

Although primary education is free in Tanzania, the secondary level involves paying school fees and other upkeep costs. Kamwene is currently supporting two of his children in a secondary school using the income from tea. He is also aware that some of the non tea households are unable to send their children to secondary schools.

Tea growing also gives Kamwene's household, access to wider choice of food needs such as meat, chicken and eggs. In a poor society where food constitute of 65% of the household expenditure (NBS, 2002), the type of food eaten by a particular household gives an indication of the relative wealth status of that particular household compared to others.

It's common in Mkonge village to find a poster with the following Swahili words "Nyama ya nguruwe iliyonona inapatikana hapa, bei kilo moja ni shs.800. wenye chai wanaruhusiwa kukopa" This translates in English as "Fine pork meat is available here, for 800 Tanzanian shillings per kilo. Tea farmers are allowed to buy on credit". This is a typical case where trust has been built in the society that the tea farmers like Kamwene are perceived to have a reliable source of income and hence can be given credit without the risk of defaulting.



PLATE 4.4: Iron roofed buildings in rural areas indicate a wealthy household

The quality of residential houses is another distinguishing feature of tea farmers. Kamwene's household consists of three buildings, all with iron sheet rooves (the most prestigious in rural areas), brick walls and cement floor. Inferior houses have a grass thatched roof, mud plastered walls, and earth floor. Though some of these attributes may seem modest by international standards, for the poor rural societies in Tanzania they represent significant difference between endowed households and poor households.

Kamwene fears that the rising costs of farm inputs (especially fertilisers) and labour charges will reduce the margins from tea production. He is concerned that whenever the greenleaf price is increased, it triggers a corresponding increase in labour charges as pluckers demand higher pay which eventually reduces the net income he

earns from his farm.

Another concern comes from the fact that, tea is one of the highest labour demanding crops compared to other perennial field crops. The biggest proportion of the labour requirement (55%) goes to harvesting work. For Kamwene and his family who does not rely entirely on family labour there is less problem. But for other growers who rely on family labour, involvement in tea production limits the effective participation of the family members in other productive activities and social obligations.

In future Kamwene aims to improve tea yield from 1,500-2,000 kg MT ha⁻¹ by increasing the use of fertiliser to recommended levels. He is also exploring the use of hand held mechanical harvesting tools to reduce dependency on hired labour and hence harvesting costs.

4.7.2. The Smallholder Tea Growers (Rungwe District)

Ten representative smallholder farmers (**Appendix 7**) were interviewed, to get their views on opportunities and constraints in the smallholder tea sector in the district. Rungwe district has the largest number of smallholder tea growers in Tanzania. A recent inventory by the TRIT extension services unit in Rungwe estimated the number of smallholders to be 14,000 owning over 3,640 ha of tea farms. Unlike other tea growing areas in Tanzania, farming systems in Rungwe are characterised by intensive cultivation with wide variety of field crops. Tea competes with banana and coffee as the main cash crop. This competition is attributed to presence of fertile volcanic soils and adequate and well distributed rainfall. With 123 people per square kilometre, Rungwe district is one of the densely populated districts in Tanzania compared with a country average of 39 people per square kilometre, this creates pressure on agricultural land.

The smallholder tea sector in Rungwe was established by the TTA just like anywhere else in Tanzania. During the establishment phase, TTA supplied planting materials and technical backup for the willing farmers. According the interviewed farmers, a lot

of farmers were reluctant to take on tea production despite TTA offering planting materials and technical backup, mainly this was because they felt committing their scarce land to a perennial crop whose economic benefit was feared to be too risky. Presence of competitor cash crops such as coffee and banana also caused initial difficulty in establishing tea.

In some parts of the district, farms were established in communal *ujamaa* farms and it was the demonstration effects of these farms that encouraged other private smallholder growers to take on tea as their main cash crop. One of the critical challenges facing the tea sector in areas with land shortages like Rungwe will be to ensure that tea remains competitive against other crops. For such a globally traded commodity, this challenge is heightened as the farm gate prices depends also on the final market prices for made tea at the auctions.

The average tea farm size in Rungwe is about 0.8 ha, and most families rely on family labour for tea operations. The exception is for households owning larger farms (usually more than 1ha) or those households with fewer family members. Land is a very critical household asset for the smallholder tea sector in Rungwe. Tea production is only possible to those with access to land.

Despite competition for land there is however a significant interdependence among various crop enterprises within the same household. A group of interviewed farmers in Igalamu village mentioned that most of the banana-coffee plots are located closer to the residential areas with average size of 0.2 ha. The household can potentially earn up to 25,000TZS from banana plots of such size. The marketing channels for banana are well established and most of the buyers tend to buy on site. When asked to compare between tea and bananas, most farmers mentioned that both crops are desirable for different reasons. Tea guarantees constant income to the household as the harvesting is well distributed throughout the year. However, farmers mentioned that tea is a labour intensive crop and it creates stress on families involved as they need to work on the farm throughout the year.

However, despite its advantage of low labour needs, banana farming demands more farm inputs for crop protection (*black sigatoka* disease), fertiliser (CAN) and

farmyard manure (for those keeping livestock). The interviewed farmers mentioned that income from tea is often used to support banana production, as the WTC input credit system covers only tea. The synergy between tea and other cash crops in Rungwe gives tea growing households a comparative advantage over non-tea households due to the stabilising role of tea income in the household. Involvement in tea growing guarantees the household access to farm inputs on credit from WTC. This is critical for the tea sector as most interviewed farmers mentioned that it is difficult to save money from discrete tea income for the purchase of farm inputs for tea.

The nature of tea income that flows regularly throughout the year creates a very important cushion for livelihood of the families. Tea supports procurement of inputs for other cash crops like banana and coffee which in turn generates a flow of incomes that households often use to buy relatively expensive physical assets that may be difficult to get from tea income alone. Most of the interviewed smallholders, when asked which crop they will plant if given new land, said they preferred banana over tea because banana has multiple utility as a food as well as a cash crop. Banana demands less labour than tea, and finally bananas have shorter period from planting to first harvest compared to tea.

The synergy between tea and other crops highlights the importance of credit to support procurement of input for tea, which farmers cannot manage due to spread out tea cash flows. Competition also highlights the higher labour requirements in tea as a serious constraint especially for households that rely on family labour, but in some ways the higher labour requirement in tea provides an opportunity for engaging people into tea production, an aspect which facilitates the distribution of potential benefits in return for work including hired labour.

Box 2: A typical smallholder tea grower in Rungwe district

Tupokigwe Kasege (52) (Not a real name) heads the household following the death of her husband. Despite her advanced age Tupokigwe works in the farm together with other members of the household. There are seven household members. Four of them are adults who usually work with Tupokigwe on the tea farm. Tupokigwe inherited almost all the household assets from her late husband. Household assets determine the way Tupokigwe copes with tea production and other livelihood activities within the household.

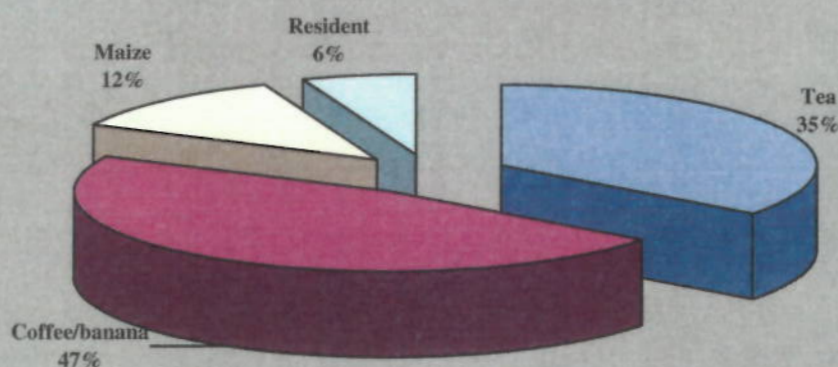


Figure 4.3: Proportionate main land use categories for Tupokigwe's household (%)

In terms of natural capital Tupokigwe's holding is 1.7 ha which she uses for crop production as well as residential purposes as shown in Figure 4.3. The land is held on permanent lease holdings 1.3ha was previously inherited by the late husband. The family expanded the farm after buying a further 0.4ha.

Regarding the financial capital, Tupokigwe sees income from tea as similar to any wage-paying job in the family due to its even distribution throughout the year. Tupokigwe achieves an average annual yield of 4,335 kg GL ha⁻¹ which is lower than the average for Rungwe district. Tupokigwe attributes this to low use of inputs as well as labour inadequacy. Her decision not to use hired labour means she is unable to cope during peak production season. This leads to poor harvesting as potential crop is lost. Tupokigwe recognises the loss but she feels that engaging pluckers will lead to even more reduction on her income from tea as costs for hired labour are high.

Though Tupokigwe considers tea as her main source of income, there are other cash crops, which also contribute to household income. Banana, with spread out harvesting pattern like tea is Tupokigwe's favourite crop due to low labour requirements and a very reliable market. Banana also provides staple food straight for the family, unlike tea and coffee which are grown for their commercial value. Coffee, another important source of family income has lost ground due to declining prices and a chaotic marketing system. Tupokigwe thinks that tea contributes to about 55% of the household income.

Farm labour (Human Capital): In normal circumstances, the four members of the household do the entire work on the tea farm without the need for hiring labour. The family employs hired labour only when any of the four members is absent due to sickness or is committed to other responsibilities outside the village. However the household employs hired labour for all maize cultivation, though the wages are usually derived from tea income. Income from tea is used to support domestic expenditure on a daily basis creating flexibility for Tupokigwe's family to manoeuvre with other sources of income.



PLATE 4.5: Harvesting tea using family labour in a smallholder tea farm Rungwe

Assets such as buildings, purchases of land and farm equipments are only possible with money coming from single payment sources like coffee sales. Income from tea is used to purchase variable farm inputs such as fertiliser, herbicides and fungicides for other cash crops.



PLATE 4.6: The quality of farm structures(manmade capital)indicate the extent of accumulation of household assets

Tupokigwe faces a number of constraints on her tea farm. Four people available in this household still struggle to cope with farming operations on the 1.7 ha of land. Even where cash is available for hiring labour, often it is difficult to get right people to do the job. Tupokigwe laments about the proportion of deductions made from greenleaf prices which she feels reduces her potential revenue from tea production. In response to that she has opted to reduce the amount of fertiliser below the recommended rates by extension services as she feels she cannot afford the full amount.

Tupokigwe intends to maintain the size of the tea farm while looking at possibilities of improving productivity. She is optimistic that if the price for greenleaf improves and some deductions are removed, she can increase the rate of input use and this will eventually lead to higher yields. A productive farm will allow her to afford hiring farm labour so that she can free her time for other activities away from the tea farm. Judging from the labour requirements in the tea production, Tupokigwes' plans appear to be less realistic as when she engages hired labourers, she still needs to supervise them hence her presence in the farm.

4.7.3. Medium Scale Growers (Mufindi)

Four representative farmers were interviewed to get their views on the constraints and opportunities facing the medium scale growers. The medium scale growers are mostly concentrated within Mufindi district. They consist of farmers with more than 10 ha of tea. Originally the more accomplished medium scale growers inherited or bought their farms from the settlers of European origin who established these farms during the colonial era. Entrepreneurs who purchased land and started their own new farms are also included in this category. These entrepreneurs are somehow connected to the existing nearby estates sector, either being former employees of some of an estates company or benefiting through businesses that earn tea income.

Medium scale growers are much more endowed with physical and financial assets dedicated to tea production compared with the typical smallholder growers. Physical assets include farm buildings used to accommodate farm labour, vehicles for ferrying greenleaf to the factory, farm machinery such as tractors and equipment, and a large acreage of land which gives them more possibilities of expanding their current tea farms. According to the Tanzania National Household Budget Survey; (NBS, 2002), only 0.2% of the households in rural areas in Tanzania own a tractor. This underlines the fact that the medium scale tea growers are among the elite. A representative profile of the medium scale farm in Mufindi is presented in Box 3.

BOX 3: MAKABILA TEA FARM (A medium Scale holding in Mufindi)

The farm owned by Mnyalukolo (not a real name) and with a total area of 350 ha can be regarded at an upper end of the medium scale tea holding by Tanzanian standards. There is abundant supply of water running on a small river adjacent to the tea fields. This makes the prospect of small scale irrigation very attractive and technically feasible. Mnyalukolo is already making enquiries at TRIT and UTTL (the company that buys his green leaves) on the cost and technical feasibility of starting irrigating his tea during drier months of the year. Mnyalukolo owns larger stocks of assets within the Makabila Tea Farm compared to the average smallholder tea holdings as follows.

Natural capital: This includes a 350 ha allocated for tea fields (146ha), forestry (95 ha), fallow (82 ha), annual crops (15 ha) and residential purposes (12 ha). The area has fertile soils and abundant water supply and Mnyalukolo appreciates the fact that he has access to valuable natural capital base.

Physical Capital: The scale of production has necessitated Mnyalukolo to invest in infrastructure development on his farm. Physical assets to facilitate operations in the farm include three staff quarters for accommodating the permanent staff (farm manager, the assistant and one house used by the owner). Other farm structures include office building and a storage facility. There are also labour camps which constitute modest houses for accommodating the general labourers. A small truck with capacity for 3.5 tons is used to ferry greenleaf to the factory located over 20 km away. Mnyalukolo also owns a tractor with complete set of implements such as plough, water tanker, mobile water pump, and a trailer. During peak tea production season, the tractor is also used to ferry greenleaf within the farm from areas with difficult terrain to the main collection shed where the truck can easily reach.

Human Capital: During the peak production the Mnyalukolo employs 200-250 workers mostly pluckers. The number drops to just 20-30 workers during the dry and cold months of June, July and August. There is occasional labour shortage during the peak production as some pluckers prefer to work in the estates where they get free access to medical treatment and day care services for their children. Mnyalukolo is contemplating allowing regular workers to use part of the land to grow annual crop with a condition that in return they work on the tea field.

In order to increase labour efficiency in the farm the entire workforce is organised into working gangs each responsible for a specific task in the tea farm. Each gang is supervised by one of the more regular and experienced pluckers. The permanent staff employed by Mnyalukolo have been trained in farm management, complemented by extended placement in one of the UTTL estates. Mnyalukolo gets technical support from TRIT and also UTTL on a need basis.



PLATE 4.7: Shortage of hired pluckers can occurs during peak production period

Financial Capital: Mnyalukolo is entirely dependent on his tea farm and his livelihood revolves around tea business. The farm produces an average of 624,150 kg GL per Annum which brings the total revenue of approximately 62,415,000 TZS. The major cost components include farm inputs, such as inorganic Fertiliser (1,000 bags per annum), herbicides (40 l per annum), planting materials (15,000 plants), farm tools (Lump sum 150,000TZS per annum), water supply (20,000 TZS per month), hired labour for at least five months (200 – 250 people), vehicle running costs (1,200 TZS per km), greenleaf transportation (7,000 kg per trip).



PLATE 4.8: Visitors from various sections of the tea industry visiting Makabila farm

There are social capital issues that bring together Mnyalukolo with fellow medium scale growers. Lobbying for better prices, information sharing on production techniques, choice of clones and other tea husbandry practices are some of the issues that bring together tea farmers. Despite that his farm appears to attain self sufficiency in terms of working facility and farming operations, Mnyalukolo maintains linkages with fellow smallholder growers. He is an active member of a district level tea farmers' organisation. Mnyalukolo believes that in the absence of their own processing factory smallholder outgrowers will always need to collaborate especially for bargaining for improved greenleaf prices.

According to Mnyalukolo, some of the pressing constraints include the following:

- *Farm labour shortages especially during peak production season (December, January, February & March),*
- *Inconsistencies in the quality standard set by factories especially during peak production season lead to confusion and misunderstanding as the farm is left uncertain on how to enforce plucking standards,*
- *The larger scale requires mechanisation that has potential for reducing cost for farm labour, but Mnyalukolo is unable to afford the initial cost for most of the farm machinery,*
- *Higher overhead costs for the farm attributed to maintenance of feeder roads within the farm, which reduces profit margins.*

Mnyalukolo is planning to expand his tea area at annual rate of 10 ha for a period of 10 years. Subject to expanding the farm to at least 200 ha, he is exploring the possibility of acquiring a small sized processing factory that will enable him to process the greenleaf on farm including the possibility to absorb greenleaf from smallholders in the surrounding areas. Another plan is to install irrigation system, which will increase yields.

The scale of the farm operations within the medium scale growers has necessitated adoption of management practices which are common in the larger tea estates. Permanent farm staff are employed to supervise the casual labourers who are employed on a needs basis depending on the demand created by various farm

operations. According to the majority of the interviewed medium scale growers, the biggest challenge facing them is the rising cost of farm labour, which threatens the profitability of tea farming.

Wages for the hired farm labour is the biggest single operational cost for the medium scale growers. Being near the UTTL and MTC tea estates medium scale farmers face stiff competition for labour. Some pluckers prefer to work for bigger companies as this gives them access to health care and other social amenities, which are well developed by tea-growing companies. On the other hand, the medium scale farmers cannot afford to provide social infrastructure and instead sometimes they are forced to increase the wages above those paid by the estates in order to attract pluckers to work in their farms. This lowers margins and reduces profitability.

The medium scale farmers, unlike the smallholders, ferry their greenleaf to the respective processing factories using their own means of transport. Maintenance for these vehicles proves to be difficult and there is risk of crop loss when breakdown occurs. Even the bigger estates like UTTL and MTC, who can benefit from economies of scale, have found it cheaper and convenient to outsource transportation of greenleaf as opposed to maintaining their own fleet of greenleaf trucks.

Despite of these shortcomings six out of the eight interviewed farmers mentioned that there is considerable potential in the tea industry. Their current productivity level (at 2,136 kg MT ha⁻¹) is still way (39%) below the potential. In their view, correct use of farm inputs, management practices and use of suitable clones can increase productivity levels.

4.8. Chapter Summary

This chapter has described the situation under which the key stakeholders in the Tanzanian smallholder tea industry operate and their views regarding opportunities and constraints facing this sector. The chapter covered five key stakeholders who represent key relevant components necessary for the tea industry to function. They included smallholder farmers, processing factories, support services providers and

organisations responsible for regulating policy frameworks for guiding smooth operations of the industry.

The processing factories are viewing smallholder producers as business partners, especially as the factories are set to expand the volume of greenleaf smallholders. Support to help smallholders to efficiently produce greenleaf is being provided by the three factories involved in this study. Dialogue between the factories and smallholders is one of the key aspects identified during the interviews that influences trust between partners which in turn can make farmers confident to invest in tea production and also in turn for factories to commit to working with smallholders.

Research and extension are other factors that appear to contribute to the sustainability of the smallholder tea production systems as evidence shows that farmers who had received extension advice through formal training had higher productivity compared with those who had not received extension advices.

Tea farmers' organizations provide a crucial logistical coordination for smallholders who are large in numbers and scattered over a wide geographical area. This is a very critical function for the survival of smallholder tea production systems. Two different types of tea farmer organisation were described whereby both cases showed how smallholders can collectively act and take part in enhancing the performance of the Tanzanian tea value chains. Negotiating contracts with factories on behalf of the farmers, organising smooth collection of greenleaf, supervising distribution of inputs and disbursement of payments for the greenleaf are some of the key functions of these farmer organisations.

The policy setting institutions play a crucial role of setting an enabling environment for a profitable tea industry in Tanzania. Policies tend to affect the performance of all players along the tea value chain that eventually affect the performance of smallholder tea production systems. It is important therefore to have supportive policies that will provide a conducive environment for the industry to be profitable.

Fiscal policies need to be harmonised to give a level playing field for the local tea factories against neighbouring countries in the region that face the same tea market at

Mombasa auction. The private sector operators feels that the Ministry of Agriculture and Food Security holds excessive discretionary powers which limits their influence on matters relating to setting policies for the tea industry. It is important for the regulatory institutions to strive to accommodate the interests of all the stakeholders in order to develop effective policies for the industry.

Three categories of representative farmers were interviewed to gather their views on the sustainability of the smallholder tea industry. There is clear evidence of the upturn in the smallholder tea sector as demonstrated by rising yields, increasing number of farmers joining the tea industry, significant investment by the private sector in processing facilities, and overall increase on the proportion of smallholders crop in the tea processing factories. At farm level greenleaf prices, yield, access to input credit, access to research and extension support, availability of farm labour, and access to a reliable greenleaf markets were identified as critical factors that influence the livelihood of the tea growing households. There was evidence of the relationship between the stocks of household assets and flow of services with household performance in tea production for each of the three groups of interviewed smallholders.

The involvement of these stakeholders who represent a cross section of the Tanzanian tea value chain provided a general overview of the issues that are relevant at various scales and for various players. The chapter provided a guideline for choice of indicators to be used on the quantitative household survey to measure the stocks of household assets and flow of services within the Asset Based Model of Sustainability in Agriculture and the Value Chain Assessment.

CHAPTER 5: RESULTS OF THE QUANTITATIVE HOUSEHOLD SURVEY

5.1. Introduction

This chapter presents the results of household survey conducted in three case study areas located within two tea-growing districts of Tanzania. The survey covered smallholder tea growing households forming catchment areas supplying greenleaf to two tea-processing factories, namely: Mufindi Tea Company (MTC) based in Mufindi District and Wakulima Tea Company (WTC) based in Rungwe district. The third case study covered medium scale tea growers who primarily supply the tea processing factory of Unilever Tea Tanzania Limited (UTTL) based in Mufindi District. A sample of non-tea smallholder farmers was also included for isolating the effect of tea on the livelihood of farmers in Mufindi and Rungwe Districts. The survey explored the stocks of assets and flows of services for the sampled households using the asset based model of sustainable agriculture as described in Chapter 3.

The asset Based Model of sustainable agriculture comprises four key components as illustrated in Figure 5.1. The model assumes that the availability of and access to the five capitals is shaped by contextual factors such as agro-ecological, climatic, cultural, economic, legal, political and social which in turn are mediated by external institutions and policies. The contextual factors provide an entry point for shaping and influencing agricultural systems through policy intervention at different levels, market regulations and trade.

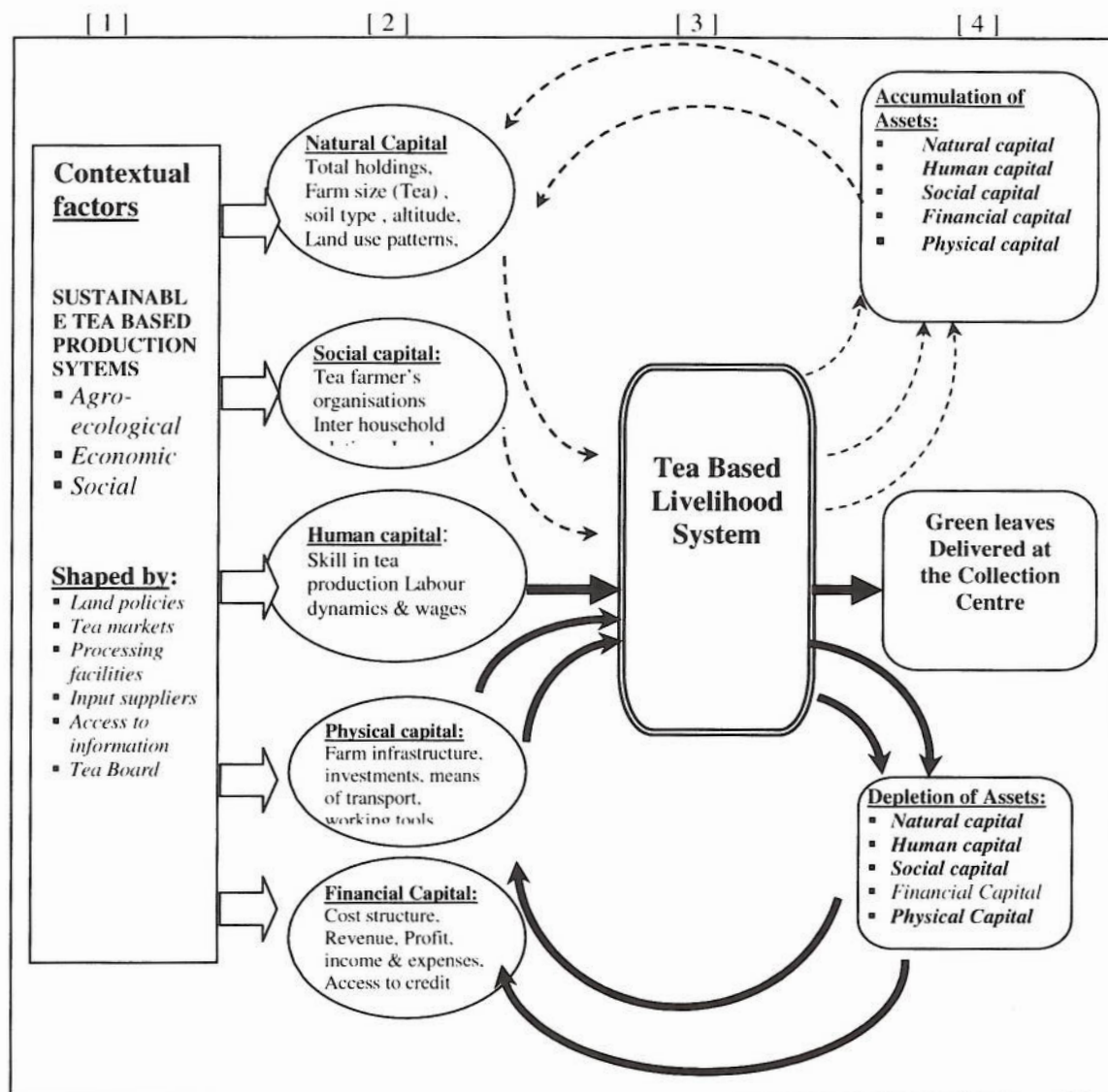


Figure 5.1: Asset based model of agricultural systems-flows and outcomes in the tea based livelihood systems how the external contextual factors[1] together with the stocks of assets[2] influences the livelihood system[3] resulting on the outcome[4]

5.2. Components of the Asset Based Model of Sustainability in Agriculture

5.2.1. The contextual factors

The contextual factors are the external factors that influence the performance of the livelihood system. This includes policies, markets, infrastructural and support services. In the context of the Tanzanian tea industry, these include the prevailing policies on the tea sector as stipulated in the Tanzanian Tea Act of 1996, land policies

(which may influence access and use by farmers), marketing channels for tea (determined by processing facilities), and input supply systems (influencing procurement costs and input use rate). The support institutions such as the Tea Board of Tanzania, Tea Research Institute of Tanzania and Tanzania Smallholders Tea Development Agency, all responsible for industry regulation and provision of support services, are also important contextual factors.

5.2.2. The Household assets/Capitals

The household assets /capitals comprises of stocks of household assets and flows of goods and services that from them that determine the ability and willingness of farmers to engage in any particular livelihood system. They include Natural, Physical, Human, Social and Financial capitals. According to Pretty (1999) economic systems at all levels (from individual households to national economies) rely for their success on the value of services flowing from the total stock of these five keys assets. In this chapter, the descriptive statistics depicting the stocks of household assets are presented including the relationship between these assets and key performance indicators in the sampled smallholder tea production systems.

5.2.3. The Tea Based Livelihood systems

The livelihood system describes the way the household deploys the assets at their disposal to generate a specific outcome or a range of livelihood outcomes. In the case of the Tanzanian tea industry, the livelihood system consists of the way tea growers use the stocks of household assets to produce greenleaf, which in turn is sold to the tea-processing factory to generate revenue for the households involved in the process.

5.2.4. The Livelihood outcomes

As tea is grown only for its commercial value, the main product of tea livelihood systems is the green leaves delivered at the collection centre. This is the first stage in

the tea local supply chain where tea acquires value as smallholders receive payment for the green leaves sold. The value of the green leaves will depend on many factors including the quality, price as well as volume produced per unit cost. However, during the process of earning livelihoods through tea production, there are also two possible outcomes, which are presented in this model as positive or negative feedback loops. The livelihood system is assumed sustainable if it leads to net accumulation of household assets and positive flow of services. Likewise, the system is adjudged unsustainable if it leads to net depletion of household assets through negative flow of services. Sustainability in the context of the smallholder's tea industry implies the ability of the household to acquire household assets through their participation in tea production. The model works in the framework of weak sustainability model, as it deals with economic activity that involve use of natural capital (land) to generate the stock of manmade assets and flow of goods and services.

5.3. The stocks of household assets and flows of goods and services

The quantitative data collected from the sampled tea-growing households (as described in Chapter 3) were analysed using SPSS/PC[®] software to obtain descriptive statistics on key sustainability indicators for each of the five household assets and flows produced by them. Statistical measures such as percentiles; means, standard error of the mean, and analysis of variance are some of the analytical outputs used

5.3.1. Comparison of stocks of assets and flows of services between tea and non tea farmers

Table 5.1 presents a summary of stocks of household assets for the selected indicators (categorised into the 5 capitals) for the three tea case study areas and non tea smallholder farmers.

Natural capital/assets:

Results in **Table 5.1**, show that tea farmers have larger holdings compared to non-tea households within the same case study areas. There is also significant difference in

average farm sizes for the smallholders in Mufindi and Rungwe (2.0 & 2.9ha) and medium scale growers (32.9ha) in Mufindi. Although there is association between the total holdings, and the tea farm, this does not necessarily mean this is a cause and effect relationship.

However, the households with bigger farms produce more compared to those with smaller holdings. It appears that, the limitation in stocks of household resources (like land) tends to limit the possibility of that particular household engaging in diverse farming activities including tea growing. Comparison of the average proportion of tea area over total holdings further supports this finding. On average, smallholders in Mufindi had significantly higher proportion of tea area over total holdings ($M=46\%$, $SE = 2.03$), than their counterparts in Rungwe ($M=31\%$, $SE = 11.5$). Both cases smallholders had smaller proportions of tea area over farm total holdings as compared to the medium scale growers ($M=56\%$, $SE = 2.9\%$) ($p<0.05$).

Table 5.1: Summary of selected indicators for household assets for the three case study areas

Type of assets/ capitals	Assets and related flow indicators	Case study areas							
		Smallholders (Ex-MTC) n=77		Smallholders (Ex-WTC) n=201		Medium growers (Ex-UTTIL) n=25		Smallholders (Non-tea) n=80	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE
Natural Capital	Total household land (ha)	2.0	(0.23)	2.9	(0.10)	32.9	(4.69)	1.2	(0.09)
	Size of the tea field (ha)	1.24	(0.09)	0.54	(0.25)	16.3	(1.41)	na	-
	Proportion of tea area (%)	46	(2.03)	31	(1.49)	56	(2.87)	na	-
Human Capital	Age of household head (Yrs)	44	(1.43)	53	(1.06)	41	(1.49)	39	(1.073)
	Members per household (N)	5.9	(0.29)	6.4	(0.23)	11.5	(0.69)	4.9	(0.264)
	Members working in the tea farm (N)	2.6	(0.14)	2.78	(0.08)	2.5	(0.24)	na	-
	Total farm labour (MD/ha)	227	(10.92)	189	(5.32)	314	(13.64)	140	(2.45)
	Experience in tea (years)	11	(0.53)	24	(0.84)	8	(0.5)	na	-
	Proportion formally trained (%)	55.8		50.5		82.6			
Physical Capital	Bought assets using tea income (%)	53.2	na	49.8	na	100	na	na	na
	Proportion owning means of transport	46.8	na	36.8	na	95.7	na	-	-
Social Capital	Members of farmers association (%)	81.8	na	100	na	79.1	na	na	-
	Living within 5 km of the tea estate (%)	75.4	na	27.4	na	65.2	na	na	-
Financial Capital	Total revenue (000' TZS/ha)	541.49	(49.21)	355.71	(37.54)	931.56	(32.82)	na	-
	Total average cost (000' TZS/ha)	392.03	(26.38)	221.06	(19.37)	442.89	(13.66)	na	-
	Credit value/household (000' TZS)	81.02	(11.72)	88.85	(17.21)	746.59	(165.52)	na	-
	Greenleaf price (TZS/kg GL)	100	(0.00)	96	(0.00)	125	(0.00)	na	-

The same trend is observed for the fertiliser application rate (measured in kilograms of nitrogen per hectare) whereby the medium scale growers use higher rates of fertiliser 125kg N ha^{-1} (which lies within the rates recommended by TRIT), compared to the two smallholders cases in Mufindi (65kgsNha^{-1}) and Rungwe (53kgs Nha^{-1}). For smallholders, the main source of variation in input use tends to be associated with resource constraints, which restrict their ability to purchase the required quantity of inputs. Although farmers in all the three case study areas have access to input credit facilities, still some farmers are reluctant to take the required amount of input due to lack of confidence in their ability to repay the loans. This is an example of attitude of farmers towards risks which need to be understood and considered by researchers and extension agents when giving research recommendations.

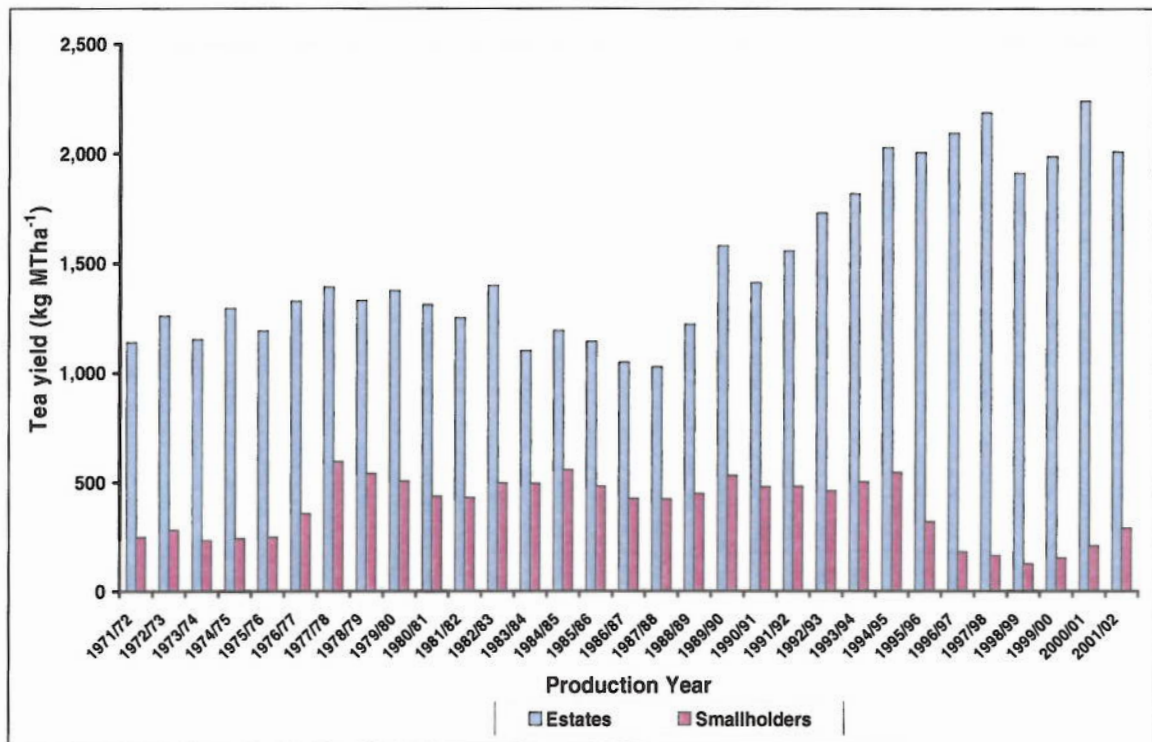
Table 5.2: Comparison of mean greenleaf yield in the three case study areas according to soils types (kg GL ha^{-1})

Soil type	Statistics	Case study area			
		Smallholders Mufindi	Smallholders Rungwe	Medium growers	Overall mean
Deep brown sandy clay loams (<i>vitric andosols</i>)	Mean	8,083	4,737	11,745	7,378
	N	51	50	15	123
	SE.mean	385	397	545	336
Red clay and brown loams (<i>humic and chromic andosols</i>)	Mean	7,874	4,236	9,845	5,130
	N	26	85	8	112
	SE.mean	652	269	251	295
Deep red clay soil (<i>rhodic ferralsol</i>)	Mean	-	4,612	-	4,612
	N	-	66	-	66
	SE.mean	-	268	-	268
Total	Mean	8,012	4,484	11,663	5,935
	N	77	201	23	301
	SE.mean	334	174	527	198

Yield is a key variable as it determines how much the farmer will earn from tea production. Comparison across the three case study areas show that medium scale growers had the highest greenleaf yield ($10,599\text{ kg GL ha}^{-1}$) and smallholders in Rungwe had the lowest yield ($4,484\text{ kg GL ha}^{-1}$).

The quality of land, modified by environmental factors such as temperature, rainfall pattern, soil type and terrain, contributes to potential yield. Greenleaf yield was

compared across areas with different soil types. The result (Table 5.2) that deep brown sandy clay loam (*vitric andosols*) supported the highest yields in all three case study areas, whereas deep red clay soils (*rhodic ferralsols*) had the lowest average yields. The results show the linkage between the stocks of natural assets (land) combined with management practices and input levels and natural quality of land result in higher yield, which potentially leads to higher revenue from tea.



Source: Tea Strategic Plan Ministry of Agriculture, 2003

Figure 5.2: Trend of average tea productivity between estates and smallholders 1971/2-2001/2(kg MT ha⁻¹)

However, although the analysis covered four-year average yield data, the long-term data show similar trend whereby productivity in the estates sector has consistently outperformed the smallholders sector as shown in **Figure 5.2**. The estates sector production systems use recommended rates of inputs, which lead to higher yield per unit area.

Human capital/assets:

Age of the household head, number of household members, household members working in the tea farm, total farm labour (MD/ha), farmers experience in tea (number

of years) and percentage of farmers who received formal training are the indicators used to assess the stocks of human capital /assets and flows of services across the three case study areas. Family labour (determined by the number of people available for farm work) was identified as one of the determinant factors on the performance of various farming systems (Dawson, 1987; Bar-Shira and Finkelshtain, 1992).

The results did not support this notion as they showed that there was no significant difference in the average number of people available for tea production between the two smallholders case study areas { $t(276)=0.27, p>0.05$ }. However, the result was significant between the typical smallholders in Mufindi and the medium scale growers { $t(98)=-2.63, p<0.05$ }. Even within each case study areas, the variations are less significant as shown by the low standard error of means (SE mean 0.014, 0.08 and 0.24 people) for Mufindi and Rungwe smallholders and the medium scale growers respectively.

However, comparisons of total labour used for tea production per hectare, show significant differences ($p>0.05$) across the three case study areas. Smallholders in Rungwe (189 mandays) have the lowest mean labour use per hectare compared with their counterparts in Mufindi (227 mandays). The medium scale growers (314 mandays) had the highest mean labour use per hectare implying that higher yields, which characterises the medium scale production systems, are associated with higher labour demand especially for harvesting work.

With all the three case study areas having similar numbers of people available for tea farming per household, the extra labour required for tea production comes from outside the household in the form of hired labour. Hired labour (both for estates and smallholders) has a long history in tea farming, especially because access to extra hired labour has a big influence on a household's ability to cope with operations for tea production.

Options for increasing tea production are either through expansion of the tea area or through intensification on the existing area. Both options require extra labour, a situation that creates dependency of these systems on external hired labour. Despite this situation creating employment opportunity, which is beneficial to the rural community, often increases in greenleaf prices by the respective factories, tend to

trigger a corresponding demand for wage increment for each kilogramme of harvested greenleaf by the hired labourers. This trend means that whenever the prices for the greenleaf are increased the advantage may not necessarily go to smallholders farmers because pluckers' demands raises the overall costs of production, hence affecting the net income earned by farmers. The implication of this trend may lead to farmers opting for smaller tea farms that can be maintained using family labour, as a measure of avoiding hiring labour. This may prove a constraint on the expansion of the smallholder tea sector in Tanzania.

Experience in tea production (measured by the number of years since the farmer started growing tea) is another indicator used to compare the stocks of assets for the three case study areas. It might be expected that experience correlates positively with performance indicators such as greenleaf yield per hectare. However, the correlation matrix presented in **Appendix 5** show that number of years as tea producer is negatively correlated with productivity. This surprising result can be attributed to inability of older farmers to adapt to new recommendations as the majority of them are likely to have planted seedling tea which give low response to inputs and hence low productivity. On the contrary, the recommendations appear to have favoured younger farmers who have recently joined the tea industry as they have been able to plant appropriate clones. Older farmers are stuck with unsuitable plants (seedling tea) and some of the older farmers are rigid /resistant to change into new husbandry practices and as a result, the younger innovative farmers leave them behind.

Formal training in tea production is provided by TRIT and local factories within the catchment, including advice on the use of recommended fertiliser rates in order to improve productivity. The proportion of smallholders who received formal training in Mufindi (56%), and Rungwe (51%) was significantly different compared with the medium scale growers (83%). Comparison of the fertiliser use rates and yield levels for the trained respondents and those not trained (**Table 5.4**) supported the assumption that farmers training can improve performance of the production systems.

Table 5.4: Comparison of mean greenleaf yield (kg GL ha⁻¹) and fertiliser use (kg N ha⁻¹) according to farmers' attendance to formal training

Performance variable	Attended formal tea training	Statistics	Case study area		
			Smallholders Mufindi (n=77)	Smallholders Rungwe (n=200)	Medium scale growers (n=23)
Estimated annual yield (Kg GL ha ⁻¹)	Yes	Mean	8,442	4,657	10,681
		SE. mean	491	245	427
	No	Mean	7,600	4,292	10,211
		SE. mean	447	250	1,127
	Total	Mean	8,070	4,476	10,599
		SE. mean	339	175	394
Fertiliser application (kg N ha ⁻¹)	Yes	Mean	71	58	126
		SE. mean	4	3	4
	No	Mean	61	49	121
		SE. mean	6	3	5
	Total	Mean	66	53	125
		SE. mean	4	2	4

The average greenleaf yield for respondents who received training on tea was significantly higher {t (297) = 2.8, p<0.005} compared to those who did not attend any formal training. The result was similar for fertiliser use rates indicating that training does improve management as well as performance of the production systems. The t statistics test showed both results were significantly different at p<0.005. The result for both variables was consistent for all the three case study areas as presented in Table 5.4.

Physical capital/assets:

Physical assets according to Pretty (1999) include farm and local infrastructure which comprises housing and other buildings, roads and bridges, energy supplies, communications, markets and various forms of transportation. From the perspective of the tea-growing households, physical assets include all man made assets that support the livelihood of the individual household as well as the local community. Physical or man made capital consists of household tangible assets acquired through the activities of household members. During the exploratory survey, farmers identified the initial ideas of the most common assets that households tend to

accumulate as an outcome of their participation in tea production. According to the interviewed farmers, they include farm structures such as houses, means of transport (vehicles, motorcycles, and bicycles), and means for communication (radio, television).

Table 5.1 shows that all the interviewed medium scale growers reported to have used income from tea to buy household assets, whereas only a fraction of the smallholders (Mufindi=53%; Rungwe= 50%) used income from tea to buy assets. The relative value of physical assets is difficult to determine. For example, the value and quality of farm buildings differ from one location to another because the type, value and quality of the building materials used for each case study area were also different. However, during the exploratory survey, the interviewed respondents mentioned that the characteristics of farm buildings within each case study area (determined by the type of building materials used) is regarded by people in rural areas as ideal indicator of the wealth status of the particular household.

Table 5.5: Distribution of the respondents based on the quality attributes of the houses owned (%)

Quality attributes of the house owned	Statistics	Case study areas		
		Smallholders Mufindi	Smallholders Rungwe	Non-tea smallholders
Best Quality (Tiles or corrugated iron sheets, cement walls & cement floor)	N	22	73	9
	% within case study	29	36	9
Good Quality (Corrugated iron sheets, burnt bricks walls, and cement floor)	N	19	25	16
	% within case study	25	12	15
Normal Quality (Corrugated iron sheet, mud bricks, cement)	N	22	63	32
	% within case study	29	31	30
Poor Quality (Grass thatched roof, mud bricks, & earth floor)	N	14	40	50
	% within case study	18	20	47
Total	N	77	201	107
	% within case study	100	100	100

($\chi^2 = 36.76$, $p < 0.001$)

Table 5.5 summarises the proportion of the interviewed households based on the quality of the houses they own. The perception of farmers regarding the quality attributes was sought during the exploratory survey (Chapter 4). The smallholders in both Mufindi (29%) and Rungwe (36%) had an evenly spread distribution of the respondents based on the quality attributes of the house they owned. There was significant differences at ($p < 0.001$) between smallholders in Mufindi and Rungwe.

However comparison of the two cases of the smallholders with the non-tea farmers indicate that, tea growing households have relatively better physical assets base compared with non-tea households. The result in **Table 5.5** indicate that the significant proportion (46.7%) of non tea households owns the poorest quality houses compared to any of the tea based case study area (Mufindi = 18.2%; Rungwe = 19.9%). This result further demonstrates that tea appear to be associated with accumulation of assets, though it does not imply causality direction.

Another indicator used to assess the stocks of physical assets was the proportion of respondents owning means of transport including motorised vehicles as well as bicycles. Again, the relative values of these assets were difficult to standardise, although generally farmers perceive that owning any of these means of transport symbolises the superior possession of household stocks.

Table 5.6: Distribution of the respondents based on the type of means of transport owned (%)

Means of transport owned	Case study area			
	Smallholders Mufindi (n=77)	Smallholders Rungwe (n=201)	Medium scale growers (n=23)	Non-tea Smallholder farmers (n=107)
Motorised vehicle & bicycle	1	-	26	-
Motorised vehicle only	2	-	39	-
Bicycle only	54	57	31	22
Don't own anything	43	43	4	78
Total	100	100.0	100	100

Table 5.6 show the proportion of the respondents who own various types of means of transport. Comparison between smallholder tea growers with non-tea growers show that more tea growers have better means of transport compared with non-tea households. A significant majority (78.5%) of the interviewed non-tea smallholders did not own any means of transport. ($\chi^2=40.7$, df 3, $p<0.001$)

Ownership of domestic assets was used to compare the stocks of physical assets for the case study areas. A composite variable was constructed by adding up scores based on the household ownership of domestic assets such as television, radio (which facilitates access to information for the household). Attributes such, possession of livestock, ownership of motorised farm machinery (like water pumps, tractors, sprayers etc), and ownership of manual farm tools (hand hoes, plucking baskets, mechanical harvesting shears, sprayers etc.) were also used to compute a composite variable for farm assets. Results in **Table 5.7** show that medium scale growers (34.8%) had a relatively higher value of farm assets compared to smallholder tea and non –tea growers.

Table 5.7: The proportion of respondents owning domestic and farm assets for the three case study areas (%)

Stocks of household assets	Statistics	Case study area		
		Smallholders Mufindi (n=77)	Smallholders Rungwe (n=201)	Non-tea Smallholders (n=107)
High (TV, Radio, Motorised farm tools, livestock)	N	9	6	9
	%	12	3	8
Medium (Radio, off farm business, motorised farm tools, livestock)	N	45	148	53
	%	58	74	49
Low (No TV & Radio, manual farm tools, no livestock)	N	23	47	46
	%	30	23	43
Total	N	77	201	107
	%	100	100	100

($\chi^2 = 38.239$, $p < 0.000$),

There was a mixed result whereby non-tea smallholders had higher value household assets compared to smallholder tea growers in Rungwe. This could be attributed to presence of alternative cash crops such as coffee and banana in Rungwe. There was no clear pattern distinguishing tea growers from non-tea growers for the medium category of household assets. However, more non-tea respondents (42.9%) fell into the low category of household assets compared with smallholder tea growers (Mufindi = 29.9% and Rungwe= 23.4%).

The four attributes used to compare the stocks of physical assets for the three case study areas including the non-tea growers provide evidence that tea is associated with accumulation of household assets. Tea growing households have consistently outperformed non-tea households in terms of possession of higher valued household assets.

Social capital/assets:

According to Pretty (1999) social capital consists of relations that define how people co-exist in their societies through norms, culture and social institutions that oversee the presence of harmonic livelihood systems. For the tea based livelihood systems, social capital consists of institutions like tea growers associations, rules that guide engagement of hired labourers and access to community assets. In all three cases, tea farmers organisations are serving farmers but with slightly different objectives.

The tea sector is one of the few sectors in the Tanzanian agriculture sector with well-organised farmers' organisations. Unlike other farmer organisations in Tanzania, these operate within the policy framework that guides their establishment and operational procedures. In areas where Government owned tea factories existed like Rungwe, farmer organisations were established or restructured to take up the role of representing smallholders in the joint venture tea companies formed after the privatisation of the public owned tea factories.

Membership of a farmer organisation is an important element of social capital, as farmers interests are represented by these organisations. In Rungwe, all tea growers

are members of tea associations by the virtue of selling tea to WTC factory. However, only 82% of the interviewed smallholders in Mufindi appear to be aware of their membership status. All the interviewed medium scale growers (100%) were aware of membership of the farmer's organisations.

In Mufindi, the structure of farmers organisation can be categorised into two types (1) the District level tea association (CHAWACHAMU) and (2) smaller village level associations (as described in Chapter 4). The District level organisation lacks grass root support as farmers appear to be more affiliated to smaller village based associations. In both cases, the farmer-based organisations in Mufindi are not fully integrated with the two factories. This set-up sometimes tends to create tension especially during negotiation for greenleaf prices. The role of the farmer organisations in Mufindi is restricted to liaison with the factory owners.

In Rungwe, the Rungwe Smallholder Tea Growers Association (RSTGA) which is regarded by various stakeholders as one of the most successful examples of the reforms which brought in the private sector in smallholders tea industry, owns 25% of the shares (on behalf of farmers) in the Wakulima Tea Company (also another most successful case of privatised former state owned tea factory) (TRIT, 2002). Again, only 79% of the interviewed farmers recognised their status as members of RSTGA, despite all farmers being members by default.

The large proportion of farmers (18% and 21%) in Mufindi and Rungwe respectively, do not know about their membership status. This points to some deficiencies in awareness of farmers, which may limit the level of influence of these associations especially when there is a need for agreeing on common strategy to enhance farmer interests in the business. An example of such difficulties can be drawn from Rungwe where farmers own 25% shares in the factory, but the association failed to convince farmers to contribute towards an equity call even when farmers were paid substantial compensation from the EU Stabilisation of Export Fund (Stabex). The compensation was provided by for the loss farmers incurred due to prolonged drought (TRIT, 2002)

The reason for this lack of awareness could be that farmers are more interested in the financial rewards they get from their greenleaf rather than any other social benefits. Also having grown tea under the stewardship of public sector for a long time, some farmers may still fail to realise that under private the sector, their collective bargaining can alter the greenleaf prices contrary to the TTA era where prices used to be set by the Government and applied to all factories throughout the country. Perceptions of farmers who are aware of the roles of the tea farmer organisation are presented in Table 5.8.

Table 5.8: Perception of the smallholders on the benefits accrued from being members of the tea farmer's organisations (%)

Benefits accrued from being a member	Tea processing factory		
	Smallholders Mufindi (n=57)	Smallholders Rungwe (n=137)	Total (n=217)
Collective bargaining for price	32	31	38
Forum for expressing concerns	5	14	10
Formal representation in the business venture	33	36	32
Access to credit facilities	4	3	3
Marketing outlet for the greenleaf	26	16	17
Total	100	100	100

($\chi^2 = 119.81$, $p < 0.000$),

According to the results, for smallholders, apart from collective bargaining farmers had perceived roles of farmer's organisation to include forum for expressing their views, formal institution to represent them on the factory joint venture, facilitate access to credit and to provide market for the greenleaf. There is significant variation on the perception of farmers regarding the roles of their organisations between the case study areas.

Access to information and technologies is acquired through regular contact between farmers and the potential source of such information. It was reported during the exploratory survey that farmers who live closer to the estates benefit from access they have to technologies copied from their neighbouring estates. Some farmers who live closer to the estates occasionally take employment in these estates hence gaining first

hand experience of the tea management practices employed. Comparison of average yields for the interviewed farmers based on the distance from the nearest estates (Table 5.9) shows a clear pattern whereby average yield declined as the distance between the estate and the smallholder's farm increases. The difference in yield levels across the four categories of distance was statistically significant ($p > 0.005$).

Table 5.9: Comparison of mean greenleaf yield according to distances from the nearest tea estates (kg GL ha⁻¹)

Distance to the nearest estate	Statistics	Case study area			
		Smallholders Mufindi	Smallholders Rungwe	Medium growers	Total
Within 1 km	Mean	8,450	4,960	10,832	7,592
	N	26	11	9	46
	SE.mean	560	644	813	473
1-5 km	Mean	8,061	4,750	10,757	6,600
	N	32	44	6	82
	SE.mean	557	371	592	372
6-10 km	Mean	7,610	4,421	10,303	5,399
	N	19	85	6	110
	SE.mean	664	256	786	293
Over 10 km	Mean		4,295	10,083	4,479
	N		61	2	63
	SE.mean		346	238	359
Total	Mean	8,070	4,484	10,599	5,869
	N	77	201	23	301
	SE.mean	339	174	394	190

In Mufindi, all the interviewed farmers were located within the 10 kilometres radius of the nearest MTC or UTTL Estates, whereas the smallholders in Rungwe consist of farmers located further than 10 km from the nearest estate. The result provides a useful feedback on the demonstration impact of the farming technologies towards improving performance of the farmers. Access to information on improved management practices increases farmer's awareness of their own potential and this helps to motivate them to improve as demonstrated by the results in Table 5.9.

Financial capital/assets:

Financial capital consists of stocks of financial assets and flows of financial revenue and costs that a household owns or is able to access in the process of earning their livelihood strategies. Financial capital include savings accrued from income generated from sales of greenleaf, purchase of key inputs for tea production, access to credit and other sources of financial resources for tea production. However, most of the data collected included only flow variables as exclusive stocks of financial assets attributed to tea were difficult to establish. With this limitation therefore, the income and expenditure patterns of the interviewed households were explored to determine the contribution of tea towards household income profiles. Four variables were used to compare the flows of household finances across the three case study areas. The variables include total revenue from tea (TZS/ha), total average cost (TZS/ha), total value of credit received by the household (TZS/annum) and the price of greenleaf (TZS/ kg GL). However, it was difficulty to get correct figures for revenue from tea due lack of record keeping as well as reluctance to discuss financial issues by the interviewed household members.

According to the results in Table 5.1, the medium scale growers (because of higher productivity and greenleaf prices) had the highest total revenue per hectare (931,560TZS) compared with the smallholders [Mufindi (541,490TZS); Rungwe (355,710TZS)]. Differences in total revenue from tea reflect the annual production per hectare as the price of greenleaf is closely similar across all three case study areas. However analysis showed different total average cost as medium scale growers with their high input management systems spend more per unit area (442,894 TZS per hectare) compared to the smallholders (392,025 & 221,059 TZS per hectare for Mufindi and Rungwe respectively). The mean revenue were significantly different at ($p < 0.005$).

Total revenue and total costs are flow indicators that may be used to enhance financial capital through savings and investment. On the contrary, net income is a more useful indicator as it reflects the contribution to disposable income that the household gained through tea production after meeting all production expenses and other overhead costs. The medium scale farms earn significantly more net income ($t(297)=2.8$,

$p < 0.005$) (507,462 TZS per hectare) despite of having higher average cost per unit area compared to smallholders. Amongst the typical smallholders, farmers in Mufindi (149,466 TZS per hectare) earns more net income per unit area compared to their colleagues in Rungwe (134,466 TZS per hectare) and the difference in income was also statistically significant ($t(168) = 3.0$, $p < 0.005$).

The results on average value of credit received by the households show similar patterns whereby the medium scale growers had far higher credit value. The medium scale growers have diverse sources of credit due to possession of high value physical and natural assets (which serve as collateral) allowing them to access more sources of credit and other sources of external funding compared to the typical smallholders households.

Greenleaf prices are usually set by the respective factories after taking consideration of several factors including the sales value at the auction, factory processing costs and other overheads. The variation in greenleaf factories may be a reflection of variation in the performance efficiency of these individual factories. The impact of the greenleaf prices and other alternative pricing mechanisms are discussed in detail in Chapter 6.

Analysis of the major sources of household income (Table 5.10) shows that tea production is the main source of income for the majority of the interviewed households (79%) followed by production of other cash crops (16%), livestock keeping (3%) and other wage driven sources (1%). Amongst the typical smallholder households, more farmers in Mufindi (83%) had tea as their major source of income compared to Rungwe (76%). One striking issue is the diversification in terms of crops grown and activities which is a prominent feature of smallholders. Smallholders typically have other non-agricultural sources of household income whereas the medium scale growers are specialist tea producers. The results complement the findings of the National Household Budget Survey 2000/01 (NBS, 2002) which showed that agricultural income accounted for 61% of total household income in rural areas.

Table 5.10: Major sources of household income for the sampled households in the three case study areas

Major source of households income	Statistics	Case study area			
		Smallholders Mufindi	Smallholders Rungwe	Medium growers	Total
Tea production	n	64	152	25	241
	%	83	75	100	80
Agriculture (other crops apart from tea)	n	10	37	0	47
	%	13	19	--	16
Livestock keeping	n	1	7	0	8
	%	1	4	--	3
Selling labour	n	0	2	0	2
	%	--	1	--	0.7
Other wage driven sources	n	2	2	0	4
	%	3	1	--	1
Total	n	77	200	25	302
	%	100	100	100	100

($\lambda^2 = 10.698$, $p < 0.219$)

In Rungwe, a small proportion of tea growing households (1%) also obtain revenue through selling labour to their neighbouring farmers. The situation in Rungwe is unique as in Mufindi smallholders obtain hired labour only from non-tea growing households.

Household expenditure patterns can reveal the priorities and strategies of a particular household in coping with the challenges of securing their livelihoods. According to Table 5.11, food and domestic needs are important components of household expenditure for smallholders (48 & 70% for Mufindi and Rungwe respectively). Other important expenditure components include child education expenses, clothing, health and medical expenses.

Relatively few farmers mentioned farm inputs as a main component of household expenditure despite that separate records from respective tea processing factories showed that these farmers spent substantial sums buying fertiliser and herbicides for tea. Smallholders in both Mufindi and Rungwe district have access to input credit from their respective tea processing factories. The fact that this input supply system does not involve transaction of cash as deductions for the inputs are made at the factory, which is the source of payment for the greenleaf sold by farmers, may distort

farmers recollection of their actual expenditure pattern. This effect also can be associated with the medium scale growers (Table 5.11) who mentioned farm input and farming operations as their sole household expenditure item. However, the general pattern emerging from the results compares with findings of the National Household Budget Survey 2000/2001 (NBS, 2002), which indicated that purchased food accounted for the 35.2% of the household expenditure in rural areas.

Table 5.11: Major components of household expenditure from tea income for the sampled households in the three case study areas

Major components of household expenditure	Statistics	Case study area			
		Smallholders Mufindi	Smallholders Rungwe	Medium growers	Total
Farm input and farming operations	n	8	4	25	37
	%	10	2	100	12
Food and domestic needs	n	37	139	0	176
	%	48	70	--	58
Medical and health care	n	4	11	0	15
	%	5	6	--	5
Education expenses	n	14	26	0	40
	%	18	13	--	13
Clothing	n	13	18	0	31
	%	17	9	--	10
Other expenditures	n	1	2	0	3
	%	1	1	--	1
Total	n	77	200	25	302
	%	100	100	100	100

Therefore, the arrangement by the factories to provide input credit is justified as farmers may face difficulties because tea income comes in small quantities throughout the year and often smallholders lack discipline required to save money for purchase of farm input in the absence of credit scheme as observed elsewhere in Tanzania (NBS, 2002).

The level of savings in the household or any livelihood system is an important indicator for assessing the performance of that particular livelihood system. A household capable of generating savings is more likely to achieve a sustainable livelihood system. According to the results presented in Table 5.1, over 43% of the interviewed households reported savings from their current combined sources of

household income. All the medium scale growers (100%) reported having savings whereas a substantial proportion of the interviewed typical smallholders (59 & 30% for Mufindi and Rungwe respectively) reported having savings.

The income patterns are mainly determined by yield levels. Yield levels also depends on the level of inputs and management practices in the tea farms, so in a way the financial resources in liquid form can contribute towards improving productivity through paying for inputs (agrochemicals) and services (labour, transport and mechanisation). Access to credit for fertilisers releases funds for other things for which credit is not available: therefore, it can be argued that growing tea facilitates borrowing (and payback) and hence more livelihood options compared with non-tea households.

5.3.2. Stocks of household assets and flows of services in non-tea growing households

A total of 107 non tea growing households were interviewed in order to determine the stocks of household assets and flows of services compared to the typical smallholder's tea growing households. Table 5.12 below presents the descriptive statistics for the selected household assets for the non tea growing households in both Mufindi and Rungwe districts. The result show that farmers in Mufindi have lower average age (35 years) compared to those in Rungwe (41 years). This trend is similar to that observed in the tea growing households (Table 5.1).

The average family sizes is smaller in Mufindi (mean=4) compared to Rungwe (mean=5) people. However this difference is not statistically significant [$t(104) = 0.27$; $p > 0.05$]. In both cases (Mufindi and Rungwe) the average household size was consistently smaller compared to the tea growing households.

Table 5.12: Descriptive statistics for the selected household assets for the non-tea growing farmers in the sampled study area

Tea growing area	Statistics	Age of the household head	Total family size (number of people)	Total household land (ha)
Mufindi	Mean	35	4	1.7
	N	27	27	27
	Std. Deviation	9.4	2	1.12
Rungwe	Mean	41	5	1.06
	N	80	79	80
	Std. Deviation	11.3	2.9	0.89
Total	Mean	39	5	1.2
	N	107	106	107
	Std. Deviation	11.1	2.7	0.98

Regarding the total land holdings, non-tea growing households had relatively larger land areas (1.7 ha) compared to their counterparts in Rungwe (1.06 ha). The variation in average total land holdings was statistically significant at $p < 0.05$. Generally, the non-tea growing households have relatively smaller average holdings (1.2 ha) compared to the tea growing households (6.1 ha) as shown in (Table 5.12). Lack of access to land could be the limiting factor for household's non participation in tea production even when other favourable aspects such as family labour and reliable market for the greenleaf are in place.

Table 5.13: Methods of acquiring land for the non tea households in Mufindi and Rungwe districts

Methods of acquiring land	Statistics	Tea growing district		Total
		Mufindi	Rungwe	
Inherited	Count	14	51	65
	% within district	52	64	61
Bought	Count	9	25	34
	% within district	33	31	32
Allocated	Count	4	4	8
	% within district	15	5	7
Total	Count	27	80	107
	% within district	100	100	100

Results in Table 5.13 indicate that (61%) of non tea growing households got access to land by inheriting it from their parents. There was no marked difference in the pattern

of acquiring land between the non-tea households in Mufindi and Rungwe, though in Mufindi slightly more households (15%) were allocation land compared to only 5% in Rungwe. When compared with tea growing households (82 & 72%) there are fewer non-tea growing households that accessed land through inheritance (52 & 64%) for Mufindi and Rungwe districts respectively.

The result appear to suggest that tea based production systems offer inter-generational stability whereby descendants of the tea farmers are likely to take over from their parents due to the perennial nature of tea production systems, compared to annual crops where there is a temptation to sell the normally underdeveloped land. The proportion of farmers who brought land for non-tea growing households is bigger (32%) compared with the tea-growing households (17%).

Table 5.14: Major sources of household income for the sampled non-tea growing farmers in the study area

Major source of household income	Statistics	Tea growing district		Total
		Mufindi	Rungwe	
Agriculture (other crops)	Count	7	53	60
	% within district	26	66	56
Livestock keeping	Count	5	6	11
	% within district	19	8	10
Selling labour	Count	10	9	19
	% within district	37	11	18
Remittances	Count	2	7	9
	% within district	7	9	8
Selling domestic consumer goods	Count	3	5	8
	% within district	11	6	8
Total	Count	27	80	107
	% within district	100	100	100

For the non-tea growing households, the patterns of major sources of household income (Table 5.14) vary across the two districts. In Mufindi, 37% of non tea households mentioned selling labour as their main source of income. Selling labour is the main source of income for more households compared to agricultural production (other crops apart from tea) mentioned by 26% of the interviewed non-tea households. However, in Rungwe district where more agricultural production options exist,

agricultural production was mentioned as the main source of household income for 66.3% of the interviewed non tea households. In Mufindi 19% of non-tea households mentioned livestock keeping as their main source of household income. A small section of non-tea growing households (8%) rely on remittances and another (8%) of the interviewed households mentioned selling domestic consumer goods as their main sources of household income. The pattern of major sources of household income for non tea growing households depicts a degree of diversification compared with the tea growing households who rely mainly on tea as the sole source of household income.

According to results in Table 5.15, the food and domestic needs is the main component of the household expenditure for the majority (71%) of the sampled non-tea growing households in Rungwe district. This is in total contrast with the situation in Mufindi where children's education expenses (30%) and farm inputs (22%) are equally important components of household expenditure as food and domestic needs. Generally the household expenditure pattern for the non-tea households is similar to that of the tea growing households, except tea growing households spend relatively more on farm inputs and farming operations.

Table 5.15: Main components of the household expenditure for the sampled non-tea growing farmers in the study area

Main components of the household expenditure	Statistics	Tea growing district		Total
		Mufindi	Rungwe	
Farm inputs and farming operations	Count	6	3	9
	%	22	4	9
Food and domestic needs	Count	8	56	64
	%	30	71	6
Medical and health care	Count	3	6	9
	%	11	8	9
Children education expenses	Count	8	6	14
	%	30	8	13
Clothing	Count	2	4	6
	%	7	5	6
Other ancillary expenses	Count	0	4	4
	%	--	5	4
Total	Count	27	79	106
	%	100	100	100

According to results in Table 5.16, only a small proportion (12.3%) of the interviewed households reported having been involved in tea production before deciding to quit. The remaining majority (87.7%) have never engaged in tea production as growers though some of non-tea farmers mentioned having worked in the tea industry as hired labourers.

Table 5.16: The status on whether the farmer ever grown tea for the sampled non-tea growing households in the study area

Have you ever grown tea	Statistics	Tea growing district		Total
		Mufindi	Rungwe	
Yes	Count	4	9	13
	%	15	11	12
No	Count	23	70	93
	%	85	89	88
Total	Count	27	79	106
	%	100	100	100

Table 5.17: The reasons for stopping tea growing for the sampled non-tea growing households in the study area

Reason for stopping tea growing	Statistics	Tea growing district		
		Mufindi	Rungwe	Total
Delayed or non payment by TTA	Count	6	4	10
	%	67	36	50
Lack of access to reliable market & outlets	Count	0	1	1
	%	--	9	5
Low returns from the business	Count	0	3	3
	%	--	27	15
Changes in preference to other crops	Count	3	0	3
	%	33	--	15
Other reasons	Count	0	3	3
	%	--	27	15
Total	Count	9	11	20
	%	100	100	100

For the households that gave up tea production (Table 5.17) the reason given was mainly delayed or non payments by the defunct Tanzania Tea Authority (TTA) that hit farmers during the early to mid 1990's. Whereas a significant proportion of the

interviewed households in Rungwe (27%) attributed low returns from the business for their decision, their counterparts in Mufindi mentioned change of preference (33%) as their second most important reason for giving up tea growing. The result suggests that presence of other cash crops in Rungwe appear to gives farmers an opportunity to compare the profitability of the tea against the alternative crops, which allows them to make an informed choice.

For the households that never engaged in tea production, the main bottlenecks (Table 5.18) were mostly due to lack of adequate household assets such as land (55.3%), family labour (13.8%) financial capital (2.1%), capital inputs such as planting materials (4.3%). There were differences on the scale of these bottlenecks across the two districts, whereby in Rungwe land shortage (63%) was a more prominent constraint. On the contrary, in Mufindi labour shortage (57%) was seen as major reason for the inability of farmers to engage in tea production.

Table 5.18: The reasons for not engaging in tea production for the sampled non-tea growing households in the study area

The reason for not growing tea	Statistics	Tea growing district		Total
		Mufindi	Rungwe	
Land shortage	Count	6	46	52
	%	29	63	55
Labour shortage	Count	12	1	13
	%	57	1	14
Lack of financial capital	Count	1	1	2
	%	5	1	2
Planting materials	Count	1	3	4
	%	5	4	4
Lack of knowledge	Count	1	1	2
	%	5	1	2
Other reasons	Count	0	21	21
	%	--	29	23
Total	Count	21	73	94
	%	100	100	100

Different but important constraints denied farmers in Rungwe (29%) an opportunity to engage in tea production. According to the interviewed farmers inheritance customs discriminate against some members of the family, notably females who cannot inherit

a tea farm. These groups of outcast farmers without land and reliable income to buy assets are left with limited possibilities to join tea production. Despite 9% of the interviewed farmers in Mufindi mentioning land shortage as one of the barriers to engaging in tea production, still there is relatively better access to land in Mufindi than Rungwe where the needs outweigh the available natural assets.

The stocks of household assets and flows of services for the non-tea growing households show variation from the tea growing families whereby tea growers appear to own more assets that allow them to access community assets. Access to land is the key to engaging in tea production, but also family labour is vital to converting an empty land into a productive farm with perennial crop like tea. Some cash endowed households are able to substitute family labour with hired labour, though this option is not available to all households.

5.3.3. Factors influencing the productivity of the smallholders tea production systems

Productivity, defined as the relationship between production of an output and some or all of the resource inputs used is measured as a ratio of output per unit of input over time. Yields measured in kilograms of greenleaf per hectare per annum represent the key measure of productivity which together with greenleaf prices determine the total revenue farmers earn from tea production.

In order to identify factors that are associated with yield, a correlation analysis was done for all variables considered to be possibly associated with the greenleaf yield. This was a first step towards establishing the strength and nature of the association (positive or negative) of the factors that determine the productivity of the smallholder tea production systems. From the resulting correlation matrix, key variables that were correlated (in order of strength) with the greenleaf yield per hectare for the entire sample are summarised in Table 5.19. Although these factors were associated with greenleaf yield, they are not necessarily responsible for high or low yields. Results in Table 5.19 help to explain both the likely source of variations in productivity as well as identifying variables that can be manipulated in order to improve productivity of the tea production systems.

Experience in tea production (-0.312**) and age of the household head (-0.159**) were negatively correlated with yield contrary to popular assumption that experience improves efficiency and hence productivity. These two variables were also correlated with each other (0.682**). Correlation matrix (Appendix 5) shows also other independent variables with high correlations among each other. Example of the variables is the tea farm size and the total holdings (0.939**), fertiliser rate and the tea farm size (0.513**), tea farm size and total value of credit (0.487**).

However, it appears that the recommended tea management practices recently introduced in the tea industry appear to suit newly joining farmers as they have an advantage of establishing farms using better planting materials (clonal tea that is more responsive to input use), appropriate planting densities and recommended input application rates compared to older farmers.

Table 5.19: Summary of factors/ variables correlated with the estimated tea yield per hectare

Input variable	Pearson Correlation
Fertiliser applied per unit area (kg N ha ⁻¹)	0.509 ^(**)
Total average costs per hectare	0.437 ^(**)
Mean size of the tea field (ha)	0.428 ^(**)
Total farm labour used per hectare (MD)	0.426 ^(**)
Altitude above sea level	0.381 ^(**)
Total holdings size (ha)	0.376 ^(**)
Distance to the nearest tea estate	-0.317 ^(**)
Experience in tea (number of years)	-0.312 ^(**)
Total value of credit per household (TZS)	0.275 ^(**)
Proportion of tea area over total holdings	0.235 ^(**)
Age of the household head	-0.159 ^(**)

(**) Correlations is significant at 0.001 level (2 tailed)

Family size, measured by the number of household members and household members available for work in the tea farm are two variables that were uncorrelated with greenleaf yield. Family labour has always been an important component of the

subsistence production systems in sub-Saharan Africa. However, for the tea industry, the reliance on hired labour means the family size does not appear to be a strong determinant factor for productivity of the system.

The result which suggests that hired labour is the key component of the smallholder tea production systems, raises an important question of the sustainability of the tea production systems in the wake of HIV/AIDS pandemic which, though it is not within the scope of this study, has eroded the human resource base on the industry that depends so much on hired labour. This is an area where further research is needed to quantify the impact of the disease on labour dynamics in the tea industry in Tanzania.

5.3.4. The relationship between farm productivity and input use across the three case study areas

Further comparison of the variables that explain the greenleaf yield within the respective case study areas was done using linear multiple regression analysis. Prior to running the regression analysis, a correlation analysis was done for all likely predictor variables from the quantitative survey data (Appendix 5). All variables that showed significant correlation ($p < 0.001$) with the estimated greenleaf yield were short-listed and screened to eliminate predictor variables that were strongly correlated with each other. For example, both the size of holdings and the size of tea farm were significantly correlated with the estimated yield. However there was also strong correlation (0.939, $p < 0.001$) between the two variables. In order to minimize multicollinearity, the variable total holdings size was removed from the list.

Screening was repeated for all variables until a list of independent /predictor variables with minimum correlation amongst them was obtained for running into the regression model. However it is worth noting that despite of this effort to minimise the effect of autocorrelation, some variables still showed significant inter correlation. Hence it is important to take this into account when interpreting the results of the regression models. The regression model attempts to explain the estimated greenleaf yield (dependent variable) from a range of independent variables that were correlated with greenleaf yield (Table 5.19) given the importance of this measure of productivity as

an indicator of sustainability particularly as it determines the potential income farmers may receive from respective production system. The multiple regression analysis is based in the following equation as described by Field (2005);

$$Y_i = (b_0 + b_1X_1 + b_2X_2 + \dots + b_nX_n) + \varepsilon_i \quad \dots\dots\dots(1)$$

Where: Y_i = the dependent /outcome variable

X_n = the n^{th} independent/predictor variable

b_n = the coefficient of the n^{th} predictor X_n

ε_i = the error term, indicating the difference between the predicted and the observed value of Y for the i^{th} observation

An attempt was made to use the **Cobb-Douglas** functional form of production functions to explain the relationship between greenleaf yields to key predictor variables.

For production, the function is $Y = AL^\alpha K^\beta$

Where:

- Y = output
- L = labour input
- K = capital input
- A is the constant, and α and β are coefficients, determined by technology

Key assumptions in the Cobb-Douglas production function are; if $\alpha + \beta = 1$, the production function has constant returns to scale (if L and K are increased by 20%, Y increases by 20%). If $\alpha + \beta < 1$, returns to scale are decreasing, and if $\alpha + \beta > 1$ returns to scale are increasing. Assuming perfect competition, α and β can be shown to be labour and capital's share of output.

The Cobb-Douglas production function was considered because of its strength in producing estimates of the elasticities of each input variable, which is a very useful way of determining the rate at which inputs are substituted for outputs in the production process. However data collected did not produce sufficient explanation for the variability of greenleaf yield as a result of changes in level of inputs use, hence use of the Cobb-Douglas production function was dropped from analysis.

▪ Relationship between variables and greenleaf yield for the entire sample

According to the results in Table 5.20, five variables; fertiliser use (kg N ha⁻¹), tea farm size (ha), total farm labour (MD ha⁻¹), number of years as tea grower and distance to the nearest estate (km) were able to explain the 49% of the observed variability in greenleaf yield for the entire sample (N=301).

Table 5.20: Regression coefficient predictors for the annual greenleaf yield for all case study areas (N=301).

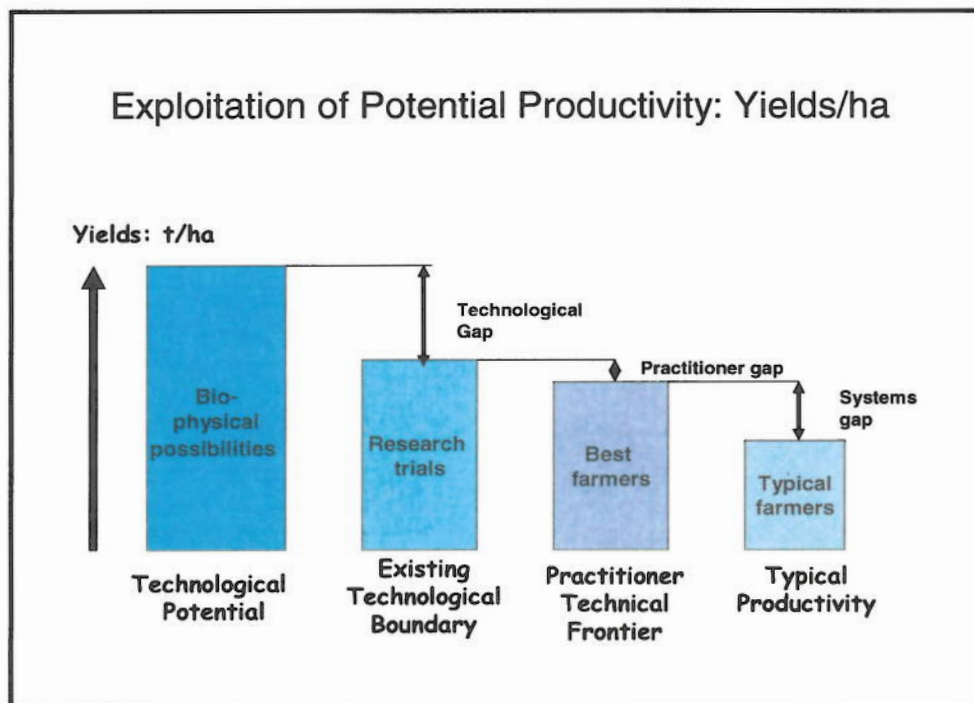
Model	Coefficients	Un standardized Coefficients		Standardized Coefficients	t	R ²
		B	SE	Beta		
1.	(Constant)	2.252.55	380.73		5.92**	
	Fertiliser (kgNha ⁻¹)	58.76	5.41	.567	10.86**	0.32
2.	(Constant)	2973.68	373.42		7.96**	
	Fertiliser (kgNha ⁻¹)	38.79	5.98	.374	6.49**	
	Tea farm size (ha)	249.98	40.26	.358	6.21**	0.41
3.	(Constant)	1437.02	493.29		2.91**	
	Fertiliser (kgNha ⁻¹)	32.61	5.92	.315	5.51**	
	Tea farm size (ha)	196.13	40.52	.281	4.84**	
	Total labour (MDha ⁻¹)	9.70	2.13	.245	4.55**	0.46
4.	(Constant)	2375.31	572.12		4.15**	
	Fertiliser (kgNha ⁻¹)	33.20	5.82	.320	5.71**	
	Tea farm size (ha)	167.0	40.93	.239	4.08**	
	Total labour (MDha ⁻¹)	9.34	2.10	.236	4.45**	
	Years as tea grower	-42.24	13.66	-.149	-3.09**	0.48
5.	(Constant)	3,578.17	744.41		4.81**	
	Fertiliser (kgNha ⁻¹)	30.07	5.89	.290	5.10**	
	Tea farm size (ha)	160.39	40.59	.240	3.95**	
	Total labour (MDha ⁻¹)	9.44	2.08	.238	4.54**	
	Years as tea grower	-39.50	13.57	-.139	-2.91**	
	Distance to nearest estate	-402.18	161.60	-.120	-2.49**	0.49

Note: R² = 0.49 *p<0.05; **p<0.001

The standardised coefficients (β) indicate the relative weight of each of the five independent predictor variables in the model in terms of explaining the variability of the estimated greenleaf yield. The result show that fertiliser ($\beta=0.290$) is the most important predictor variable followed by tea farm size ($\beta=0.240$), total farm labour ($\beta=0.238$), years as tea grower ($\beta= -0.139$) and distance to the nearest estate ($\beta=0.120$).

The specific contributions of each of the five variables given by the R^2 show that fertiliser use ($R^2=0.32$) explains 32% of the variability in greenleaf yield. This is a very strong variable considering that inclusion of the remaining variables improves R^2 by only 0.17 as shown in **Table 5.20**. However, this is a case where the effect of autocorrelation might have contributed to smaller increase in R^2 because some of the potential predictor variables were correlated with each other.

Three variables (fertiliser, tea farm size and total labour) showed positive relationship with the estimated yield, indicating that an increase in one unit of each of the three variables results in corresponding increase in the greenleaf yield at the ratio given by the coefficients of B values. For example, based on results of step 5 in Table 5.20; increase in fertiliser use by 1 kg N ha⁻¹, results in a corresponding increase in the estimated greenleaf yield by 30 kgs. This yield response is lower compared with the range obtained under experimental condition in Mufindi, where 1 kg N resulted in mean increase of 13.8 kgs of dried tea (equivalent to 62 kg of greenleaf) (TRIT, 2001). This difference in yield between research and farmers fields can be explained by the hierarchy exploitation of potential productivity illustrated in Figure 5.3 below.



Source: Morris et al (2005)

Figure 5.3: Exploitation of Technological Potential: Yields/ha

According to Morris et al (2005), there is often a small but recognisable gap between the yields of research trials and those achieved by the best farm practitioners which can be attributable to a 'research attention' bias. But more important is the considerable 'systems gap' between the productivity of the most efficient farm (or group of farms) and that of the mean or typical farm like the smallholders tea growers. Morris et al. (2005) attributes this gap to a range of economic, social and environmental factors.

The results show that, an increase of farm labour by 1 MD results in a corresponding increase of approximately 9 kg of greenleaf. Labour and fertiliser are two variable inputs in agriculture that can be altered depending on the recommended practices (60–150 kg N ha⁻¹ for smallholder's non-irrigated production systems) or their availability in a particular production system. The positive relationship depicted by the result is an important indicator that the tea production systems productivity can be improved through the application of recommended input regime, although the response can only be explained by a small proportion as shown by a low R^2 .

The two remaining variables; number of years as tea grower and the distance to the nearest estate both showed negative relationship with the estimated yield. Both variables are more related to farmer's inherent knowledge, which we assume is influenced by the knowledge base and access to sources of information. The number of years a farmer has been growing tea showed a negative relationship with greenleaf yield indicating that farmers who have been growing tea for longer time are less productive compared to newly established farmers.

This result confirms the opinion of some interviewed farmers who indicated that tea production is a labour demanding agricultural activity, which is limited by the capacity of older farmers to do heavy work. Older farmers also struggle to adapt to the changing recommendations on tea management practices. In extreme cases, age restricts some older farmers from participating in tea production, relying instead on hired labourers. Hired labourers are more interested in short term gains; hence, there is evidence of poor management in the farms that rely on hired labourers especially if the supervision is poor. Hired labourers are mainly engaged for harvesting work which tends to compromise tea bush maintenance if not done properly.

Another influential factor in the performance of the smallholder's tea production systems is the location of the farm with respect to the nearest estate. The result in Table 5.20 indicates that the average greenleaf yield declined by the rate 402kgsha⁻¹ for every 5 kilometre away from the nearest estate. Although this seems to be interesting result that shows how access to information can improve performance, the extent of variability brings suspicion on the possibility that farmers living closer to the estates may be stealing greenleaf from the estates.

However still despite of the impact of "stolen" greenleaf, the general trend suggest that farmers closer to the estates are more productive owing much to their access to improved management techniques copied from the estates. The result in Table 5.20 provides useful feedback to stakeholders in the tea industry about the focal areas where intervention can bring the desired impact. Availability of fertilisers at affordable costs, wage structures for hired labourers and creating favourable environment for young people to join the tea industry (through easy access to land, credit and technical support) are some of the potential strategies that can be employed to ensure the sustainability of the Tanzanian smallholders production systems.

▪ **Relationship between variables and greenleaf yield for the typical smallholders (Mufindi and Rungwe)**

Regression model for the typical smallholders (Table 5.21) produced slightly different results whereby only four variables were able to contribute to the variability in the estimated greenleaf yield. Fertiliser use is still the most significant and strongest explanatory variable despite the regression model explaining only 27% of the variability in the estimated greenleaf yield for the smallholders ($R^2=0.27$). Fertiliser use ($B=28.73$) and total labour ($B=9.38$) had a positive relationship with the estimated greenleaf yield, whereas Number of years as tea grower ($B= -40.09$) and distance to the nearest estate ($B= -498$) had negative relationship with the estimated greenleaf yield. Fertiliser use and total labour were significant predictors at ($p< 0.001$) whereas number of years as tea grower and distance to the nearest estate were significant predictors at ($p<0.005$).

The B values for model 4 (where all independent variables were included) show that an increase of 1 kg of Nitrogen fertiliser will result in a corresponding 29 kg of greenleaf. The response is low compared to results obtained in a long-term fertiliser trial in Mufindi where an increase of 1 kg of nitrogen resulted in a corresponding increase in greenleaf yield by 63 kg. However, the response can be considered realistic because smallholders based production systems employ low input management (no irrigation, low fertiliser use, poor harvesting).

The result also indicates that an increase of 1 manday of farm labour is associated with a corresponding yield increase of 9.28 kg of greenleaf. This relates to improvement in harvesting efficiency brought by the additional labour available in the farm. The relationship between productivity and labour is very important in the tea industry whose labour requirement is amongst the highest in agriculture (mostly because of harvesting work). Even if the farmers apply fertiliser and other farm inputs, failure to guarantee labour for harvesting work means the leaves will overgrow in the field and will not contribute to farm yield levels.

Table 5.21: Regression coefficient predictors for the annual greenleaf yield for the typical smallholder's case study areas (Mufindi and Rungwe)

Model	Coefficients	Unstandardized Coefficients		Standardized Coefficients	t	R ²
		B	Std. Error	Beta		
1.	(Constant)	3,111.07	401.15		7.76**	
	Fertiliser (kgNha ⁻¹)	39.29	6.25	.385	6.29**	0.14
2	(Constant)	1,522.35	528.24		2.88**	
	Fertiliser (kgNha ⁻¹)	32.90	6.19	.322	5.32**	
	Total labour (MDha ⁻¹)	9.83	2.23	.267	4.40**	0.22
3.	(Constant)	2,509.95	611.54		4.10**	
	Fertiliser (kgNha ⁻¹)	33.21	6.08	.325	5.47**	
	Total labour (MDha ⁻¹)	9.39	2.20	.255	4.27**	
	Years as tea grower	-43.72	14.33	-.177	-3.05**	0.25
4	(Constant)	4,045.68	811.95		4.98**	
	Fertiliser (kgNha ⁻¹)	28.73	6.19	.282	4.64**	
	Total labour (MDha ⁻¹)	9.38	2.16	.255	4.34**	
	Years as tea grower	-40.09	14.17	-.162	-2.83**	
	Distance to nearest estate	-498.10	176.60	-.167	-2.82**	0.27

Note: R² = 0.27, *p<0.05; **p<0.001

According to results in **Table 5.21**, experience in tea growing (measured by the number of years farmers were engaged in tea) showed consistent negative relationship with greenleaf yield. The same explanation applies here whereby older farmers appear to struggle to adapt to the excessive labour demands associated with tea production. The location of the tea farms measured by the relative distance to the nearest estate showed the same response whereby distant farms appear to be less productive than those, which are closer to the estates.

The result suggest that performance of the typical smallholders appear to be influenced by both the inherent knowledge base of the farmers themselves as well as the stocks of physical assets owned or accessible to farmers. For example, labour and fertiliser are the two typical farm inputs whose use rate can be altered depending on availability (supply) or procurement costs. The results of experimental trials in the southern highlands, with varying nitrogen levels ($0 - 450 \text{ kg N ha}^{-1}$) showed positive yield response ($p < 0.001$) to nitrogen levels of up to 225 kg N ha^{-1} . In the contrary experience and knowledge may not directly contribute to improved productivity without access to physical farm inputs (such as agrochemicals, labour, land and other household assets) needed to improve the performance of the system.

- **Relationship between variables and greenleaf yield for the medium scale growers**

There is significant variation between the typical smallholders and the medium scale growers based on scale of production and type of management practices employed in the two systems. Results of the regression model for the medium scale growers highlight this variation, whereby (Table 5.22) two variables; Fertiliser (kg N ha^{-1}) and tea farm size (ha) are the only significant predictor variables explaining over 94% of the variability in greenleaf yield for the medium scale growers. The medium scale growers tend to follow recommended practices especially on input use compared to the typical smallholders who are often constrained and are compelled to adopt sub-optimal management practices.

Table 5.22: Regression coefficient predictors for the annual greenleaf yield for the medium scale growers Mufindi.

Model	Coefficients	Unstandardized Coefficients		Standardized Coefficients	t	R ²
		B	S.Error	Beta		
1	(Constant)	1,373.27	810.46		1.69	
	Fertiliser (kgNha ⁻¹)	89.81	6.94	.95	12.95**	0.89
2	(Constant)	2,045.66	794.36		2.58**	
	Fertiliser (kgNha ⁻¹)	69.92	10.79	.74	6.48**	
	Tea farm size (ha)	96.74	42.55	.26	2.27**	0.92

$R^2 = 0.92$ * $p < 0.05$; ** $p < 0.001$

This variability is clearly demonstrated in the scatter plot (Appendix 4) which shows the yield response to nitrogen fertiliser for the three case study areas. Even for fertiliser, which is the strongest predictor for the smallholders, the extent of variability in response is high compared with the medium scale growers whose response shows a consistent ratio.

The results in Table 5.22 show that for the medium scale growers, fertiliser was the most significant variable that explains 89% of the variability in the estimated greenleaf yield. The other variable was the farm size, which explained the 5% of the variability in greenleaf yield. Both variables depicted a positive relationship with the estimated greenleaf meaning that an increase in one unit of each of the two variables will result in a corresponding increase in the greenleaf yield equivalent to the value of B coefficients in the model. The fertiliser-induced yield response (70 kg GL ha⁻¹) is higher compared to the typical smallholders' production systems where 1kg N resulted in a corresponding yield increase of only 31.41 kg GL ha⁻¹.

The variable response to input use as presented in Tables 5.19 – 5.22 suggests that a combination of strategies for improvement may bring optimum response compared to improving just one component. For example, increasing the fertiliser rate alone may not result in a linear response in greenleaf yield, because other limiting factors such as labour for plucking, weeding and post harvest greenleaf handling need to be optimised as well. Results from experiments conducted by TRIT show that, there is significant yield response to fertiliser up to rates as high as 225 kg N ha⁻¹. The

regression models for the typical smallholders and the medium scale growers have both shown that each production system face different type of opportunities and constraints, hence it's important to develop specific strategies for improving these production systems rather than applying a "blanket" recommendation for all production systems.

5.2. Chapter Summary

This chapter presented the results of the quantitative household survey conducted in the three case study areas. The key message emerging from the results include;

There is evidence that farmers involved in tea production own relatively bigger stocks of household assets (natural, physical and financial) compared with non-tea households. Although the mechanisms that facilitate accumulation of assets is not entirely clear, available evidence from the survey results suggest that tea production contributes to accumulation of household assets, hence indicating a contribution to sustainability of the respective production systems. Sustainability is measured within the context of weak sustainability paradigm as the study was not focused in any depth on environmental issues.

Amongst the smallholder's tea farmers, there is also evidence that households with larger stocks and better flows of assets tend to perform better than those with smaller asset base. The stock of household assets appears to correlate positively with performance indicators such as the estimated greenleaf yield per hectare. This result further confirms the assumption that household asset dictates the capability of the household to engage in productive activities, and as tea production is associated with accumulation of assets, then we can conclude that involvement in tea production widens the capability of the household to earn livelihoods through agriculture.

The result also showed no significant variation between the typical smallholders tea growers across the two case study areas, but there was significant diversity within the case study areas. These results suggest that opportunities and constraints facing

smallholders across different tea growing areas may be similar hence the prospect of policy intervention for the whole country appear to be good.

The response from non-tea farmers show that access to land and farm labour is the key factor affecting the ability of a household to engage in tea production. This explains why most of the interviewed farmers were not involved in tea production. This is an important message as it appears to suggest that effort to expand tea area in Tanzania should concentrate on freeing land and making it accessible for potential farmers. In addition, effort should be concentrated in areas where there is no shortage of suitable land, provided other basic requirements for tea production (proximity to the factory, skills base etc.) are met.

The results also confirmed that performance of the respective production systems (measured by the greenleaf production per unit area) is positively correlated with the level of inputs use (particularly fertiliser). Other influential factors include labour, farm size, and the proximity to the well-maintained tea estates. The correlation was significant ($p < 0.001$). For the typical smallholders, both the inherent farmer's knowledge (enhanced through training and access to information) as well as stocks of household assets (owned or accessible to farmers) appear to contribute to the better performance of the respective production system.

CHAPTER 6: ASSESSMENT OF THE TANZANIAN TEA VALUE CHAINS

6.1. Introduction

This chapter presents the assessment of the value chains for the three tea processing factories mapping input-output structures for the various actors in the tea production, and processing systems. Key stages of the tea value chain classified by their constituent parts by main functions are described using the concept of value chain analysis. The chapter also presents analysis of performance of the three case study areas based on the four categories of performance indicators (effectiveness, efficiency, equity and robustness) highlighting in the process the strengths and weaknesses of the respective value chains and the ways in which these affect the sustainability of smallholder tea production systems. The value chain assessment complements the farm level analysis of the stocks of assets and flows of services in tea growing household in order to provide an integrated farm level as well as assessment of factors that influence the sustainability of smallholder tea supply chain in Tanzania.

6.2. Description of the key stages and participants in the tea value chain

The tea value chain for the production systems that involve primary processing consists of three main components namely; (1) greenleaf production, (2) collection and transportation of the greenleaf, (3) processing packaging and wholesaling. There are further stages involving blending, packaging and retailing for both locally consumed and exported tea, but these stages are outside the scope of this study. There are geographical variations on the location of these components depending on whether the chain involves exporting bulk tea to a second country or local blending and retailing. This influences the cost of sales as factories which are located further away from export points tend to incur more costs. Figure 6.1 shows the location of the key stages of the tea value chain and export channels in Tanzania.

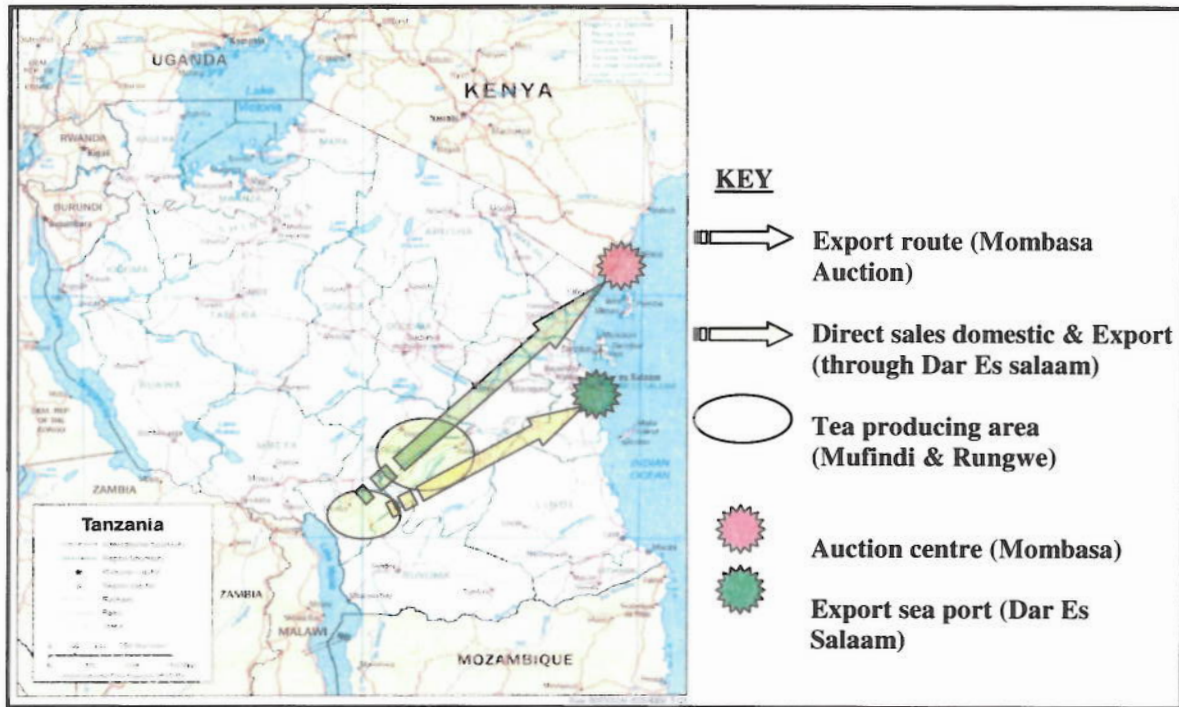


Figure 6.1: The main export marketing outlets for the case study tea companies

6.2.1. Greenleaf production

Greenleaf is the sole product from the tea farm. It is the first stage in the tea value chain where tea as a product acquires commercial value as growers, particularly smallholder outgrowers receive payments based on the quantity of harvested greenleaf. In Tanzania, tea produced in either the large-scale tea estates or the smallholder's tea farms, involves deployment of the five capitals, namely; Natural capital (land, water for irrigation), Physical capital (farm machinery, tools, farm buildings, and vehicles), Social capital (organisations, social relations), Human capital (skills, education) and Financial Capital (Revenue, savings, and access to credits).

Structural organisation and activities

A generic value chain adapted from Porter (1985) for the production of the greenleaf, (Figure 6.2) comprises primary activities that involve the physical creation of the product and its sale and final transfer to the buyer. For the greenleaf production stage of the tea value chain, primary activities consist of farm bound logistics, farm operations, outbound logistics, and marketing and sales for the tea production units (farms). The primary activities are complemented by the support services which according to Porter (1985) support the primary activities and each other for the firm to function effectively.

For the tea sector value chain, support services consist of farm infrastructure, human resource management, technology development, and procurement systems. The smallholder tea industry consists of support organisations, controlled by stakeholders to facilitate the continued development of the industry. TRIT is an example of such an organisation that provides the research, and extension services for the tea industry. The generic value chain also consists of margins, which are the difference between the total value of the products created through the primary and support activities and the collective cost of performing these value adding activities.

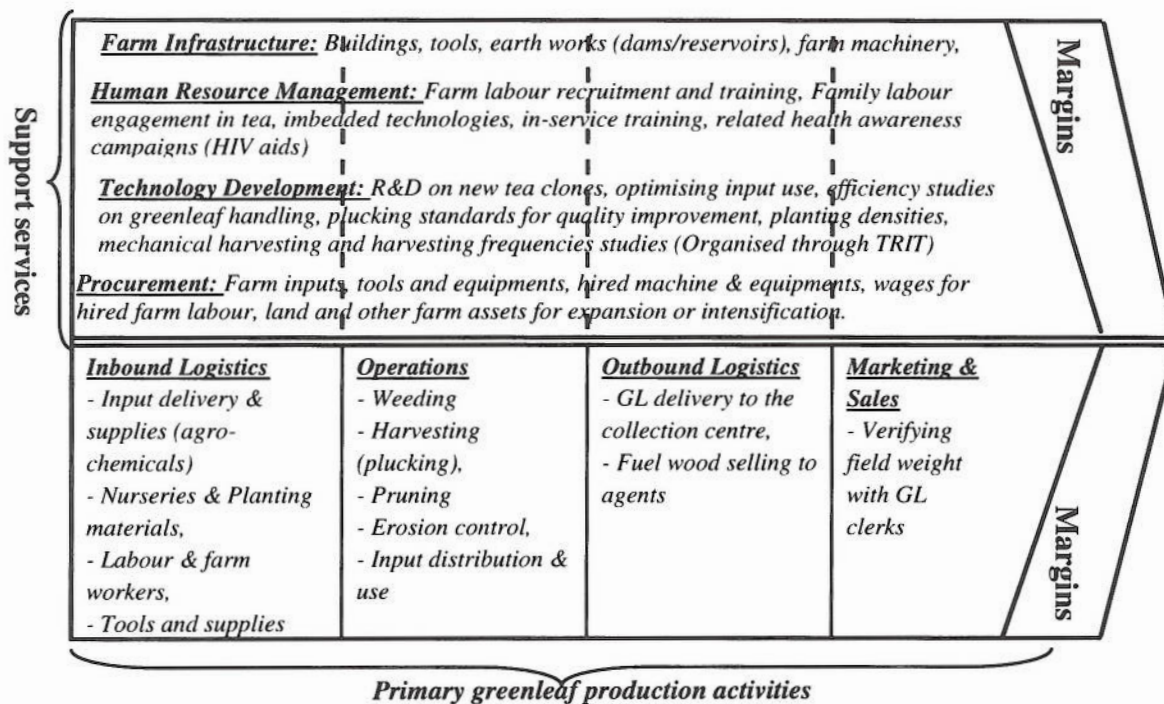


Figure 6.2: Activity categories within the farm/GL production level generic value chain

Both the primary greenleaf production activities and support services (as summarised in Figure 6.2) are necessary for the effective functioning of the greenleaf production chain. In the following sections, the greenleaf production stage of the tea value chains for the three case study areas is further assessed to determine its performance in terms of effectiveness, efficiency, equity and robustness.

Cost structure and revenue flows for the Greenleaf production

Table 6.1 shows that the biggest proportion of greenleaf production cost consists of hired labour for all three case study areas. Medium scale growers with bigger acreage relies more on hired labour and this forms approximately 70% of the total annual variable costs per hectare. For the typical smallholders in Mufindi and Rungwe, hired labour accounts for approximately 50% of the total variable costs. This suggests that as farms increase in size, farmers are compelled to rely on hired labour, as some of the operations particularly plucking, require higher labour input than available within the household's human capital base. Reliance on hired labour, despite widening opportunities for employment in the tea industry, puts individual households involved in tea production in a riskier situation as frequent escalation of wages often cannot be prevented by farmers. This reduces the net income for the households that rely on hired labour compared to those using family labour.

Table 6.1: Average revenue, costs and margins per hectare of tea for case study areas

Item	Unit of measure	Unit cost (TZS)	Medium Scale Mufindi (n=25)	Smallholders Mufindi (n=77)	Smallholders Rungwe (n=103)
Yield	kg GL ha ⁻¹		9,561	5,415	4,357
GL-price	TZS	Variable	115	100	96
Gross revenue ('000 TZS ha⁻¹)			828	540	418
Family Labour Input:					
- Weeding	Mandays		15	56	42
- Pruning (every 3-4 years)	Mandays		18	22	20
- Fertilizer application	Mandays		23	28	26
- Plucking	Mandays		56	186	193
Total Family labour (MD ha⁻¹)			112	292	281
Total Farm labour (MD ha⁻¹)			424	398	374
Costs of variable inputs: ('000 TZS ha⁻¹)					
- Fertiliser NPK 25-10-10	50 kg bags	15,000	150	120	105
- Herbicides	Lts	5,000	15	15	13
- Hired labour	MDs	1,200	374	144	123
- Tools	total sum	15,000	30	15	15
Total cash inputs ('000 TZS ha⁻¹)			569	294	256
Gross margin ('000 TZS ha⁻¹)			259	246	162
Returns to family labour (TZS MD⁻¹)			2,312	843	577

Source: Field Survey 2003

Other key cost components include fertiliser, whose application rate varies across the three case study areas. The medium scale growers apply over 150 kg N ha⁻¹, whereas the typical smallholders in Mufindi apply an average rate of 100 kg N ha⁻¹ their counterparts in Rungwe apply only 37 kg N ha⁻¹. According to the interviewed TRIT extension services manager in Rungwe (Mhagama, 2003), farmers are provided with fertilisers on credit by WTC. However, some of the farmers in Rungwe are reluctant to apply the recommended fertiliser rates of 60 kg N ha⁻¹, because they are not confident whether the expected yields will be adequate for them to break even and repay the fertiliser loans. A majority of the interviewed farmers in Mufindi (n=77) mentioned the same reason. As a result, these variable application rates influence the productivity of the three systems as well as the cost structures. Although the medium scale growers attains the highest yields per unit area, this also lead to increases in their cost structure.

However if the returns to family labour are compared across the three systems, the medium scale growers have the highest earning per unit family man-day compared with the two typical smallholders production systems as shown on Table 6.1 above. This is a result of using less family labour per unit production area compared to smallholder production systems, which tend to rely mostly on family labour. The systems that delivers more output from the same quantity of family labour or less is desirable as it allows the household to use the surplus labour to expand tea production or engage in other productive activities outside tea production.

This is important for smallholder production systems, as higher levels of input usually lead to higher production, which demands higher labour for harvesting. For households with limited family labour and limited access to hired labour, they are likely to lose significant quantity of the crop if they increase the level of input without ensuring that they have access to adequate labour for harvesting. It is important for farmers to balance the resource needed for various farming operations in order to optimise productivity at farm level.

6.2.2. Greenleaf collection and transportation to the factory

Collection and subsequent transportation of the harvested greenleaf to the respective processing factory is the second main stage in the tea value chain. It comprises a range of core activities and support services for ferrying the greenleaf from the farms to the

factories. It links the farm based greenleaf production activities and their respective tea processing factories. Tea, once harvested from the field, is required to reach the factory within 6 – 8 hours otherwise it is spoiled. The range of primary activities and the support services for the greenleaf collection and transportation stage of the tea value chain is presented in Figure 6.3.

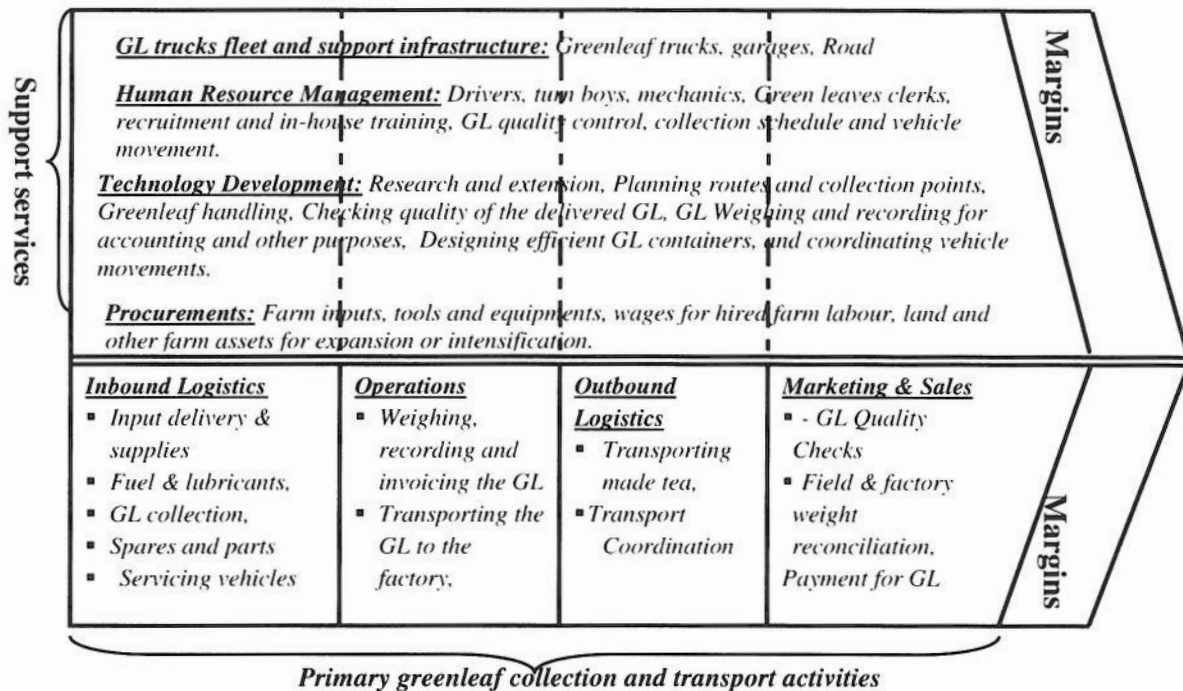


Figure 6.3: Activities within the greenleaf collection and transportation level generic value chain

Structural organisation and activities

Traditionally the transportation function for greenleaf within the tea sector has been organised either as an integral part of the tea processing factory or as part of the greenleaf production unit (tea farms). However, more recently a completely independent transportation companies have been contracted to ferry the greenleaf on behalf of the tea processing factories as illustrated in Figure 6.4. This is part of the tea factory strategy of outsourcing strategic services while the company focuses on processing and marketing of made tea.

Unlike the smallholders in both Mufindi and Rungwe, medium scale growers in Mufindi are involved in both the production of the greenleaf as well as transporting it to the factory. They are therefore paid factory gate prices. For both cases of smallholders in

Mufindi and Rungwe, the function of greenleaf transportation is contracted to private transporters by the respective factories and farmers receive the farm gate prices for their greenleaf. However, between MTC and WTC arrangements, there are further variations on the way transportation of greenleaf is organised. Whereas MTC uses smaller private transporters combined with some farmers who own trucks (who cover different zones in the catchment), WTC uses a single big company (Caspian Limited), which covers the entire catchment area within Rungwe District.

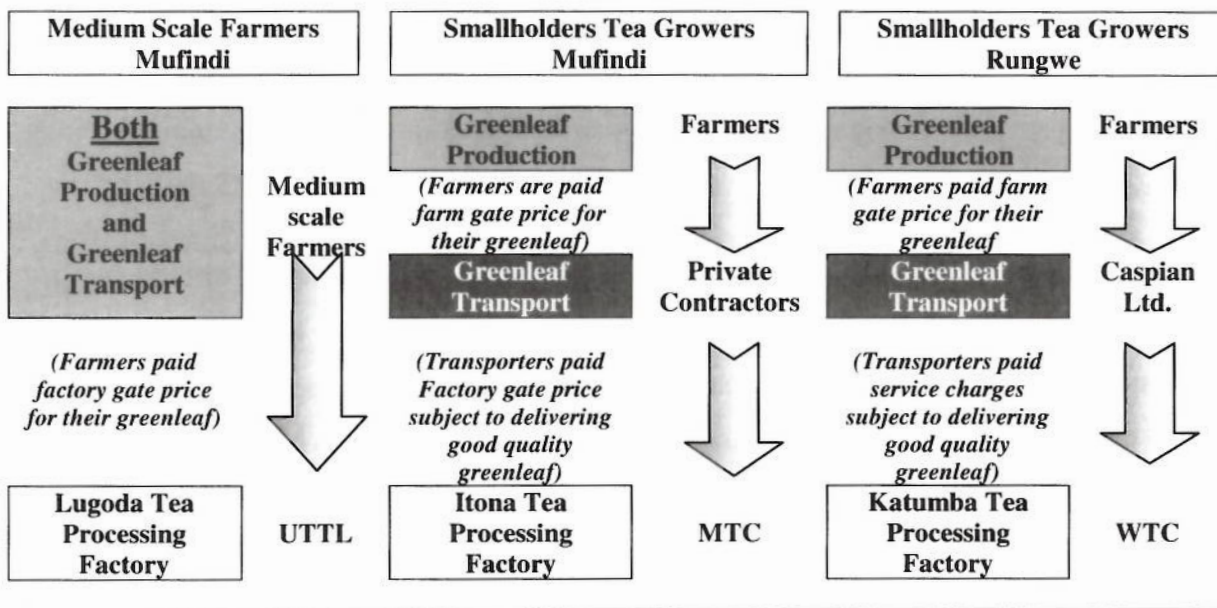


Figure 6.4: Production and transportation of the greenleaf for the case study areas

There are advantages for the arrangement where private contractors are involved like WTC and MTC cases in Rungwe and Mufindi respectively:

- Contractors are specialised transporters with experience of maintaining vehicles and planning transport systems, so they are potentially more effective than individuals or tea growing companies, and this adds value to the entire value chain;
- The arrangement involves shifting the risks from farmers to transporters during a very vulnerable stage of the value chain, after greenleaf is harvested before delivery to the factory. This provides protection to farmers, which boosts their confidence and increases their commitment to continue with tea production;
- Transporters are paid based on volume of delivered greenleaf but subject to fulfilling pre-set quality standards, this arrangement provides incentive for transporters to use sensible checks that ensures most of the harvested greenleaf is collected without

compromising the quality standards. Such balance is difficult to achieve when the factory is directly involved in transportation, as the main focus is usually placed on quality control hence frequent rejection of greenleaf from outgrowers; and

- Engagement of private transporters provides opportunity for the factory to concentrate on processing of tea.

However, there is also potential drawback with this system, especially if contractor operations span outside the tea industry, as there is a possibility of resources being siphoned away from the industry. For cases where growers are compelled to ferry their greenleaf as in the UTTL catchment area, this may prove to be a single limiting factor for resource poor farmers to join tea production as very few are likely to afford investing in means of transportation.

These variations in the management of greenleaf transportation lead to differences in performance of the tea value chain across the three case study areas affecting the distribution of the proceeds in the tea value chain amongst different players. In cases where growers are involved in the transportation of the green leaves, they potentially improve their chances of earning more income from tea as they control two different stages in the tea value chain. Medium scale growers in Mufindi are paid 100TZS as first payment followed by second payments (15-45TZS/kg GL) that depend on the profit realisation at the end of the season. Smallholders in Mufindi (100TZS/kg GL) and Rungwe (96TZS/kg GL) receive only single payments. However as explained earlier this increases their risk levels. On the other hand, the smallholders whose influence on the chain is restricted to production of greenleaf only face less risk but their potentials for expanding their income base from tea is also restricted.

Cost structure and revenue flows for the greenleaf transportation

The transportation function has very specific cost components mostly associated with vehicle capital costs, repairs and maintenance, fuel and lubricants, staff costs, and overheads such as insurance, road taxes and depreciation. It was difficult to obtain information on the breakdown of the transport cost into these categories, as respective transporters were only willing to provide aggregate figures. Table 6.2 provides the overview of the cost components for the transportation of the greenleaf across the three case study areas.

Table 6.2: Cost structure for greenleaf transportation for the three case study areas

Cost items	Medium scale growers (Ex-UTTIL)	Smallholders Mufindi (Ex-MTC)	Smallholders Rungwe (Ex- WTC)
Average distance - field to the factory (km)	18	23	58
Transport cost per kilo of green leaves(TZS)	20*	11	29.4
Average transport time per route ** (hrs)	1.30-2	4-6	1-8
* Own delivery to the factory			
** Influenced by the distance and the condition of the road			

Source: Field Interviews Mufindi & Rungwe 2003

Poor condition of the roads as well as the average distances from fields to the factories contributes much of the variation in the cost structure in the respective catchment areas. Where roads are better as in Mufindi there is significant reduction on transportation time hence allowing faster delivery of the greenleaf. This is important as it enhances delivery of high quality greenleaf which determines the quality of the processed tea and hence the value at the auction. The type of vehicles used is also another factor. The medium scale growers uses mostly smaller trucks, which can move faster with less fuel consumption but a lower payload.

There is a need to analyse further the impact of these three factors (road condition, distance to the factory and type/size of the vehicles) on the efficiency of greenleaf transportation systems in the Tanzanian tea industry in order to recommend the most efficient and effective system that will improve the performance of the tea value chain. Poor roads in Rungwe compounded by the higher average distances from the fields to the factory results in the overall increase on the cost of transporting greenleaf to the factory as shown in Table 6.2.

6.2.3. Tea processing, grading, packaging and wholesaling

The third stage in the tea value chain is the processing of the green tea into black dried tea. This stage involves high capital cost infrastructure in the form of machinery, factory buildings, power and water supplies. Figure 6.5 summarises the main tea processing activities as well as the support services.

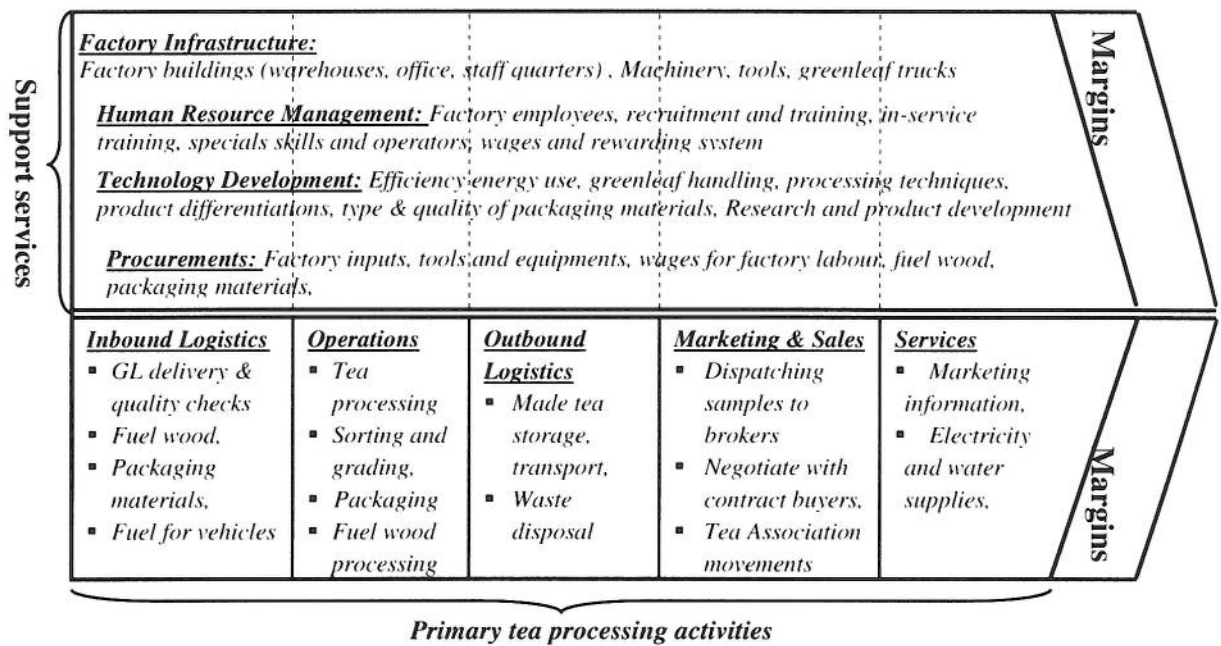


Figure 6.5: Activity categories at the tea-processing level generic value chain

Structural organisation and activities

All the three factories involved in this study use identical processing technology producing similar final product (black tea). The process involves cutting, tearing and crushing (CTC) the tender greenleaf to produce a thick paste, which is fermented to acquire the distinctive taste and aroma found in the brewed tea. The process continues by drying the fermented paste to produce a dry made tea. Sorting based on particle sizes and packaging into known tea grades packages is the final processing activity in the factory. The bulky graded tea is sold on either the regional auction in Mombasa Kenya or by direct sale to respective contract buyers.

The processing of black tea consists of five major stages as illustrated in Figure 6.6. These standardised stages are similar in all the three factories involved in this study as all factories manufacture black tea. However, in terms of global tea market, there are other types of tea products mostly distinguished by the method of processing. This study covers only black tea as this is the only product from the Tanzanian tea industry.

Similarly, as with the previous stages of the tea value chain, there are variations and differences in the way tea processing is organised across the three factories. These differences lead to performance variations, whereby some factories attain sufficient levels

of effectiveness and efficiency. Effective and efficient processing will eventually lead to low production cost per kilo of made tea, hence helping to maintain the profit margins. These aspects of performance are addressed in the following sections of this chapter.

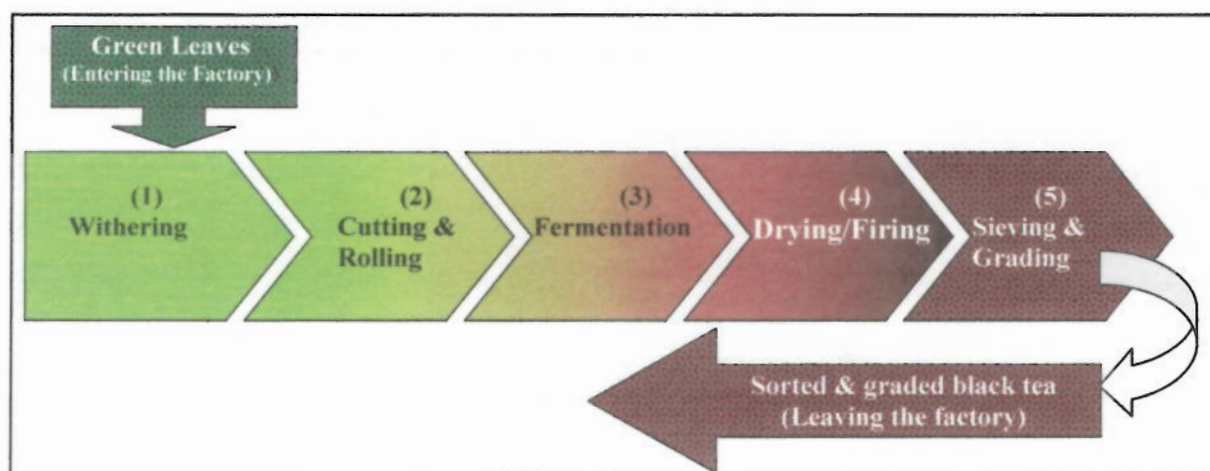


Figure 6.6: Key processing stages within a CTC based tea factory

Cost structure and revenue flows for the tea-processing factory

The cost structure for tea processing is similar across the three factories although the use of different accounting systems across the three factories may have accounted for the big differences in some of the cost components. The main cost components include materials (inbound logistics), power and water, repairs and maintenance, labour, staff salaries, fuel wood and factory overheads. A review of year 2003 production data for the three factories (Table 6.3) shows that UTTL has the highest processing cost per kilogramme of made tea (232) compared with MTC (201) and WTC (158). Differences in processing costs for the three factories provide a measure of the performance efficiencies of the respective factories. UTTL, which processes the biggest volume of tea (12,071tons) in Tanzania, compared to MTC (4,743 tons) and WTC (2,507 tons) requires more repairs and maintenance as shown in Table 6.3 whereby the source of the variation appeared to be higher repair and maintenance costs for UTTL (66.8 TZS) compared to MTC (40.9 TZS) and WTC (33.5 TZS).

Table 6.3: Processing cost structure for three factories serving the case study areas for year 2003 (TZS /kg MT)

Cost Component	Medium scale growers (Ex- UTTL)	Smallholders Mufindi (Ex-MTC)	Smallholders Rungwe (Ex- WTC)
▪ Direct materials	28.6	21.4	22.5
▪ Power and water	40.3	54.7	42.6
▪ Repairs and maintenance	66.8	40.9	33.5
▪ Labour and other costs	28.5	20.6	29.5
▪ Staff salaries and wages	9.1	10.9	4.3
▪ Fuel wood	8.5	22.5	22.1
▪ Factory overheads	50.3	30.2	3.7
Total processing costs (TZS kg⁻¹ MT)	232.1	201.2	158.2

Source: Company Accounts & Records (UTTL, MTC & WTC)

Another cost component showing large variation is the factory overheads whereby UTTL (50.3 TZS) has a relatively higher figure compared with the remaining two factories. Under normal circumstances, one would have expected the factory utilisation percentage to be the main cause for the different overhead costs across the three factories as UTTL and MTC receives a big proportion of greenleaf from their own irrigated tea estates. This provides them with fairly well distributed crop over the year compared with WTC that relies on rain fed smallholders based production systems. On the contrary, it is WTC, which has the lowest overhead costs with factory utilisation capacity of 90% (WTC, 2004). Factory capacity utilisation is determined by the rate of cumulative quantities of processed tea as a proportion of factory daily installed capacity.



PLATE 6.1: A tea garden belonging to a smallholder tea grower in Rungwe district



PLATE 6.2: Reliable and well organised greenleaf collection is a very important component of the tea value chain.



PLATE 6.3: Inside the tea processing factory, green leaf is being fermented ready for drying and sorting into market grades



PLATE 6.4: Made tea packed in standard bulk paper bags ready for sale through auction or contract buyers.

6.3. Framework for assessing the tea value chain

The performance of the value chains tend to vary due to differences in the way activities at various stages of the chain are organised. In order to assess the variation in the performance of the tea value chains it is important to have a set of performance criteria for comparing different value chains. Johnson and Scholes (1999), identified effectiveness in adding value, cost efficiency, fairness (linkages) and robustness as the key basis for identifying organisational competences in the value chain analysis. Effectiveness, efficiency, equity fairness and robustness in adding value to the product are critical to the sustainability of that particular system. In the following sections, the value chains for the three case study areas are compared based on the set of performance indicators (as summarised in Table 6.4). These indicators were derived from multiple sources that include literature review, secondary data from the tea producing companies and results of the qualitative exploratory survey (Chapter 4). Data for computing these indicators were provided by the three tea processing factories involved in this study.

6.3.1. Assessment of the effectiveness of the tea value chains

Effectiveness of the value chain is a measure of the amount of total value created from a given level of resources (Johnson and Scholes, 1999). Practically the assessment of the effectiveness of the value chain is made by determining how well matched are the product/service features are to the requirement of customers or expected outputs. In the tea industry, different stages in the value chain require different sets of indicators for assessing their effectiveness. At the farm scale where the main product is greenleaf, effectiveness is assessed by determining whether the system is able to produce greenleaf of the required quantities and acceptable quality from the stocks of assets available on the farm or accessible to household members.

Table 6.4: Potential indicators for assessing the performance of the key stages of the tea value chain

Tea value chain stage	Associated performance indicators			
	Effectiveness (Outputs)	Efficiency (Input : Output)	Equity/fairness (Distribution)	Robustness (Stability/resilience)
Greenleaf production	<ul style="list-style-type: none"> Yield levels % good leaves Net income per unit area Variability 	<ul style="list-style-type: none"> Production cost /kg Fertiliser use /kg GL Herbicide use Cost of input/ total Plucker-productivity Return to labour Margins/ha** Margins per kg GL** 	<ul style="list-style-type: none"> Returns per ha GL price Returns per manday Returns to capital Margins/ha** Margins per kg GL** 	<ul style="list-style-type: none"> % tea as source of income Price stability Production stability Land tenure & ownership
Greenleaf transport	<ul style="list-style-type: none"> Distance field to factory Proportion of delayed leaves Fuel use /kgs GL Variability 	<ul style="list-style-type: none"> Loss due to spillage Spoiled leaves on transit Average transit time Transport cost/kg GL 	<ul style="list-style-type: none"> Margins per kg GL Returns to capital Returns per kg GL Risks & uncertainties 	<ul style="list-style-type: none"> Infrastructure Services /repairs feasibility Rehabilitation
Tea processing	<ul style="list-style-type: none"> Factory daily capacity Factory capacity utilisation (%) Output of tea by quality grades Prices received Variability 	<ul style="list-style-type: none"> Processing cost per kg Greenleaf/MT ratio Fuel wood/ kgs MT Margins per kg MT** Factory overhead/ total cost Rate of returns to investment Power cost/kg MT Volume of wastes/ tonne of MT 	<ul style="list-style-type: none"> Margins per kg MT** Returns to investment Risks & uncertainties 	<ul style="list-style-type: none"> Market shares Prices trend Profit margins Resilience to political change Resilience to climate change

** Also serves as indicators for equity and fairness in the tea value chain

Household assets include land and the natural environment within which the farming system exist (soil type, rainfall pattern, altitude, temperature and humidity), available family labour and the skill and experiences of members, social networks in the community that may support the tea production systems, available financial resources and access to external funding by household members. Other biotic factors such as type of plants (clones), age of the tea bushes, and general management practices may also determine the effectiveness of any particular production systems.

Table 6.5: Selected assessment indicators for the effectiveness of the tea value chain for the three case study areas

Value chain stage	Assessment metric indicators for the greenleaf production	Medium scale growers (Ex-UTTL)	Small holders Mufindi (Ex-MTC)	Small holders Rungwe (Ex-WTC)
Greenleaf production scale	GL yield levels (kg GL ha ⁻¹)	9,561	5,415	4,357
	% of good GL received	75	85	87
	Net annual income from tea (TZS ha ⁻¹)	288,600	246,000	162,772
	Amount of hired labour (MD ha ⁻¹)	312	106	93
	Family labour input (MD ha ⁻¹)	112	292	281
	Returns to labour (TZS/ MD)	1,493	980	764
	Returns to family labour (TZS/MD)	2,577	843	579
Greenleaf transport scale	Distance fields to factory (km)	18	23	58
	Quantity of spoiled leaf on transit (kg/Annum) & (% of total)	30,276 (1.2%)	26,280 (0.78%)	105,009 (0.92%)
	% of leaf loss due to spillage	0.4	0.2	1.25
	GL volume (Tonnes/Annum)	2,523	3,350	11,433
	Good greenleaf received (%)	75	60	76
Tea processing scale	Factory capacity (Tonnes/day)	260	120	160
	Factory capacity utilisation (%)**	72	75	90
	MT prices received (US\$/kg MT)	1.28	1.32	1.41

** Seasonal GL production means the factories are under-utilised for approximately 4 months of each year

Greenleaf production stage

In the scale of greenleaf production, assessment indicators include yields levels, proportion of good leaves received at the factory, net income from tea, amount of hired labour per hectare, amount of family labour input per hectare, returns to farm labour and returns to family labour as shown in Table 6.5 above. Comparison of the three case studies shows that the medium scale growers who produce more per unit area (9,561 kgs GL ha⁻¹) and have higher net income per hectare compared with the two typical smallholder's production systems in Mufindi and Rungwe. It appears this is due to the use of higher levels of agro-chemical input, which raises their greenleaf production per unit area and hence income.

Results in Table 6.5 also indicate that medium-scale growers have higher returns per family labour (2,577 TZS/MD) compared with the two typical smallholders systems in Mufindi (843 TZS/MD) and Rungwe (579 TZS/MD) respectively. This confirms the results of the farm survey that also suggested medium-scale farms have higher yields per unit area compared to the smallholdings. However, comparison of the returns to farm labour across the three case study areas, shows that the extent of variation is relatively less between the medium scale growers (1,493 TZS/MD) and the smallholders (980 & 764 TZS/MD) for Mufindi and Rungwe respectively. Higher quantities of hired labour (312 MD) by medium scale growers contributes to higher cost of production that lowers their rate of returns to farm labour, despite being higher than the two smallholder case study areas.

However, the results also indicate that smallholder production systems (both in Mufindi (85%) and Rungwe (87%)) produce higher quality leaf than medium scale growers (75%) as shown by the proportion of good leaves over total greenleaf received at the collection centres. Higher quality greenleaf often lead to manufacture of higher quality tea that fetches better prices in the market as evidence indicates from both factories; (MTC 1.32US\$ /kg MT and WTC 1.41US\$/kg MT) shows. Therefore, although the smallholders may appear to be less competitive in terms of greenleaf production, they are relatively more effective in producing higher quality standards of harvested greenleaf compared to the larger scale production systems. This is a very

useful strength for the smallholder production systems because of the significance of quality in determining the value of made tea at the auctions. This trend conforms to the widely known case of the Kenyan smallholder's tea industry (which accounts for over 60% of the Kenyan production) which consistently out-performs the estates sector in terms of quality of the produced tea. (KTDA, 2003)

However, since the medium scale growers have higher production per unit area than smallholders, their return per unit area is also significantly higher. Quality of the harvested greenleaf is often associated with proper enforcement of plucking standards, a task which relies significantly on the effectiveness of the field extension staff as well as farmers commitment to delivering good quality tea. In Rungwe, WTC have instituted a specific extension service to oversee quality maintenance as well as improving greenleaf production per unit area in the catchment area.

Greenleaf collection and transportation stage

Five performance indicators were used to compare the effectiveness of the greenleaf transportation stage across the three case study areas. They included average distance from fields to the factory, proportion of lost leaves due to spillage, average delivery time per route, total volume of transported leaves and quantity of spoiled leaves on transit.

Rungwe district, with an estimated 14,000 growers, has the longest average field to factory distance (58 km) followed by smallholders in the catchment that supply the MTC (23 km). The medium scale growers who are responsible for transporting their greenleaf to the factory are located within the 18 km radius from their respective factory (UTTL). Shorter distances reduce time taken to deliver the leaves to the factory with less risk of deterioration whilst in transit. Also with shorter distances to the factory, farmers in the catchment area have more harvesting time as the greenleaf trucks can wait until late before collection and delivery to the factory.

Shorter distance from the factory also allows the possibility of making more than one collection run using the same truck, an option which is not possible for distant collection centres. This kind of flexibility increases farmers' ability to manoeuvre available resources, especially labour for harvesting tea, to ensure that all greenleaf that is due is harvested and delivered to the factory within the permissible time. Such flexibility does not exist in distant farms, as trucks need to deliver greenleaf within a specified time window to allow the factory to start processing leaves at the same time as leaves delivered from nearby farms. Therefore, farmers in distant farms have a relatively shorter window of time within the day to harvest their crop before the trucks arrive and this reduces the effectiveness of not just the collection and transportation system, but also the greenleaf production stage.

The quantity of greenleaf handled in a particular production system highlights the scale of the activity, which in turn helps to compare the logistical as well as operational challenges. Results in Table 6.5 show that smallholders in Rungwe handle the biggest quantity of greenleaf (11,433 t GL/annum), whereas the medium scale growers in Mufindi who account for only 5% of the total UTTL crop had the least quantity (2,523 t GL/ annum).

The leaf loss due to spillage is caused by poor condition of the road as well as unsuitable designs of the collection trucks. The extent of the loss across the three factories ranges between 0.2 – 1.25%, whereby the smallholder catchment area in Rungwe (1.25%) had the highest losses compared with the remaining case study areas both with just under 0.5% lost leaves. The proportion of lost leaves provides a good indication of the effectiveness of the transportation function for the three catchment areas. However, the combination of effective plucking standards and faster and organised transportation systems appear to have contributed to production of good quality tea at WTC factory.

The proportion of spoiled greenleaf in transit is another realistic performance indicator to measure the effectiveness of the green leaf collection and transportation system. Results in Table 6.5 show that, the proportion of spoiled greenleaf ranges between 0.78 – 1.2%, whereby the medium scale growers had the highest proportion

of spoiled greenleaf. Greenleaf deterioration in transit is aggravated by other factors such as poor road conditions, design and state of the vehicles, and the organisational efficiency of the transporters. The medium-scale growers who recorded the highest proportion (1.2%) of spoiled leaves are less effective. Specialisation of the contactors on transportation business for the two smallholder catchment areas may have attributed to more effectiveness compared to medium scale grower's catchment area.

Another performance indicator is the proportion of good leaves received at the respective factories. This indicator captures the effectiveness of both green leaves production (plucking standards) and the transportation function. However, each factory has different quality standards, a situation that may render this indicator invalid for comparing the effectiveness. However this indicator can be used to measure achievement against the pre-set quality standards. The smallholder's production system in Rungwe (76%) as well as medium scale growers (75%) delivered a higher proportion of good quality leaves compared to smallholders in Mufindi (60%). This suggests that the two systems are equally efficient in the collection and transportation of the greenleaf to their respective factories.

Tea processing, packaging and wholesaling stage

A tea-processing factory is considered as the anchor of the tea value chain: a stage where the core competence of the entire tea value chain resides. It is a specialised stage where involvement of high capital costs restricts the likelihood of competitors joining the chain. Most of the activities upstream (green leaf production) as well as downstream (marketing and sales) are usually controlled by the decisions made at the tea-processing factory. Even with the involvement of exclusively different stakeholders in various stages of the tea value chain, the factory is the centre for most of the business initiatives and decisions within the tea value chain.

In order to assess the effectiveness of the tea processing, packaging and wholesaling, the following performance indicators were compared across the three case study factories;

- Factory capacities,
- Factory capacity utilisation, and
- Prices received by the factories for made tea.

Factory capacity is important it determines the maximum volume of green leaves that a factory is able to process in a single day. This also determines the size of the catchment area that can be served by a single factory at a given field productivity level. UTTL with three factories has the combined capacity of 260 t GL d⁻¹, but 95% of the received greenleaf comes from their own estates. On the other hand, MTC has a dedicated processing line for smallholders with a capacity for 7 t GL d⁻¹. Smallholders supply over 23% of the total production at MTC. WTC in Rungwe, whose capacity is 160 t GL d⁻¹ relies almost entirely on smallholder farmers. Factory capacity has a significant influence in determining the size of the tea industry in a particular catchment area as well as efficiency of the tea processing as described below.

Capacity utilisation is a much more realistic measure of the effectiveness as well as efficiency of the tea processing stage compared with the factory capacity alone. It is a proportion of the installed factory daily capacity which is utilised effectively to process tea as determined by the volume of received green leaves per day. Table 6.5 shows that WTC factory in Rungwe with 90% cumulative capacity utilisation is more effective compared with MTC (75%) and UTTL (72%). The seasonal nature of tea production as influenced by rainfall and temperature patterns in the case study areas, accounts for much of this variation in factory utilisation capacities as affected by seasonal fluctuations in greenleaf supply.

The typical production cycle for both the medium scale and smallholders in Mufindi (without irrigation), as illustrated in Figure 6a, shows a large single peak around February and March whereas an equally large trough culminating on the lowest production around July, August and September is recorded. This pattern creates problems as usually a mismatch between factory capacity and the supply of green leaves occurs during peak production where the factory is unable to deal with the volume of delivered leaves. Likewise, during low production, the factory is under utilised leading to higher overhead costs per unit output (Figure 6c). Use of irrigation

in the estates sector helps to spread the distribution of the crop over the year as illustrated in Figure 6b.

The mismatch between the factory capacity and seasonality in the supply of the greenleaf have an affects to the smallholders because their leaves are not processed separately from those produced from the estates; rather they make up the total raw materials received at the factory ready for processing. Although the estates sector in Mufindi use irrigation to even out the supply of greenleaf, the factories are under utilised during the colder months of May, June, July and August when lower temperatures restrict growth of the tea bushes. On the contrary Rungwe district has more even rainfall and temperature distribution throughout the year compared to Mufindi. This gives Rungwe tea production systems natural advantage over Mufindi as it is possible to attain higher factory utilisation, which may lead to more effective processing stage compared with factories in Mufindi.

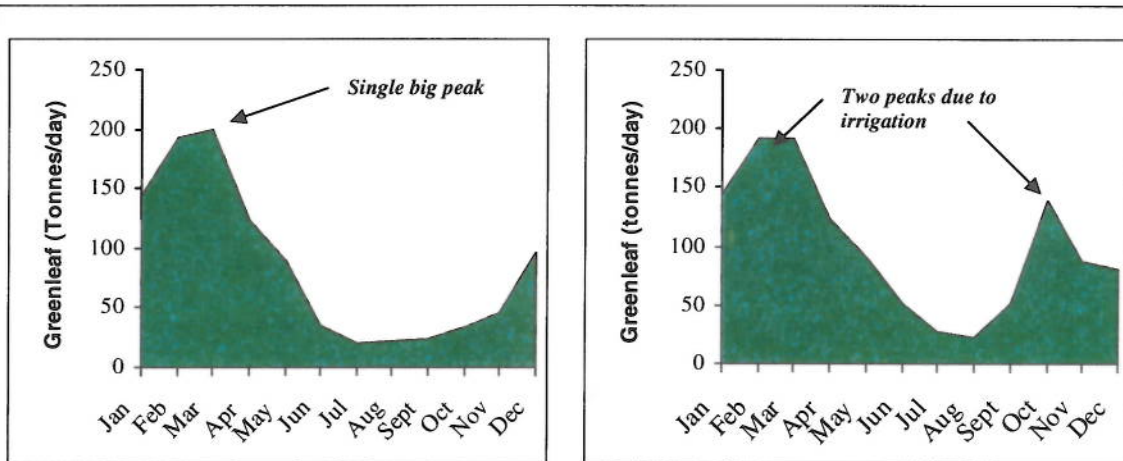


Figure 6a: Southern highlands without irrigation

Figure 6b: Southern highlands with irrigation

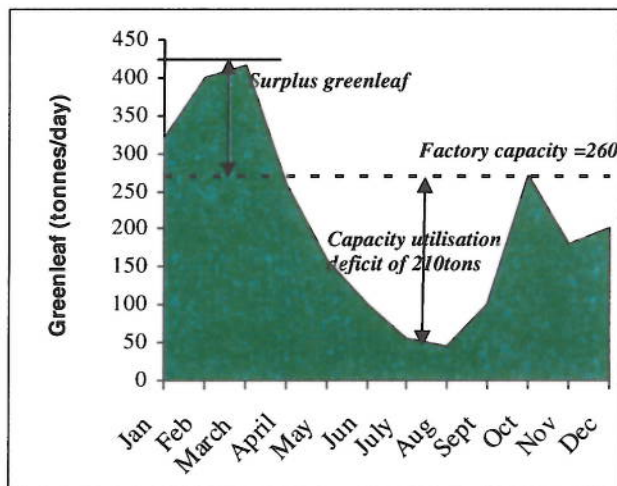


Figure 6c: Mismatch between capacity and GL supplies

Source: Tanzania Tea Production records TBT, (2003)

The price received by the factories for made tea (which reflects the quality of made tea) is a good measure of the effectiveness of the value chain. Tea quality plays a vital role in determining the final value at the auction. Although market forces may affect the general price levels, it is quality which distinguishes the value of made tea across different factories irrespective of demand and supply patterns on the market place. It is WTC (1.41US\$) with consistently higher quality tea, which realises better prices for a kilo of made tea than UTTL (1.28US\$) and MTC (1.32US\$). However, the made tea prices alone may not exactly determine the effectiveness of the production system especially if there is limited price transmission to the smallholders down the value chain. A detailed breakdown of the margins and operating profit levels for the

various stages in the tea value chain across the three case study areas is presented in the next section in order to explore value added and its distribution to various players in the chain.

6.3.2. Assessment of the efficiency of the tea value chains

Efficiency is a measure of input: output ratios which provide another way of assessing the performance of the value chain. The ratios can be physical (e.g. km per litre), financial (e.g. TZS/ha) or profit recorded (Revenue-cost). It involves measuring the amount of resources needed to create a given quantity of output or value. For the Tanzanian tea industry, efficiency contributes to adding value for the resources invested along all the three stages of the value chain (greenleaf production, transportation, processing, and sales), unlike effectiveness which measures delivery/achievement made against the target output. Therefore, efficiency is a measure of the rate at which inputs are used to generate the intended outputs in a particular value chain.

As indicated in Table 6.4 above, efficiency at the greenleaf stage is assessed by comparing the levels of unit production costs, ratio of input use per unit product, proportion of cost for major inputs, productivity of pluckers, and returns to labour and other resources (capitals) invested. At the greenleaf transportation stage, performance indicators such as transport cost per kilo of the greenleaf and average fuel use (l/km) was used to compare the efficiency of the value chains. Finally, at the processing, packaging and wholesaling level, the following performance indicators were used to measure the effectiveness of the tea value chain:

- ratio of green tea to made tea (out turn)
- processing cost per unit output
- power costs per unit output
- fuel wood over made tea ratio
- Proportion/ volume of wastes produced per given product volume
- Rate of returns to investment

The efficiency of the greenleaf production stage

Results in Table 6.6 indicate that the costs of greenleaf production are identical for the two systems based in Mufindi district (54.4 & 54.3 TZS/kg GL), whereas the smallholder system in Rungwe (71.8 TZS/kg GL) had a significantly higher costs of production. Higher production costs reduce margins at farm level especially for low yielding systems and this can subsequently reduce farmers' ability to re-invest and improve both productivity as well as scale of production in their respective production systems. Low productivity is often associated with unsustainable production systems.

The nature of the tea crop, which involves continuous removal of the vegetative part of the plant (leaves) during harvesting, demands higher level of nitrogenous fertilisers to replenish the plants for the removed leaves. Therefore, it is a standard practice in the tea industry to apply nitrogen fertilisers (usually applied in the form of compound NPK formulation) to optimize economic returns. The results of long-term experiments conducted in the southern highlands of Tanzania showed that at the application rates ranging from 20 – 150 kg N ha⁻¹ the yield response to nitrogen averaged 63 kg GL per kilo of nitrogen applied (TRIT, 2000).

Results in Table 6.6 show that medium scale growers in Mufindi (60 kgGL/1 kgN) have the highest fertiliser to greenleaf production ratio, followed by the smallholders in Mufindi (54 kg GL/ kg N). These response levels are relatively high compared with the regression analysis presented in Chapter 5 that showed an increase of 1kg N ha⁻¹ resulted in a corresponding increase of 29 kg GL. The result identified fertiliser together with farm labour, number of years the farmers has been growing tea and distance to the nearest estate as factors responsible for variation in the estimated greenleaf yield for the typical smallholder tea production systems.

The rate of agrochemical input use in tea production reflects also the amount of resources committed for tea production by that particular household. Higher fertiliser rates imply the households also have adequate labour, which will be required for harvesting the bumper crop. Using this reasoning, the medium scale growers in Mufindi (120 kg N ha⁻¹) are more efficient in terms of returns per unit of fertiliser

compared to smallholders in Mufindi (80kgN/ha) and Rungwe (36kgN/ha). The same trend was observed for the quantity of herbicides used across the three case study areas.

Table 6.6: Selected assessment indicators for the efficiency of the tea value chain for the three case study areas

Value chain stage	Assessment metric indicator	Medium scale growers Mufindi (n=25)	Small holders Mufindi (n=77)	Small holders Rungwe (n=201)
Greenleaf production Scale	Greenleaf yield (kgGLha ⁻¹)	9,561	5,415	4,357
	Production cost (TZS/kg GL)	54.4	54.3	71.8
	Fertiliser use (kg N ha ⁻¹)	120	80	36
	Herbicide use (l ha ⁻¹)	6	4	2.5
	GL/Fertiliser ratio (kg GL/kg N)	60	54	44
	Agro-chemicals /total cost (%)	36	51	52
	Pluckers productivity (kg GL d ⁻¹)	20	17.7	14.7
	Family labour return (TZS/MD)	2,577	843	579
Greenleaf transport scale	Transport cost (TZS/kg GL)	20	11	29.4
	GL transport time per route (hrs)	1.30-2	4-6	1-8
Tea processing Scale	Processing cost (TZS/kg MT)	263	229	180
	Power cost (TZS/kg MT)	46	62.3	48.6
	GL /MT ratio (out turn) (%)	21.5	21.9	20.8
	Fuel wood use (Kg MT /m ³)	198	205	200
	Volume of wastes produced (% of MT produced)	0.3	0.5	0.48

Source: Own Field Survey 2003

The proportion of costs for agrochemical inputs over total production costs is another important performance indicator. Agro-chemicals (especially nitrogen fertiliser) are farm inputs imported from outside the household and often this involves direct financial transactions, unlike other resources such as family labour and land. In this respect the higher the proportion of costs spent on agro-chemicals, the more likely the

system is dependant on external resources and hence more prone to risks associated with operational failures (logistics, prices, quality, and performance).

The medium-scale growers (36%) have the smallest proportion of agro-chemical input costs compared with the typical smallholder production systems. (Mufindi=51%; Rungwe=52%). But this is caused by use of relatively more hired labourers, who raise the total production cost for the medium scale growers. The superior performance of the medium scale production system is consistent for other performance indicators (pluckers productivity and returns to family labour) as shown in **Table 6.6** above.

The efficiency of the GL collection and transportation stage

Two performance indicators were used to compare the efficiency of the GL collection and transportation systems namely: average transportation cost per kilo of GL and the average greenleaf delivery time per route (hours). Medium scale growers (20TZS/kg GL) have a relatively higher cost structure compared to the smallholders (11TZS/kg GL) despite of both being in Mufindi District where the roads are relatively better compared to Rungwe. Therefore, in Rungwe District, the cost for ferrying leaves is higher than Mufindi district, due to bad roads, and significantly longer average distances between farms and factory.

An efficient transportation system should be capable of delivering good quality leaves to the factory at the lowest possible cost and the shortest time possible. Comparison of the three case study areas does not show much differences in the efficiency of the greenleaf transport systems. Although, the Rungwe smallholder catchment area, despite having longer average distances to the factory, has kept a relatively low cost structure with competitive delivery times. For example, the average greenleaf delivery time per route in Mufindi (23 km) is five hours, which translates into the average speed of approximately 4.6 km/hour. In Rungwe (58 km) where the upper bound is eight hours, the average speed is approximately 7.25 km/hour, which is considerably faster than Mufindi. However what matters most is whether the system is able under the circumstance to deliver greenleaf to the factory within the shortest time possible in order to maintain quality standards. Road maintenance in rural areas is the

responsibility of the local district councils, though the tea estates occasionally undertake repair work to ensure smooth and timely delivery of greenleaf.

The efficiency of the processing, packaging and wholesaling stage

According to the results in Table 6.6, WTC has the lowest processing cost (180 TZS/kg MT) compared with the two Mufindi factories, which is consistent with the earlier stages of the tea value chain. Lower processing costs help the factory to realise higher margins, which increases the prospect of smallholders benefiting from better prices (assuming that a fair and equitable distribution of the proceeds is in place).

Electrical power is another cost component for factories. In Tanzania, power is provided by the state owned TANESCO and according to TAT (1999), the power tariffs in Tanzania are among the highest in Africa. Results show close similarity between WTC and UTTL factories in terms of power cost per kilo of made tea (UTTL=US\$ 0.46, WTC= US\$ 0.49). However, MTC (US\$ 0.62) had the highest power cost. The type of machinery and technology used often determines the power consumption efficiency. This is a capital-intensive stage of the value chain and often there is limited flexibility as consumptions rates do not vary. However, due to stagnant tea prices, compounded by rising cost of production, it is important for the factories to invest in energy saving technologies and infrastructure in order to reduce processing cost and hence increase margins.

The rate at which greenleaf is converted into made tea through processing (out run) is a measure of the efficiency of any particular tea factory. According to the results in Table 6.6, the out turn of the three factories (21 – 22%) is very similar, reflecting the use similar processing technology. A higher outturn percentage indicates that the factory is efficient as it produces more made tea from equally the same quantity of raw materials (green leaves) that other factories (with less out turn percentage) are capable of producing. In order to improve efficiency some factories employ the concept of benchmarking. According to Hill and Jones, (2001) benchmarking is the process of measuring company performance against the products, practices and

services of some most efficient global competitors with the view of adopting them to improve efficiency. For the Tanzanian tea industry, the smallholders sector benchmarks its performance against the estates sector, whereas the estates sector pegs its performance against Kenyan companies that fetch better prices at the Mombassa auction.

The proportion of overhead costs over total costs also indicates the operational efficiency of the factory. A well-planned and functioning processing factory is expected to have lower overhead costs compared to the core direct processing costs. Table 6.6 shows that UTTL (21.7%) has the highest proportion of overhead costs compared with the remaining factories. WTC particularly had an uncharacteristically very low proportion of overhead cost (2.4%) despite undergoing significant refurbishment requiring large capital injection. The cost of servicing loans and capital expenditure alone would have potentially put WTC at par with the two remaining factories in terms of proportion of overhead costs over total costs. This result raises questions on the uniformity of the descriptions of the cost components across the three factories

Fuel wood is a key input used to fire boilers that generate heat used to dry the tea as well as initial moisture reduction (withering) at the beginning of the tea processing cycle. The quantity of produced tea from a cubic metre of fuel wood is another indicator used to measure the efficiency of the tea processing stage on the value chain. Table 6.6 shows a small variation across the three factories on the rate of fuel wood use for tea processing. The three factories produce between 198 – 205kgs of made tea from one cubic metre of fuel wood used in the factory. MTC have slightly more efficient factory as it turns out more made tea (205 kgs) per cubic metre of fuel wood.

In the wider context, use of fuel wood for tea processing has been a subject of fierce criticism from the environmentalists as in the past. The process initially involved harvesting natural forests hence causing significant environmental damage. However, the tea industry in Tanzania has responded to this challenge by developing a self-sufficient renewable source of fuel wood through forestry programmes. UTTL in particular has made significant progress on this aspect as it grows eucalyptus species,

which is harvested on 8-10 year cycles producing up to 100 m³ of fuel wood per hectare (Unilever, 2003). In addition, natural forests are maintained by both estates as well as smallholders. UTTL despite of having only 3,000 ha of tea, maintains 14,000 hectares of natural forests which play a vital role in preserving bio-diversity as well as wetlands which are important catchment for the two major rivers (Ruaha and Kilombero) in Tanzania (Unilever, 2003).

According to Mbunda (2003), the smallholders in Mufindi maintain micro catchment programmes at local community levels whereby they have identified the critical catchment areas and protect them from encroachment by new tea growers. In Rungwe WTC is assisting farmers to grow woodlots by providing them with seedlings. The company also buys fuel wood from farmers hence, widening their source of household income. For the individual factory, the cost of maintaining these woodlots and outgrowers programmes is often accounted for and adds to processing costs. Factories which use less fuel wood per unit production will also contribute to the efficiency of the tea value chain by lowering cost of production while contributing to environmental conservation.

The proportion of wastes over total greenleaf processed by the tea factories is used to indicate performance from waste management perspective. According to the factory manager for WTC (Kambasila, 2003), the main wastes produced from a factory include ashes from the boiler, fibres extracted from the dried tea and dirty water used for cleaning machinery and the factory. Across all three factories, the proportion of the wastes produced ranges between 0.3- 0.5% of the total weight of greenleaf processed. The biggest advantage with wastes from tea processing is they are mostly biodegradable and can be recycled into the tea value chain. The fibres are used as mulch on newly established tea farms, whereas condensation emissions from withering troughs are recycled back into the boilers. There appear to be distinct variation across the three factories in terms of waste production and management.

6.3.3. Assessment of the equity/fairness of the tea value chains

Equity or fairness relates to how the wealth created in the product value chain is shared amongst participants in that particular chain. For the tea industry, key participants include; smallholder growers, greenleaf transporters, estates sector (some owning processing factories), and other service providers. The following section presents the assessment of the proportionate sharing amongst key participants in the tea value chain for the three case study areas, as an indication of how equitable is the distribution of value created along the chain. This assessment provides further basis for determining the sustainability of the respective production systems.

Comparison of the profit margins and the proportion of the operating profits

A profit margin defined as the result of Revenue - Total Costs represents the net value retained by the participants at the given specific stage of the chain after deducting the associated cost in the value adding activity. The margins need to be positive over the medium to long term. Results in Table 6.7 show that the smallholders in Mufindi and Rungwe receive farm gate prices, whereas medium scale growers receive the factory gate price because they are responsible for transporting their greenleaf to the factory.

Table 6.7: Selected assessment indicators for the equity/fairness of the tea value chain for the three case study areas

Value Product	Proportion of value acquired	Medium scale growers Mufindi	Small holders Mufindi	Small holders Rungwe
Farmers (Greenleaf at farm Gate)	Greenleaf price (TZS/kg GL)	--	100	94
	Total cost (TZS/kg GL)	60	54	59
	Net Margins (TZS/kg GL)	--	46	35
	Operating profit (%)	--	46	38
Transporters Greenleaf at factory gate)	Greenleaf price (TZS/kg GL)	135	120	123
	Transport cost (TZS/kg GL)	20(80)	11(100)	19(94)
	Net Margins (TZS/kg GL)	56	9	10
	Operating profit (%)	41	45	35
Factories (Made tea at auction price)	Price of made tea (TZS/kg MT)	1,502	1,548	1,654
	Processing cost (TZS/kg MT)	264	228	179
	Sales costs (TZS/kg MT)	140	158	146
	Net Margins (TZS/kg GL)	424	562	713
	Operating profit (%)	28	36	43

Comparison between the two sets of smallholders show that Mufindi farmers (46%) have a higher proportion of operating profit (defined as the percentage of net income over total revenue per kg of the greenleaf), compared to those in Rungwe (38%). Two factors account for this variation: Mufindi farmers receive higher greenleaf prices and they have lower operating cost compared to their counterparts in Rungwe. In both cases of the smallholders, the cost of production excludes the family labour which does not involve financial transaction.

The medium scale growers have the advantage of commanding two stages of the tea value chain, production and transportation of the greenleaf. Their combined net margin, which is 56 TZS/kg GL, is marginally higher than the remaining smallholder cases where contracted transporters operate (Mufindi-54.75 TZS/kg GL and Rungwe = 45.65 TZS /kg GL). However, comparison of the operating profits shows that greenleaf transporters in Mufindi (45%) had the highest proportion of operating profit

per unit value of greenleaf, whereas the transporter in Rungwe (Caspian Ltd.) had the lowest operating profit margin (34.7%). This provides clue that involvement of contractors in the value chain may not have added financial value to the chain, though it appear to have increased performance of the chain in terms of effectiveness and efficiency. The net margins at the factories stage show a different trend whereby the Rungwe WTC factory (43%) has the highest proportion of operating profit compared with the two factories in Mufindi (MTC=36% and UTTL=28%).

In broader terms, the result shows that performance of the entire value chain is determined by the performance of the individual stages in the chain. A good example is the Rungwe smallholder chain where the field stages of the value chain had the lowest proportion of operating profit, but the situation improved at the factory stage. In addition, the involvement of contractors in the transportation stage appears to have helped the factories to increase their net margins, but this did not help the smallholders in the perspective of their catchment areas where the pre-factory greenleaf prices lag behind those paid to medium scale growers by UTTL.

Comparison of the value chain participant shares of the final product value

Another criterion for comparing the equitability of the value chain is through assessing the share of the final product value to various participants in the chain, providing an insight into the relative influence of each individual participant in the value chain. The higher the proportion of the final value allocated to the participant, the higher is their degree of influence on the performance of the value chain. Figure 6.7 show that apart from the medium scale growers who control 42% share of final auction price, it is the tea processing factories that control the highest proportion of the product value in their respective chains.

Product / Location	Shares to the participants in the tea value chain	Medium scale growers	Smallholders Mufindi	Smallholders Rungwe
Auction Price (TZS/kg GL)		(300.2)	(309.7)	(330.8)
Black tea (Mombasa Auction)	Cost, margin and share to sales agents	9.3%	9.9%	8.7%
Ex-factory value (TZS/kg GL)		(272)	(279)	(302.6)
Black tea (Ex-factory value)	Cost, margin and share to factories	48.9%	51.3%	54.2%
Factory gate value (TZS/kg GL)		(125)	(120)	(123.4)
Greenleaf (Factory gate)	Cost, margin and share to transporters	41.6%	6.5%	8.8%
Farm gate price (TZS/kg GL)			(100)	(94)
Greenleaf (Farm gate)	Cost, margin and share to farmers		32.3%	28.3%

Figure 6.7: Proportionate allocation of margins along the tea value chain for the three case study areas

Smallholders in Mufindi (32.3%) and Rungwe (28.3%) account for less than a third of the product value whereas factories control around half of the product value along the chain. The role of the factory extends to the auction, despite the involvement of brokers and sales agents who claim 8 – 10% of the made tea value including the transportation, brokerage and cess payment by the respective factories.

Assessment of the tea value chain based on the categories field (greenleaf production) stage, factory (processing) stage and auction (sales and marketing), show that the medium scale growers (supplying greenleaf to UTTL) have the highest field share (42%) compared to the smallholders in Mufindi (39%) and smallholders in Rungwe (37%). The allocated share represents the portion of the total value that a participant is able to earn in the value chain before considering the operating cost. So a bigger share should ideally reflect more flexibility to chain participant has on cost control to

maximise the net margin, whereas the smaller share reflects less flexibility. A good example is for transporters who control just less than 10% of the final value in the chain. The impact of improving performance will be limited to within a narrow range of the final value compared to processing factories that control about 50% of the final product value. The proportionate distribution of the shares of the product value in the chain can be used to identify the possible targets for improving the overall performance of the value chain and hence the sustainability of the production system.

Review of the alternative tea value chain

So far, the three case study areas represent the traditional value chain for the Tanzanian tea industry. However, other marketing channels offer somewhat different value chains that are worth reviewing and comparing with the traditional value chains. The Fairtrade[®] chain (Table 3.8) is one example of an emerging chain in Tanzania. According to FLO (2004) the trading standards for Fairtrade products, including tea, stipulate that traders have to:

- pay a price to producers that covers the costs of sustainable production and living;
- pay a premium that producers can invest in development;
- partially pay in advance, when producers ask for it; and
- sign contracts that allow for long-term planning and sustainable production practices.

Table 6.8 presents the conditions and pricing criteria for the Fairtrade tea chain. The biggest advantage of the Fairtrade chain is the premium payment of € 0.50 kg⁻¹ to suppliers (tea factories). In addition, the Fairtrade value chain stipulates clearly that the minimum price paid to growers should not be less than the market price. Where a Fairtrade minimum price has not been set, buyers and sellers negotiate a price based on auction prices and the conditions stipulates that the price must at least cover production costs.

These two conditions ensure that the Fairtrade price is equal to or above the minimum market price plus the premium payment. For example, the likely price under the fair

trade value chain for the three case study factories would have been 1.28US\$ + € 0.50 kg MT⁻¹ for UTTL, 1.32US\$ + € 0.50 kg MT⁻¹ for MTC and 1.41US\$ + € 0.50 kg MT⁻¹ for WTC.

Table 6.8: Conditions and pricing criteria for Fairtrade tea products

Payment Criteria	Type of tea products	
	CTC teas	Orthodox teas
Form	Made tea (black tea bulky)	Made tea (orthodox)
Quality	CTC, Orthodox Dust, and Fannings & Rooibos, Camomile, Hibiscus, Peppermint	All other orthodox teas
Geographical Origin	All sources	All sources
Fairtrade price	Market price + Premium	Market price + Premium
Volume	Kilogramme of made tea	Kilogramme of made tea
Basis	FoB (Ex-auction)	FoB (Ex-auction)
Minimum price	Market price	Market Price
Premium	€ 0.50*	€ 1.00*

* Exchange Rate June 2003 1€ = 1,220TZS

Adapted from <http://www.fairtrade.org.uk/> (accessed on 15th January 2006)

The Fairtrade Scheme has limits on the volume of tea sold through it. In Rungwe for example out of the total 2,486 tons of tea produced by WTC in 2003 only 5-6% of this was sold through the fair trade marketing chain.

Small farmers can join Fairtrade if they have formed organisations (such as co-operatives, associations or other organisational forms). RSTGA has enabled WTC to qualify for the Fairtrade scheme. RSTGA was able to demonstrate its ability to contribute to the social and economic development of their members and their communities and is democratically controlled by its members.

A rigorous vetting procedure is used by FLO to certify these farmer organisations as well as factories vying for the Fairtrade market. However, the system is not very

effective for the smallholder systems with large numbers of producers like Rungwe. For smallholders, the concern of individual growers is increasing their income from tea in order to support their livelihood while retaining enough resources to maintain their tea gardens, whereas Fairtrade premium focuses on community development projects. However the fair trade marketing system provides better prices than the conventional tea value chain.

6.3.4. Assessment of the robustness of the tea value chains

Robustness relates to the stability of the value chain particularly its ability to withstand shocks and survive while still offering sustainable livelihood and earnings to various participants in that chain. In purely technology based manufacturing value chains, robustness is determined mostly by the degree of difficulty for competitors to imitate and break into the niche market. However, for agricultural production systems like tea, which deal with primary processing, robustness is determined by ability of the participants in the chain to withstand shocks. For the tea industry, the main challenges include socio and political pressures of operating in developing countries, need for flexibility to changes in the consumer preferences and market forces, need for resilience to changes in prices and input costs and need to maintain and develop the assets within the tea industry.

Adaptation to political and social settings

The political system in Tanzania has a history of nationalising productive infrastructure and government interference on business affairs. This background has created an awareness especially for private multinational corporations and local investors who own the majority of the processing infrastructure in the Tanzanian tea industry. One of the responses to this uncertainty has been to involve smallholders as shareholders in these factories. This move was mandatory for the privatised state owned factories whereby the government reserved 25% of the stakes to smallholders. For the three case study areas only WTC have the partnership with smallholders who own 25% of the shares while UTTL and MTC are still solely owned by private investors. Involvement of smallholders creates security against public sector

interference as while majority of shares belong to private or foreign investors, still the factories are co-owned by local smallholder farmers.

For the remaining two factories, which are entirely owned by private investors, the share of the crop from smallholders is another stabilising factor against political uncertainty. MTC for instance absorbs up to 23% of its factory capacity from smallholders. Such commitment and reliance by the factory on smallholders who in turn receive their payment on time helps to protect the investment against possible state intervention, which could have been a possibility if the benefit to surrounding growers were not obvious. The UTTL, which absorbs only 5% of the crop from smallholders, may not be secure on this basis; rather it is the large job provision in their estates, which provides livelihood to thousands of families that earns the company the support of the government.

Flexibility of the value chain towards changing production environment

The tea industry in Tanzania is well known for continued changes in management practices in the quest to raise productivity. However, the changing market scenario whereby demand for high quality tea dictates prices has increased pressure for the industry to respond faster in order to accommodate these changes. Figure 6.7 presents the historical trends associated with adoption of various research recommendations in one of the representative tea estates in Mufindi. Use of inorganic fertiliser, introduction of clonal tea and the arrival of sprinkler irrigation in the Tanzanian tea industry brought big jumps in the productivity levels of the estates.

However, these scientific innovations come with a cost and it appears since the early 1990 the estates sector has not made the necessary improvement in productivity and as the costs of production (inputs, labour wages, and electricity) keep increasing there is obvious pressure on the estates to look to smallholders as the way forward. Smallholders provide a least cost option for production of greenleaf. It is estimated that labour costs consist of 18.4% of the total tea production cost in the estates (Kelly, 2002). For the crop with high labour requirement of 311 MD ha⁻¹, the continuous

demand for increase of wages means the proportion of labour cost will continue to increase hence reducing margins for the estates.

Of the three case study areas, WTC being a predominantly smallholders factory, faces a less daunting task compared to UTTL who have the biggest tea acreage in Tanzania (3000 ha) and so far absorbs only 5% of its processing capacity from outgrowers. MTC who have 23% crop from outgrowers and still increasing the proportion appear to be addressing the problem of over reliance on estates production, which is prone to escalating costs. Although there is no evidence of decreasing estates area, the smallholder sector accounts for the majority of the current expansion of tea area in Tanzania.

The increasing preference towards smallholders based production systems mean that factories are prepared to invest into smallholders to ensure that the system is able to supply the respective factories with greenleaf. The decision by MTC to install a dedicated processing line for smallholder tea (with an exclusive brand) shows how much the companies are committed to support smallholders.

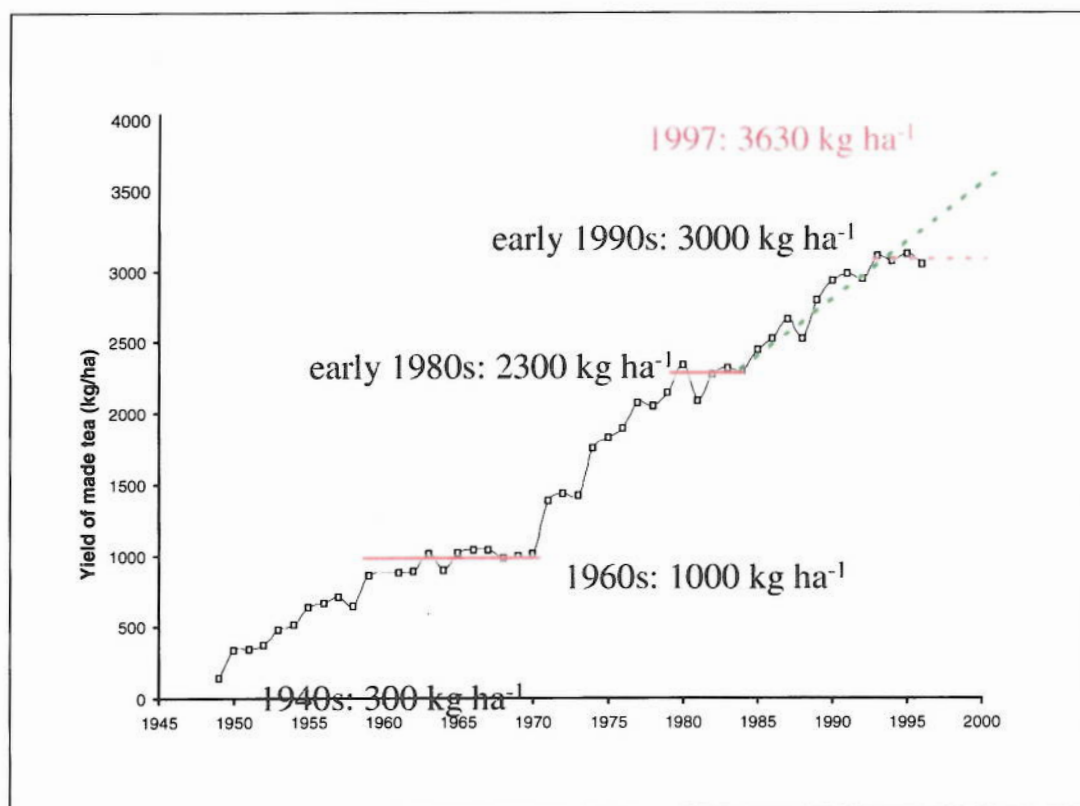


Figure 6.7: Phases in the productivity of the tea estate in the southern highlands
(Adapted from Stephens & Mathews, 1999)

One other recent change has been the outsourcing of some key services in the tea industry such as greenleaf transport. All three factories have sub contracted the greenleaf transportation function, though UTTL have left their outgrowers to handle the transportation of their greenleaf.

Resilience to price fluctuations

The price of made tea is very important for the sustainability of the production system affecting revenue for all participants in the tea value chain. Although the tea industry is considered as price taker, tea price is the function of quality as an attribute that can be influenced by individual growers. For the last two decades, prices of tea have been declining worldwide. The market is very turbulent as depicted by the price trends for Mombassa tea auction where the bulk of Tanzania tea is sold (**Figure 6.8a**).

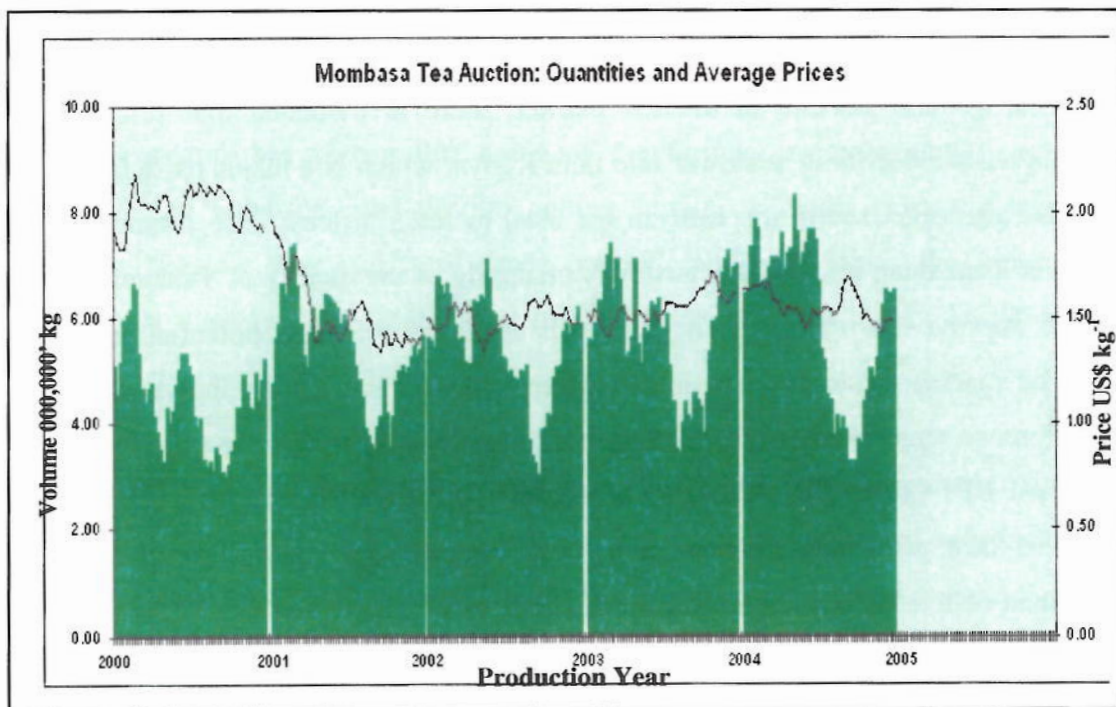


Figure 6.8a: Tea sales volume and price trends at Mombasa auction (2000 – 2005)

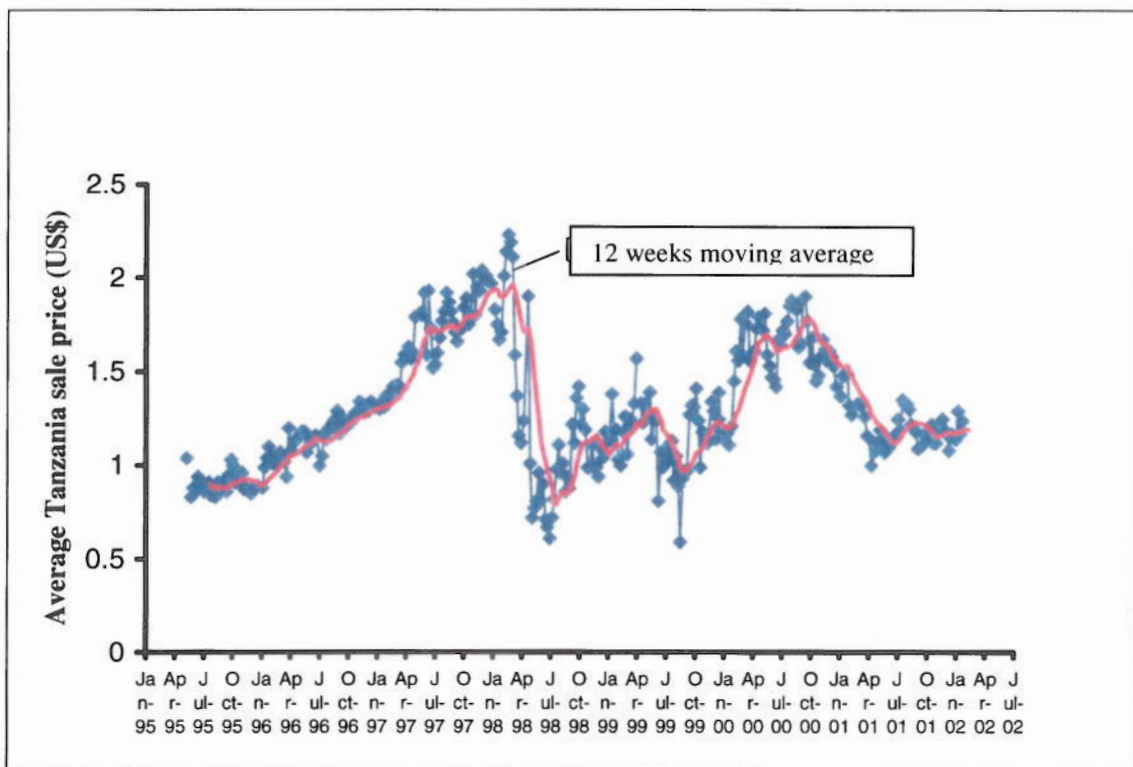


Figure 6.8b: Average price trends for the Tanzanian tea in Mombasa auction 1995 - 2002

Despite the general decline in the tea market, there is evidence that prices for Tanzanian tea are declining at slower rate than Kenya, which is a major participant at Mombassa auction. Usually the Kenyan tea used to fetch at least 25% premium on prices over Tanzanian tea, but this is slowly changing as the quality of Tanzanian tea begins to improve. Increasing quality can still uplift the prices as potential for that exists. The market report for Auction Number 50 (EATTA, 2004) shows that the price difference range between the highest and lowest quality tea for the following tea grades was; BP1 (1.46 US\$), PF (2.57 US\$), PD (0.74US\$) and D1 (1.19US\$). In most cases, these price ranges represent the possibility of poorly performing factories to more than double their prices at Mombasa auction.

The WTC is to engage in local blending and packaging, a value adding activity whereby TATEPA group, which owns the 75% of the stakes on WTC also, commands over 50% of the local retail market through its CHAI BORA brand. Prices affect the returns for the processing factories and this effect is usually transmitted further down the chain to the smallholders. The impact of price trends is similar to that caused by efficiency in processing. The biggest difference is that efficiency can be improved by

measures taken by the particular processing factory, whereas prices are beyond the influence of the single tea-processing factory, with the exception of quality improvement which often may involve reduction in quantities.

6.4. Chapter Summary

This chapter explored the value chains of the three tea factories covered by this study, describing the structure and key activities on each stage of the chain. The chapter also presented the framework for assessing the performance of the tea value chain.

Hired labour accounted for the biggest proportion of greenleaf production cost in the first stage of the tea value chain, indicating significant dependency of the smallholder tea production systems on hired labour. It is argued that reliance on hired labour, despite widening opportunities for employment in the tea industry, exposes tea growing that relies on hired labour to risk associated with escalation of wage rates that reduces their potential income compared to those using family labour.

The assessments has shown that some of the farmers are reluctant to apply the recommended fertiliser rates despite getting inputs on credit from the respective factories, because they lack confidence on their ability to repay the input credit. Fertiliser is important for smallholder production systems, as higher levels of input usually lead to higher production.

There has been a change in the way greenleaf is collection and transported to the respective processing factories. Private transporters are now preferred over factories' own greenleaf transportation arrangement. The arrangement appears to have advantages such as;

- Specialisation by contracted transporters brings effectiveness in the entire value chain,
- Protection to farmers as risk is shifted elsewhere during critical stage where the greenleaf is perishable (after harvesting, but before processing),
- Incentive for transporters to use sensible checks that ensures most of the harvested leaves are collected without compromising the quality standards, and

- Engagement of private transporters provides opportunity for the factory to concentrate on processing of tea,

Generally it has been shown that the performance of the value chains tends to vary as a result of differences in the way activities at various stages of the chain are organised. On the basis of this observation, the assessment of the value chain based on the effectiveness, efficiency, fairness (linkages) and robustness are found to be critical elements for the sustainability of the particular system.

Assessment of the value chain showed that, although the smallholders may appear to be less competitive in terms of greenleaf production (yield), they are relatively more effective in producing higher quality standards of harvested leaves compared to the larger scale production systems. This is a very useful strength for the smallholder production systems because of the significance of quality in determining the value of made tea at the auctions.

The assessment has shown that the mismatch between the factory capacity and seasonality on the supply of the greenleaf affects the profitability of the Tanzanian tea sector including the smallholders who share processing facilities with the estates.

In broader terms, the results show that performance of the entire value chain is determined by the performance of the individual stages in the chain. A good example is the Rungwe smallholder chain where the field stages of the value chain had the lowest proportion of operating profit, but the situation improved at the factory stage.

Chapter 7: Conclusions and recommendations

This chapter presents the conclusions of this study against the five objectives set in Chapter 3. Finally on the basis of the conclusions, recommendations (targeted at the key stakeholders identified in Chapter 4) are discussed regarding the sustainability of the Tanzanian smallholder tea sector and the wider context of cash crop based livelihood systems in Tanzania.

7.1. Conclusions

Five objectives were set for this study. Based on the outputs of the research, conclusions are drawn on each of the research objectives in turn.

Addressing objective 1: *“To define sustainability in the context of the Tanzanian smallholder tea production systems”.*

In the context of the Tanzanian smallholder tea sector, this study has critically reviewed the concepts of sustainable development, whereby the lack of a clear definition of sustainability was highlighted. The review (in chapter 2) demonstrated that in order to define sustainability, there is a need to derive an explicit definition based on the context under consideration. Therefore, for the Tanzanian smallholder tea sector, sustainability is defined in terms of the ability of the household to accumulate assets through their involvement in tea production.

The three-pillar definition of sustainable agriculture (Social, Environmental and Economic) was considered, whereby it was demonstrated that currently it is the economic viability of smallholder tea production systems in Tanzania that is attracting much attention. Within the resources available for the research it was decided to focus on the economic dimension of tea production systems, because tea, being a cash crop, is viable and attractive to farmers provided they anticipate that they will be able to earn their livelihood from tea. However the study recognises the importance of the social and environmental dimensions of sustainability and some of these issues have

been addressed, such as the response of the tea industry in securing reliable and sustainable source of firewood for processing tea.

The focus on the economic dimension of sustainability drew support from the conclusions of the food crop versus cash crop debate (reviewed in Chapter 2), which supported the assumption that smallholders' tea production in Tanzania has the potential of sustaining the livelihood of farmers and their dependants. The debate has given further endorsement for the choice of cash crop based livelihood systems over food crop (food sufficiency) livelihood strategies.

This definition of sustainability considers the smallholder production systems in the context of a weak sustainability perspective, which allows substitution of natural assets with focus on livelihoods at the household level. However the concept of weak sustainability recognises the need for maintaining the natural assets (land) from which these livelihoods are drawn. The process of carving out a relevant definition of sustainability in the context of the Tanzanian smallholder tea industry, achieves objective 1 of this study.

Addressing objective 2: *"To determine the key sustainability indicators for the existing smallholder tea production systems"*

This followed on from Objective 1, reviewing literature in order to produce a preliminary list of possible sustainability indicators for measuring sustainability of the smallholder tea production systems. These indicators were chosen on the basis of the criteria required for a good indicator namely that the indicator should be: representative, valid, simple and easy to interpret, shows trends over time, capable of providing an early warning with respect to irreversible trends, sensitive, based on readily available or affordable data, and capable of being upgraded and comparable to other indicators.

The indicators that were produced were scrutinised during the exploratory survey involving key stakeholders in the Tanzanian tea sector. The objective of this exploratory survey was to verify the relevance of these indicators from the perspective of the stakeholders. The survey involved, preparation of the preliminary list of

indicators that was included in a checklist used to guide discussion with stakeholders. During the interviews, these indicators were tested for suitability and their relevance to measure sustainability of the smallholder livelihood systems such as tea.

From practical standpoint, a set of relevant indicators (Table 3.3) representing the five key assets namely human, social, physical, financial and natural capitals were identified and used to measure the stock of household assets and flow of services (hence sustainability). Specific indicators included those depicting stocks of household assets such as Natural Capital (comprising Size of holdings (ha), Size of tea area (ha), Access to land, Land quality (soils, weather & climate) and Land use pattern); Physical /Man made Capital (comprising Stocks of Farm tools & equipment, Farm buildings, Means of transport and Domestic assets); Social Capital (which comprises Membership to tea growers association, Land tenure system, Benefits accrued, Negative aspects of farmers organisations); Human Capital (which comprises Household size, Members available for tea production, Skills in tea production, Members working in tea, Imported hired Labour, Distance to the nearest estates) and Financial Capital (which comprises Sources of household income, Proportion of income from tea, Farm operating costs, Net tea cash flow (+/-), Access to credit for tea, Tea production & Prices).

These indicators were able to measure the stocks of assets and flow of services and hence the level of sustainability of the smallholder tea based production systems. The identification of suitable indicators for assessing the sustainability of the Tanzanian smallholder's tea sector hence attained objective 2.

Addressing objective 3: *"To develop and apply an analytical framework for assessing the sustainability of Tanzanian smallholder tea production systems, with particular reference to economic performance".*

The ambiguous nature of sustainable development made it difficult to develop an appropriate analytical framework for assessing the sustainability of tea production systems. However, the literature review suggested that a unique combination of two models, an Asset Based Model of Sustainability and a framework for Value Chain

Assessment, could provide an analytical framework for assessing the sustainability of cash crop based livelihood systems, and specifically in this case, of the Tanzanian smallholder tea sector. Assessment of stocks of household assets and flows of services were shown to be an appropriate mechanism for assessing the performance of the livelihood systems that depend on a globally traded agricultural commodity such as tea. The presence of many factors outside the farm level (such as prices, input costs, taxation) that influence the performance of the tea production system necessitated the need to evaluate the performance of the value chain for tea from field through to auction sales. The combined framework helped to confirm the relevance of the research objectives, identify key research issues, and guide the methods for data collection and analysis, especially in circumstances where resources to carry out the research were limited.

Lessons learnt and Critique of the methods

Although the analytical framework is unique and generally served the purpose of this study, on reflection, it is worthwhile to make a number of observations on its use.

- The framework helped to determine the choice and the timing of qualitative and quantitative methods. The approach confirmed the importance of qualitative, interactive methods as means of getting a sound understanding of circumstances, processes, attitudes, practices and consequences, especially on identifying key issues, stakeholders and factors responsible for the way that systems, in this case livelihoods and values chains for tea, operates. It is critical therefore to start with qualitative approaches in order to get an overview of system components before embarking on quantitative approaches which are mainly useful for verifying and measuring the strength and direction of influence of previously identified system components and relationships. For the most part, they are able to confirm ideas or hypotheses that have been previously identified during exploratory studies. In this study the process of identifying stakeholders, stakeholder interactions, and key sustainability indicators for the livelihood and value frameworks were important pre-requisites for the quantitative survey.

- Another key lesson from the methodology relates to the balance of qualitative and quantitative approaches. Although both methods served different purposes for this

study, with hindsight probably the research outcome could have been enriched more emphasis on qualitative methods, engaging a greater range of techniques. Aspects such as stakeholder perceptions of and preferences amongst alternative sets of livelihood strategies (compared with tea) could have produced more insights on the strengths and weaknesses of the tea based livelihood systems. For interested researchers wishing to use this framework under different or similar circumstances, these modifications are highly recommended.

- Another area where the use of framework could be improved is on understanding and quantifying where possible the feedback loops. The sustainability concept is linked with the time factor and this study used mostly cross section data which made it difficult to confirm temporal feedback loops in tea livelihood and value chain systems. It is appropriate to determine the time scale over which important changes which may have an impact on sustainability can potentially occur, as measured by temporal changes in stocks and flows. Such analysis, combining qualitative and quantitative methods, can provide a more comprehensive framework to assess the sustainability of the commodity based livelihood systems.
- It was also felt on reflection that data in the quantitative survey could be extended to include more qualitative ranking and scale variables rather than the nominal or ordinal variables that dominated the database for this study. The latter to some degree restricted the use of analytical tools.

However despite of these shortcomings, the developed analytical framework for assessing the sustainability of the Tanzanian smallholder tea production systems fitted the purpose of this study and fulfilled the third objective of this study.

Addressing objective 4: *“To identify the major opportunities and constraints hindering sustainability of the smallholder tea production systems”.*

Analysis of the qualitative survey (Chapter 4), quantitative survey (Chapter 5) and the Value Chains (Chapter 6) revealed a number of opportunities that can be capitalised to

improve/ ensure the sustainability of the Tanzanian smallholder tea production systems. The following opportunities were identified;

One positive fact for the Tanzanian smallholder tea sector is that processing factories are regarding smallholder producers strategically as business partners and are supporting smallholder efforts to increase yield as well as quality of greenleaf delivered at the collection points. Dialogue between the factories and smallholders was one of the key elements identified during the qualitative surveys that influences trust in the partnership between smallholders and estates sector, which in turn provides confidence for farmers to invest in tea production and factories to commit themselves to working with the smallholders.

Already there is clear evidence of the upturn in the smallholder tea sector as demonstrated by rising output and yields, increasing number of farmers joining the tea industry, significant investment by the private sector in processing facilities, and an overall increase on the proportion of the total tea crop supplied by smallholders. The situation provides an ideal opportunity for the smallholders to prosper through acquisition of the required expertise in tea production from their partners in the estates sector in order to improve performance and hence their sustainability. This can be regarded as a symbiotic relationship between estates and the smallholders.

The relationship between smallholder and the estates sector provides evidence of the convergence of the Asset based model of sustainability and the Value Chain Assessment, as development of socio capital in the smallholders production systems as the outcome of experiences gained from interaction with the estates (experience in tea production, input use, access to information on better management practices) supports the tea value chain (i.e. improves the greenleaf production from smallholders). Knowledge exchange facilitated by this partnership ensures transfer of human capital from estates and factories to smallholders allowing them to build (accumulate) stocks of assets that support the value chain. Another example of how this partnership helps to enhance the performance of the value chain is the provision of services by the estate to smallholders that facilitates their participation in tea

production. These services include credit for inputs, and facilitating provision of transportation for the greenleaf.

Research and Extension are other factors that appear to contribute to the sustainability of the smallholder tea production systems as they enhance productivity and hence profitability at farm level. The current organisation that provides smallholders with research and extension services (TRIT) is a private sector led organisation. However, agricultural research has always been a public domain due to difficulties in ring fencing the outputs, as required in the private setting. However, we can argue that tea industry as a cash crop should fund its own research, e.g. by a cess on the crop. Research funded by the government is usually justified in terms of the public good e.g. meeting needs of vulnerable groups, solving environmental problems, and strategic issues. This is the case for R&D which targets small farmers who are unable to fully fund it, and many of the benefits accrue to society as a whole. The current expansion of the smallholders sub sector, and the subsequent need for technical support from research adds urgency to look at the possibility of government supporting the funding in the form of subsidy or matching fund for cess collected from growers because of the time lag between establishment of the tea farms which delays contribution from smallholders until they start harvesting.

Tea farmers' organizations provide a crucial logistical coordination for smallholders who are large in numbers and scattered over wider geographical areas. This is a very critical function for the coordinating the functioning of the smallholder production systems, namely: negotiating contracts with factories on behalf of the farmers, organising smooth collection of greenleaf, supervising distribution of inputs and disbursement of payments for the greenleaf. The study has demonstrated the importance of social capital as an integral part of household asset base that enhances the sustainability of the smallholder's production systems. The 'integration of the tea supply chain' enable service flow from assets held/owned in one part of the value chain (the estates and processing) to be made available to smallholders in a way which otherwise would not be possible. This is a key strong point of the tea sectors synergy between smallholders and the estates sector

The study was able to establish the crucial role of the policy setting institutions in setting an enabling environment for a vibrant tea industry in Tanzania. Policies tend to affect the performance of all players along the tea value chain that eventually affects the performance of the smallholder production systems.

At farm scale, important insights on the factors that contribute to farmer's decision to join the tea production were identified. Evidence confirms a relationship between tea production and the stock of household assets and related service flows. Tea farmers were shown to have accumulated relatively bigger stocks of household assets (natural, physical and financial) compared with non-tea households. The results suggest that tea production does contribute to accumulation of household assets as evidenced by increasing yield from farmer's fields, also purchase of assets such as land, building farm structures attributed to flow of income from tea. These observations indicate sustainability of the respective production systems.

Amongst smallholder tea farmers, there is evidence that the stock of household assets is correlated positively with performance indicators such as the estimated greenleaf yield per hectare. This result further confirms the assumption that assets are associated with the capability of the household to engage in productive activities, and as tea production is associated with accumulation of assets, then we can conclude that involvement in tea production gives farmers access to the flow of services generated from the stock of household assets.

For a typical smallholder, both the inherent farmer's knowledge (enhanced through training and access to information) as well as stocks of household assets (owned or accessible to farmers) appear to contribute to the higher productivity. This is an important message as it shows there is potential for smallholders to prosper through interaction with the estates sector as well as research and extension providers. Most of the recent and more general literature that focuses on collaborative or "social learning" approaches (Healy 1997; Marshall 2005; Roth, Boelens and Zwarteveen 2005; Philipson et al. 2006) supports this notion. The estates tea sector provides services that facilitate smallholders' pursuit of their livelihoods through tea production. This approach recognises the need to empower the smallholders to make

decisions that best suits their production circumstances. The establishment of a village based nursery scheme is an example of such synergy between estates, research /extension organisations and farmers, whereby farmers managed to overcome the knowledge barrier that has restricted tea nursery activities to the few employees in the estates. By collaborating with researchers, farmers were able to offer labour and local knowledge of the most suitable tea clones to be propagated. Researchers provided training on basics while the estates provided loan for the materials.

However, the study also highlighted some key constraints on achieving the sustainability of smallholder tea;

The responses from non-tea farmers show that access to land and farm labour is the key factor for a household's ability to engage in tea production. In some tea growing areas, like Rungwe there is an acute shortage of land, which prevents potential smallholder farmers joining tea production. In such areas, this constraint restricts efforts to expand the smallholder tea sector to raising productivity of the existing tea area. This is an important message as it appears to suggest that effort to expand tea area in Tanzania should be concentrated in areas where there is adequate and climatically suitable land for expansion.

There is a clear link between the performance of the respective production systems (measured by the greenleaf production per unit area) and the level of inputs used (particularly fertiliser). However, high input costs hinder farmers from applying recommended rates, a situation that leads to low productivity in smallholder tea production systems compared with the medium scale growers or the estates sector. This is where research to improve productivity of the low input smallholder production systems is needed. The research could focus on plant improvement through systematic clonal selection, or improvement on plant environment such as finding technical optimum yield response from inputs.

The study was able to demonstrate that, increasing the scale of production for the smallholders forces them to rely on hired labour, as some of the operations particularly plucking require higher labour input than available within the household

human capital base. Reliance on hired labour, despite widening opportunities for employment in the tea industry, it exposes the farmer to risks associated with frequent escalation of wages. This reduces the net income for the households that rely on hired labour compared to those using family labour. This is another area where contribution of research is needed to develop appropriate harvesting technologies that enhances labour productivity in the smallholder tea production systems.

7.2. Recommendations

Addressing objective 5: *“To propose ways or initiatives that could improve the sustainability of the existing smallholder tea production systems”.*

Based on the above conclusions, the following recommendations for various categories of stakeholders in the Tanzanian smallholder tea industry are discussed. The recommendations take into consideration the prevailing policy environment in Tanzanian agriculture sector and trends in the global market for tea.

7.2.1. Recommendations for the Policy makers

The study was able to establish the crucial role of the policy setting institutions in setting an enabling environment for a vibrant tea industry in Tanzania. Policies tend to affect the performance of all players along the tea value chain that eventually affects the performance of smallholder production systems.

The study has demonstrated that the tea sector can offer mechanisms for facilitating the sustainable livelihoods for the rural people engages in the sector. Cash crops appear to offer a mechanism through which sustainable livelihoods can be supported. This is one of the potential areas where the Tanzania Poverty Alleviation Strategy, which seeks to address the Millennium Development Goals, can benefit through promotion of cash crops based livelihood strategies.

In order to enhance the contribution of the tea sector towards this goal, there is a need to review the national land policy especially in rural areas to enable landless people who intend to engage in production of agricultural cash crop like tea to get access to land. Currently the land tenure systems allow ownership of land by people who don't use it for agriculture and other productive activities, hence denying other opportunity to earn livelihood through agriculture.

Agricultural research and extension services are important promoters of the sustainability of smallholder production systems. Currently these services are being provided by the private sector mainly serving the predominantly commercial interests of the tea sector. However, it has been shown that smallholder tea production generates many social benefits in terms of improved livelihoods amongst poor people. These 'public good' benefits of agriculture research can justify continued support from Government, operating in collaboration with the private sector. This will potentially improve the performance of the smallholder tea sector thereby contributing to Government goals of reducing poverty in Tanzania.

7.2.2. Recommendations for the factory owners

The study has demonstrated that, smallholder outgrowers can offer a competitive option for production of greenleaf to feed the factories. However, smallholders have limitations in terms of the stocks of assets they can deploy to access the flow of services from the tea sector. It is recommended that factory owners should continue to support the smallholder tea sector to enable the sector to acquire the capacity and asset base needed to sustain the tea production. Provision of credit for inputs seems to work well as it creates synergy between smallholders who cannot manage to buy these inputs in bulky transactions and the estates that are able to recoup the credit from greenleaf sales.

The study has shown evidence of variation in the cost structure of the processing factories indicating that costs could be better managed to improve both effectiveness and efficiency of tea processing. It is recommended that the factories should extend

the use of benchmarking against better performing factories within the country and from the neighbouring countries such as Kenya in order to improve performance. An efficient tea processing factory has potential to offer better services and higher greenleaf price to outgrowers compared with an inefficient one.

7.2.3. Recommendations for the service providers (research and extension)

The study has shown that there is significant potential for improvement in the smallholder tea production systems. It has been demonstrated that farmer interaction with researchers and extension workers was associated with, and most likely a cause of, higher average yields. This is an important message that should encourage researchers and extension staff to increase their interactions with smallholder farmers.

The study identified an analytical framework for assessing the sustainability of the smallholder tea production systems in Tanzania using a set of indicators. These frameworks need to be developed further by TRIT in order to monitor the livelihood impacts of the smallholder production systems as a guide for research recommendations. With such monitoring systems, researchers for example, will be able to determine the viability of research recommendations under the socio economic circumstances of target farmers before they are disseminated. Such monitoring systems can potentially provide guidance on the appropriate research recommendation for the smallholder tea sector in Tanzania. TRIT should explore other potential uses of this analytical framework in order to understand the range of circumstances under which smallholder tea growers operate, and design intervention programmes accordingly.

The study also demonstrated how inputs, especially fertiliser, can contribute to increased yield if used as recommended. However there has been reluctance by farmers to apply the recommended input rates, mostly due to higher input costs which erode farmer confidence in their ability to repay the input credit. Currently research recommendation for fertilisers are made for all tea growing areas without considering

local variations in soils, weather and climate. Such recommendations may not be universally appropriate, hence the need to develop location specific input application rates. But at the same time researchers need to understand farmer attitudes towards research recommendations, especially as these interact with their risk management and coping strategies. Such information will help design research and extension programmes better suited to end-user needs, as well as understand and predict farmers' likely reaction towards newly introduced recommendations.

However, with input prices continuing to increase, there is a need to explore scope for low input production systems as an optional package for smallholder tea. Research that focuses on optimising the genetic potential of plants to withstand drought and low level of fertiliser are examples. Another option is to enhance labour productivity through developing appropriate tea harvesting technologies. It is important that social and economic factors, as they link to livelihoods and value chains that determine user needs and the feasibility of technology solutions are researched in order to inform research on technology development.

Although this study focused on the economic dimension of sustainability, there are issues related to the social and environmental dimensions that were identified as important for the sustainability of the smallholder tea production systems. The long term impact of fertiliser and other agrochemical use on the environment is of particular concern. This is an area where further research is required to understand the scale of the threat and to identify possible ways to reduce environmental risk.

It is apparent that little attention has been paid to date on mechanisms to deliver extension messages. As a result some potentially useful recommendations fail to reach intended users or are misunderstood by the recipients due to poor delivery methods. Both service providers in the Tanzanian tea industry (TRIT and DALDO's) need to determine the best ways to deliver extension services to farmers, including methods which involve participatory and shared learning.

7.2.4. Recommendations for the medium scale tea growers

The medium scale growers offer an intermediate production system between the typical smallholders and the estates sector. The system performs better in terms of yield than smallholders, albeit below the estates sector. It is recommended that the medium scale growers should continue to benchmark their activities against the estates sector, in order to improve their management practices and hence yield. However, there appears to be scope for improving labour productivity particularly on the prospect of using semi mechanical harvesting tools. This is important and failure to respond to this could prove to be a threat to this sector. This technology is available in Tanzania through the Tea Research Institute, which conducted a field experiment which led to detailed findings on the performance of shears in tea harvesting. However there is was a concern that quality of the shear harvested leaves is lower than hand plucked leaves.

7.2.5. Recommendations for the smallholder tea growers

The study has demonstrated that tea sector can offer sustainable livelihoods to families engaged through its role in accumulation of stocks of household assets and access to services. Tea appears to offer beneficial livelihood options, especially in areas where alternative and competitive income generating activities does not exist. It is therefore recommended to encourage more smallholders to join tea growing, especially as the large estate sector begins to focus on tea processing.

For farmers already involved in tea production, the study demonstrated that use of recommended input rates was associated with improved yields. The reluctance of some farmers to use the recommended input rates needs to be reviewed through collaborative interaction with researchers with the purpose of seeking to explain the risk aversion strategies employed by the smallholders. Such an understanding will help various stakeholders in the tea sector to anticipate the likely response of target farmers towards newly introduced innovations.

Smallholders also need to strengthen their tea farmer organisations as these have the potential to facilitate collective action by the smallholders. In the private sector, where

the main motive for most stakeholders is profit maximization, smallholders also need an organisation to coordinate linkages with other players in the tea value chain. The move by the Government to reserve 25% of the stakes for smallholders in all the privatised tea factories was an important step towards empowering smallholders to participate in relatively equal terms in the tea industry otherwise dominated by the estates sector.

7.2.6. Implications for further research

The study has unveiled a range of issues that appear to influence or are associated with the performance of the Tanzanian smallholder tea sector. Although some of the findings lead to conclusive recommendation, there were issues which were identified to be important but not well understood. The list of priority areas for future research is presented on Table 7.1.

Table 7.1: List of proposed research topics

Recommended Research Topic	Organisation
1. Develop further the analytical framework for understanding the cash crops smallholder production systems	TRIT/ DRD/ SUA
2. Develop location specific input application rates for the tea growing areas taking consideration of variations in growing conditions.	TRIT/Estates
3. Explore farmer attitudes towards research recommendations, especially their risk management and coping strategies.	TRIT /DRD
4. Explore scope for low input production systems as an optional package for smallholder tea.	TRIT/ DALDO
5. Explore ways to enhance labour productivity through developing appropriate tea harvesting technologies.	TRIT, All categories of tea growers
6. Assess the long term impact of agrochemical use in the ecosystem of the tea growing areas	TRIT in collaboration with tea estates
7. Explore ways to enhance factory efficiency through benchmarking	Estates/ Factories
8. Develop effective and efficient greenleaf transport collection and transport system for respective catchment areas	Estates / Transporters

7.3. Closing Statement

This study aimed at identifying the current and potential contribution of the smallholder tea sector towards economic sustainability of the Tanzanian tea industry and to inform policy accordingly. The author feels that this aim has been fulfilled given the circumstances and limitations under which the study was conducted. Important lessons and insights gained will help to inspire further research into topics that the study did not focus but were identified to be important. The recommendations made are meant to help various stakeholders in their endeavours to further develop a successful smallholder tea sector in Tanzania.

REFERENCES

- Agriculture Food and Rural Development (2002), Value chain handbook; new strategies to create more rewarding positions in the marketplace, Edmonton Canada
- Agriculture Sector Development Program (2002) The Government Strategy for Promoting Agriculture in Tanzania, Ministry of Agriculture and Food, Dar Es Salaam, Tanzania
- Andreoli, M. and Tellarini, V. (2000) Farm sustainability evaluation: Methodology and practice, *Agriculture, Ecosystems and Environment*, 77, 43-52
- UNDP (2003) Poverty and Human Development Report 2002; the Research and Development Working Group, Dar es Salaam
- Ashley, C and Carney, D (1999) sustainable livelihood: Lessons from early experience, Department for International Development, London
- Atapattu, J. (1997). Sustainable Farming Systems and the role of change agents: Moneragala District, Sri Lanka, *Thesis (PhD) Cranfield University*, School of Agriculture, Food and Environment, Silsoe College, UK
- Baffes, J (2003) Tanzania's Tea Sector, Challenges and Constraints, World Bank, Washington, USA
- Barbier, E. (1989) Cash crops, Food crops and sustainability: The case of Indonesia, *World Development*, 17, (6), 879-895
- Bar-Shira, Z. and Finkelshtain, I. (1992), Labour on the family farm: a theory under uncertainty – an extension, *Agricultural Economics*, 8, 33-43.

- Bebbington, A. (1999) Capitals and Capabilities: A framework for analysing peasant viability, rural livelihood and poverty, *World Development*, 27, (12), 2021-2044
- Bernstein, H. (1996) the political economy of the maize *filiere*, *Journal of Peasant Studies* 23 (2), 120-133
- Bernstein, H., Crow, B. and Johnson, H. (1992) Rural livelihoods: crises and responses, Oxford: Oxford University Press.
- Blaikie, N. (2000) Designing Social Research: The logic of anticipation, Cambridge: Polity Press
- Böhringer, A. and Ayuk, E. (2003) Farmer nurseries as a catalyst for developing sustainable land use systems in southern Africa. Part B: Support systems, early impact and policy issues, *Agricultural Systems*, 77 203–217
- Borreggarrd, M & Halle, M. (2002) Striking a balance for trade and sustainable development, *OPINION – World Summit on Sustainable Development*, International Institute for Environment and Development
- Borrus, M., D. Ernst and S. Haggard (2000) International Production Networks in Asia: Rivalry or Riches? London: Routledge
- Bossel, H. (1999). Indicators for sustainable development: Theory, Method, Application: A report to the Balaton Group, International Institute for Sustainable Development (IISD), Winnipeg, Canada, pp. 7-16
- Bruce, J. and C.B. Lloyd (1997) 'Finding the ties that bind: Beyond headship and household' Ch.13 in L. Haddad, J. Hoddinott and H. Alderman (eds), *Intra-household Resource Allocation in Developing Countries: Models, Methods, and Policy*, Baltimore: John Hopkins, pp. 213-228.

- Bryman, A. and Cramer, D. (1994) *Quantitative Data Analysis for Social Scientist*, Revised Edition, Routledge, London
- Carney, D. (1998) *Sustainable Rural Livelihoods: what contribution can we make?* Department for International Development (DFID), London.
- Carr, M.K.V. (1999). Evaluating the impact of research for development: tea in Tanzania, *Experimental Agriculture*, **35**, 247-264
- Carr, M.K.V. Ndamugoba, D.M, Burgess, P.J. and Myinga G.R. (1992) An overview of Tea Research in Tanzania – With special Reference to Southern Highlands, pp. 237-252 In Ekpere et al (1992) *Proceedings of an International Conference on Agricultural Research, Training and Technology Transfer in Southern Highlands of Tanzania: Past Achievements and future prospects*. Uyolet Agricultural Centre, Mbeya Tanzania.
- Carsley, D.J. and Lurry, D.A. (1981) *Data Collection in developing Countries*, Oxford: Clarendon Press,
- Carswell, G. (1997) agricultural intensification and rural sustainable livelihoods: a “Think Piece” IDS Working Paper No. 64, Institute of Development Studies, University of Sussex, Brighton
- Chambers, R. (1989) Editorial Introduction: vulnerability, coping and policy, IDS Discussion Paper No. 31, Institute of Development Studies, University of Sussex, Brighton
- Chambers, R. and Conway, R (1992) sustainable rural livelihoods: Practical concepts for the 21st century, IDS Discussion Paper No. 296, Institute of Development Studies, University of Sussex, Brighton

- Collier, P. (2001) The future of perennial crops, Paper prepared for the International Conference on the future of Perennial Crops, 5-9 November 2001, Yamoussoukro, Cote d'Ivoire
- Coughlan, K. (1995). Assessing the sustainability of cropping systems in Pacific Land countries – Bio-physical Indicators of sustainability. *Paper prepared for IBSRAM Annual Meeting of Pacific land Network, June 19-26, Lae, Papua New Guinea*
- Davies, S. (1996) adaptable livelihoods: coping with food insecurity in the Malian Sahel, London: Macmillan Press,
- Dawson, P. (1987), Labour on the family farm: a theory under uncertainty, *Agricultural Economics*, 1: 365-380
- De Graaf, J. (1986) Economics of Coffee. *Economics of crops in developing countries*. No.1. Wageningen: PUDOC.
- DFID (2001) achieving sustainability: Poverty elimination and environment, strategies for achieving international development targets, DFID, United Kingdom
- DFID (2002) Better livelihoods for poor people: The role of Agriculture, Department for International Development, UK
- Douglas, G. (1984). The meaning of agricultural sustainability. In agricultural sustainability in a changing world order (G.K. Douglas, Ed.), pp. 3-30. Boulder, Colorado, Westview Press.
- East African Tea Trade Association (2004) TEA Bulletin: The market report for Auction Number 50; 20th December 2004 (held under the rules of the East African Tea Trade Association) Mombasa, Kenya

- Ellis, F. and Bahiigwa, G. (2003) Livestock and rural poverty reduction in Uganda, *World Development*, 31, (6) 997-1013
- Ellis, F. (2000) Rural livelihoods and diversity in developing countries, Oxford: Oxford University Press
- FAOSTAT Database (2000) www.fao.org (Accessed on 24th April 2005)
- Field, A. (2005) Discovering Statistics using SPSS, (Second Edition) London, SAGE Publications
- Fink, A. (1995) How to Design Survey; the Survey Kit Series No. 5, Thousand Oaks, SAGE Publications
- Gereffi (1994) The organisation of buyer - driven global commodity chains: How US retailers shape overseas production networks' in G. Gereffi and M. Korzeniewicz (eds.) *Commodity Chains and Global Capitalism*, Westport, CT: Praeger, pp. 95-122
- Gereffi and Korzeniewicz (1994) *Commodity chains and Global Capitalism*, Westport, CT: Praeger
- Gereffi, G., Humphrey, J., Kaplinsky, R. and Sturgeon, T. (2001) Introduction: Globalisation, Value chains and Development, *IDS Bulletin*, 32 (3), 1-8
- Gibbons, P. (2001) Agro-Commodity Chains: An Introduction, *IDS Bulletin*, 32, (3), 60-68
- Goldthorpe, C. G. (1985) Plantation Agriculture in Papua New Guinea, *Discussion Paper No. 19*, Institute of National Affairs, Papua New Guinea.

- Goodrich, R. (2001) Sustainable Rural Livelihoods: a summary of research in Mali and Ethiopia, Institute of Development Studies, University of Sussex, Brighton
- Grimble, R. and Wellard, K. (1997) Stakeholder Methodologies in Natural Resource Management: a Review of Principles, Contexts, Experiences and Opportunities, *Agriculture Systems*, 55, (2) 173 – 193
- Gundimeda, H. (2004) how 'sustainable' is the 'sustainable development objective' of CDM in developing countries like India? *Forest Policy and Economics*, 6, (3-4), 329-343
- Gutèz, M. (1996) The concept of sustainable development, *Ecological Economics*, 17, 147-156
- Hansen, J.W., (1996) Is agricultural sustainability a useful concept? *Agricultural Systems*, 50, 117-143
- Healy, P (1997) Collaborative Environmental Planning: Shaping Places in Fragmented Societies: Basingstoke, UK: Palgrave.
- Hill and Jones, (2001) Strategic Management: An Integrated Approach (5th Edition) Houghton Mifflin Company, Boston
- Hobbs, J., A. Cooney and M. Fulton (2000) Value Chains in the Agri-Food Sector, What are they? How do they work? Are they for me? Dept. of Agricultural Economics, University of Saskatchewan
- Hodge, I. (1993). Sustainability: Putting principles into practice. An application to agricultural systems. *Paper presented to 'Rural Economy and Society Group, Royal Holloway College, December 1993.*
- Humphrey, J. and Schmitz, H. (2001) Global governance and upgrading: linking industrial clusters and global value chain research, IDS Working Paper 120, Institute of Development Studies, University of Sussex, Brighton

- Humpton, M.G. (1992) Production of Black tea In, *Tea: Cultivation to Consumption* (edited by K.C. Wilson & M.N. Clifford) 1st Edition, Chapman & Hall, London, pp 459 -510
- Hussein, K. and Nelson, J (1998) Sustainable livelihoods and livelihoods diversification, IDS Working Paper No. 69, Institute of Development Studies, University of Sussex, Brighton
- Ikerd, J. (1993). Two related but distinctly different concepts: Organic Farming and sustainable agriculture, *Small Farm Today*, **10**, (1), 30-31.
- Institute of Development Studies, (2003) IDS Research: Globalisation, Value chain Studies, Institute of Development Studies, University of Sussex, <http://www.ids.ac.uk/global> (Accessed on 10th February 2003)
- Johnson, G. and Scholes, K. (1999) Exploring Corporate Strategy (Fifth edition), London: Prentice Hall Europe
- Kaplinsky, R. (2000) spreading the gains from globalisation: what can we learned from value chain analysis? *Journal of Development Studies*, **37**, (2), 117-146
- Kaplinsky, R. and Morris, M. (2000) A handbook of Value Chain Research: Prepared for the IDRC. www.ids.ac.uk/global (accessed on 7th February 2003)
- Kambasila, R. (2003) Manager, Katumba Tea Factory, Rungwe; Personal Communication
- Kelly, N. (2003) Creating and Sustaining a profitable tea business in Tanzania, Paper presented at the TRIT Annual Open Day and Conference 7-8th November 2001, Mufindi Tanzania.
- Kelly, N (2003) BBT Managing Director, Personal Communication

- KTDA (2003) Managing Directors Speech on the occasion of launching new KTDA logo, Chai News Bulletin, [http://www.ktdateas.com/pdfs/KTDA MAGAZINE.pdf](http://www.ktdateas.com/pdfs/KTDA%20MAGAZINE.pdf) (Accessed on 15th January 2006)
- Malavanu, D. (2003) BBT Estates Superintendent, Personal Communication
- Marshall, G. (2005) *Economics for Collaborative Environmental Management: Renegotiating the Commons*. London: Earthscan Press.
- Mather, C. (1999) Agro-commodity chains, market power and territory: re-regulating South African citrus exports in the 1990s, *Geoforum* 30, 61-70
- Matthews, R. and Stephens, W. (1998) CUPPA- Tea: a simulation model describing seasonal yield variation and potential production in tea II. Biomass production and water use, *Experimental Agriculture*, 34, 369-389
- Maxwell, S. and Fernando, A. (1989) Cash crops in Developing Countries: The Issues, The Facts, The Policies. *World Development*, 17, (11), 1677-1708
- Mbunda, S. (2003) District Agricultural and Livestock officer Mufindi; Personal Communication
- Mhagama, J. (2003) Extension services manager WATCO, Personal Communication
- Ministry Of Agriculture and Food Security (2003) Agricultural Sector Development Strategy (Final Report), Ministry of Agriculture and Food Security, Dar Es Salaam,
- Ministry of Agriculture and Food Security (2003) Tea Strategic Plan, Ministry of Agriculture, Dar Es Salaam Tanzania
- Ministry of Agriculture, Food and Fisheries (UK) (2002) Towards sustainable Agriculture: A pilot set of indicators, *MAFF Publications*, Admail 6000, London, pp. 14-15, <http://www.maff.gov.uk> (accessed on 24th April 2003)

- Morris, J., Audsley, E., Pearn K. and Rickard, S. (2005) Future directions for productivity in UK agriculture: In Sylvester-Bradley, R and Wisemann J, (ed) Yields of farmed species: constraints and opportunities in the 21st century, Nottingham: University of Nottingham Press
- Munasinghe, M. (1994) Sustainomics: A transdisciplinary framework for sustainable development. Keynote paper. In: Proceedings of the 50th Anniversary sessions of the Sri Lanka Assoc. for the advances of science (SLAAS), Colombo, Sri Lanka
- Narayanan, S. and Gulati, A. (2002) Globalisation and the smallholders: A review of issues, approaches and implications, *MSSD Discussion Paper No. 50*, International Food Policy Research Institute and The World bank, Washington
- National Bureau of Statistics (2002) Household Budget Survey, 2000/01, Dar Es Salaam, Tanzania. http://www.tanzania.go.tz/hbs/HomePage_HBS.html (accessed on 12th March 2006)
- Natural Resources Institute (2001) Household livelihoods strategy in semi-arid Tanzania; Synthesis of findings, Final Technical Report – Annexes
- Ndunguru, B (2001), The Tea Industry in Tanzania, Paper presented at the World Tea Convention, 17 – 22nd October 2001, Nairobi and Mombasa Kenya
- Niemeijer, D. (2002). Developing indicators for environmental policy: data-driven and Theory-driven approaches examined by example, *Environmental Science and Policy*, 5, 91-103, <http://www.elsevier.com/locate/envsci>
- Nyanga, A.; Simbua, E.; and Ndamugoba, D. (2000). Constraints and challenges for improving profitability of smallholder tea production in Tanzania: potential role for research, *Tea*, 21 (1), 42-58
- Orr, A. and Mwale, B. (2001) Adapting to adjustment: Smallholder Livelihood Strategies in Southern Malawi, *World Development*, 29, (8), 1325-1343

- Pacini, C., Wossink, A., Giesen, G., Vazzana, C. and Huirne, R. (2003) Evaluation of sustainability of organic, integrated and conventional farming systems: a farm and field-scale analysis, *Agriculture, Ecosystems & Environment*, 95, (1), 273-288
- Palmer-Jones, R.W. (1977) The effect of plucking policies on the yield of Tea in Malawi, *Experimental Agriculture*, 13, 43-49
- Pearce, D. and Atkinson, D. (1993) Capital theory and the measurement of sustainable development: an indicator of "weak" sustainability, *Ecological Economics*, 8, (2), 103-108
- Pesek, J. (1994). Historical perspective. In *sustainable agricultural systems* (J.L. Hatfield and D.L Karlen, Eds.) pp. 1-19 London: Lewis Publishers.
- Porter, M. (1985) *Competitive Advantage: Creating and Sustaining Superior Performance*, London: Collier Macmillan Publishers
- Poulton, C; Al-Hassan, R; Cadisch, G; Reddy, C and Smith, L (2001) Cash crop versus food crop debate, Crop Post Harvest Programme, *Issue Paper 3*, DFID and NRI
- Pretty, J. (1999) Can sustainable agriculture feed Africa? New evidence on progress, processes and impacts, *Environment, Development and Sustainability*, 1, 253-274
- Raikes, P., M. F. Jensen and S. Ponte (2000) Global commodity chain analysis and the French filiere approach: comparison and critique, *Economy and Society*, 29, (3): 390-417
- Ramadhani, T; Otsyina, R & Franzel, S. (2002) improving household income and reducing deforestation using rotational woodlots in Tabora district, Tanzania, *Agriculture, Ecosystems and Environment*, 89, 229-239

- Rao, P. (2000) Sustainable development: economics and policy, pp. 88, Padstow, UK: Blackwell publishers
- Rasul, G. & Thapa, G. (2003) sustainability analysis of ecological and conventional agricultural systems in Bangladesh, *World Development*, 31, (10), 1721-1741
- Regmi, P. and Weber, K. (2000). Problems to agricultural sustainability in Developing countries and a potential solution: diversity, *International Journal of Social Economics*, 27, (7-10), 788-801, <http://emerald-library.com> Accessed on 12th March 2003
- Rigby D.; Woodhouse, P.; Young, T.; and Burton, M. (2001). Constructing a farm level indicator of sustainable agricultural practice, *Ecological Economics*, 39, 463-478
- Rigby, D.; and Caceres, D. (2001). Organic farming and the sustainability of agricultural systems, *Agricultural Systems*, 68, 21-40
- Robinson, J. (2004) Squaring the circle? Some thoughts on the idea of sustainable development, *Ecological Economics*, 48, (4), 369-384
- Roth, D., Boelens, R., Zwarteveen, M. Eds. 2005 *Liquid Relations: Contested Water rights and Legal Complexity*, New Brunswick, NJ: Rutgers University Press
- Rowland, P. (2003) General Manager WTC, Personal Communication
- Scoones, I. (1998) Sustainable Rural Livelihoods: A framework for Analysis, IDS Working Paper No. 72,
- Sen, A. (1981) poverty and famines: an essay on entitlement and deprivation, Clarendon Press, Oxford
- Simbua, E and Ndunguru, B (2000). Large Scale Tea Production in Tanzania: The role of entrepreneurship and research towards enhancing profitability, *Paper presented at the IVth Scientific Conference and Annual General Meeting of the*

- Agricultural Economics Society of Tanzania*, Iringa Tanzania 31st August – 1st September 2000.
- Smith, N. (2003). General Manager Mufindi Tea Company, Personal Communication
- Smith, C.; and MacDonald, G. (1998). Assessing the sustainability of agriculture at the planning stages, *Journal of Environmental Management*, **52**, 15-37
- Sturgeon, T.J. (2000) how to define value chains and production networks, *Background paper prepared for the Bellagio Value Chain Workshop*, 25 September – 1 October 2000, Rockefeller Conference Centre, Bellagio, Italy
- Swift, J. (1989) Why are rural people vulnerable to famine? *IDS Bulletin*, 20, (2),8–15
- Tait, J.; and Morris, D. (2000). Sustainable development of agricultural systems: competing objectives and critical limits, *Futures*, **32**, 247-260
- TAT (1999) Tax Burden, The TAT position paper presented to the Government of Tanzania
- Tiffen, M. and Mortimore, M. (1990) Theory and Practice in Plantation Agriculture: an Economic Review, ODI Development Policy Studies, ODI London
- Agriculture and Food Council, (1998) Value chains as a strategy: Abstract of the study submitted to Agriculture and Food Council, Alberta Canada, <http://www.agfoodcouncil.com/serve/chain.html> (Accessed on 14th April 2003)
- TRIT, (2000) Annual Report 1999/2000, Tea Research Institute of Tanzania, Dar Es Salaam, Tanzania
- TRIT, (2002) Annual Report 2000/2001, Tea Research Institute of Tanzania, Dar Es Salaam, Tanzania

- TRIT (2002) Ability, Attitude and Willingness of Rungwe Smallholder Tea Growers to contribute to the purchase of RSTGA's shares in the Wakulima Tea Company, Unpublished *Consultancy Report prepared for TechnoServe (T) Ltd*, TRIT, Dar es Salaam, pp. 5-6.
- UNDP (2003) Poverty and Human Development Report 2002; the Research and Development Working Group, Dar es Salaam
- Unilever (2002) Tea Popular Beverage; Journey to sustainable future.
<http://www.unilever.com/publications/> (Accessed on 12th March 2003)
- WCED, 1987, Our Common Future: The Brundtland Report, Oxford: Oxford University Press
- Williams and Karen (1985) Agribusiness and the small-scale farmers: A dynamic partnership for development, London: Westview Press
- Wilson, K. and Clifford, M. N. (Eds.) (1992) Tea Cultivation to Consumption, Chapman & Hall, London
- Winter, M., Gasson, R., Curry, N., Selman, P., Short, C. 1996. *Socio-Economic Evaluation of Free Conservation Advice Provided to Farmers in England by ADAS and FWAG*, CCRU Report to MAFF 1995. Countryside and Community Press, Cheltenham.
- World Bank (2002) The World Bank Group: Tanzania Country Profile
<http://web.worldbank.org/> (accessed on 04th April 2005)
- World Bank Group (2004) Data and Statistics,
<http://www.worldbank.org/data/countrydata/countrydata.html> (accessed on 24th July 2005)
- Yunlong, C and Smit, B. (1994). Sustainability in Agriculture: a general review, *Agriculture, Eco-systems and Environment*, **49**, 299-307.

APPENDICES

8.1. Appendix 1 Household Assets Questionnaire for the Smallholder Tea Farmers

District _____

Village _____

Date _____

Enumerator _____

DEMOGRAPHIC INFORMATION (Human Capital)

1.1 Name of Household head _____ Male/Female ____ Age _____

1.2 Particulars of other household members

Sn.	Household members	Gender	Age	Relation to Household head
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

1.3 Number of household members available for labour in tea-field _____

1.4 Do you employ hired labour on your farm operations? Yes/No _____
 If yes how many and on which activities?

	Crop	Farm operations	Number of workers	Duration of employment	Payment rate (T.shs)
1.					
2.					
3.					
4.					

2. OWNERSHIP OF NATURAL RESOURCES (Natural Capital)

2.1 Total household land (ha) _____

What are the major land uses and how did you acquire the land?

Sn.	Land Use/ Crop	Area (Ha)	Tenure system
1.			
2.			
3.			
4.			
5.			

2.2 Size of tea field (ha) _____ Area under Production (ha) _____

2.3 Since when did you start growing tea _____

2.4 What is your average annual tea yield _____

3. OWNERSHIP & ACCESS TO INFRASTRUCTURE AND FACILITIES (Physical Capital)

3.1 How many houses do you own? _____ What are the features of your house

Size _____
 Roof _____
 Walls _____
 Floor _____

3.2 What are your major means of transport? _____

3.3 Do you own any transport facility? YES/NO _____ If YES what type _____

3.4 What other assets do you own to support your livelihoods _____

3.5 What equipments and tools do you own for assisting you to work?

Tool / Equipment	Uses/ Type of work	How did you acquire it

4. SOURCES OF HOUSEHOLD INCOME AND EXPENDITURE PATTERNS (Financial Capital)

4.1 What are the major sources and proportions of income for this household?

RANK	Source of Household Income	% Proportion over Total income

4.2 What are the major expenditure items and proportion of your household income?

RANK	Major Expenditure Item	% Proportion over Total expenditure

4.3 Do you have any savings from your major sources of income? YES/No _____
If yes what is the form of your savings _____

4.4 Do you have access to any credit facility for tea production YES/No _____
If YES what is the source(s) and amount? _____

Source of Credit	Form of the credit	Value of the credit

4.5 What are the major expenditures in tea production?

Sn.	Major Expenditure	Quantity	Total Cost (Tshs)
1.			
2.			
3.			
4.			

4.6 What are the sources of income/funding that you use to invest on the production of tea?

YES /No _____

If yes what are the sources and the amount

Sn.	Source	Amount
1.		
2.		
3.		
4.		

5. ACCESS TO INFORMATION AND KNOWLEDGE ON TEA PRODUCTION (Human Capital)

5.1 How did you learn about tea production and start growing tea?

5.2 Have you ever worked in any tea estate? YES/No. _____

5.3 How close is the nearest tea estate? _____

5.4 Have you ever attended any formal training/course on tea production?
YES /No. _____ If yes what was it about and who conducted it

5.4 What are your major sources of information on tea production?

Sn.	Type of information /Topic	Source
1.		
2.		
3.		
4.		
5.		
6.		

5.5 What are your main information gaps regarding tea production?

6. AFFILIATION TO TEA GROWERS SOCIETIES & INSTITUTIONS (Social Capital)

6.1 Are you a member of any farmer's organisation in your area? YES/No _____

If yes what is the name and purpose of the organisation

6.2 What benefits do you get or expect to get by being member of the organisation?

6.3 What are the disadvantages/constraints associated with being member of the organisation

6. THE IMPACT OF INVOLVEMENT IN TEA GROWING ON SMALLHOLDER HOUSEHOLDS ASSETS (Feedback Loops)

6.1 What are the positive impacts of tea production on your household assets?

Sn.	Household Assets	Positive Impacts
1.	Natural Capital	1. 2. 3. 4.
2.	Physical Capital	1. 2. 3. 4.
3.	Financial Capital	1. 2. 3. 4.
4.	Social Capital	1. 2. 3. 4.
5.	Human Capital	1. 2. 3. 4.

6.1 What are the negative impacts of tea production on your household assets?

Sn.	Household Assets	Negative Impacts
1.	Natural Capital	1. 2. 3. 4.
2.	Physical Capital	1. 2. 3. 4.
3.	Financial Capital	1. 2. 3. 4.
4.	Social Capital	1. 2. 3. 4.
5.	Human Capital	1. 2. 3. 4.

7. COMMENTS/ SUGGESTIONS/ REMARKS FROM THE INTERVIEWEE

8.2. Appendix 2: Household Assets Questionnaire for the Non-Tea Farmers

District _____

Village _____

Enumerator _____

1. Name of Household head _____ Male/Female _____ Age _____

2. Composition and age of household members

Sn.	Household members	Gender	Age	Relation to Household head
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

3. Total household land (ha) _____ or Acres _____

What are your major land uses and how did you acquire the land?

4. What are the major sources and proportions of income and expenditure for your household?

RANK	Source of Household Income	% of total	Major household expenditure	% of total

5. Have you ever grown tea? YES/NO _____ If yes why did you stop?

If no, why didn't you grow tea?

On your opinion, what should be done to encourage more people to grow tea?

8.3. Appendix 3: Checklist for farmers informal interviews

FARMERS INFORMAL INTERVIEWS

CHECKLIST

1. Demographic Information (human capital _static)	
1.1. Family size, composition and age structure	
1.2. Number available for field work	
1.3. Sources of farm labour and operations involved	

2. Resource Endowment (Natural Capital)	
2.1. Total area/family holdings	
2.2. Major land uses (proportionate)	
2.3. Tenure systems/method of acquisition (descriptive)	
2.4. Proportion with tea	
2.5. Reason for allocating land for tea	
2.6. Entry path into tea growing (which came first land or tea field?)	
2.7. Average yield	
2.8. Other option /competition for tea land	

3. Ownership / Access to infrastructure, and Markets (Physical Capital)	
3.1. Buildings and farm structures (type, size, quality)	
3.2. Major means of transportation	
3.3. Ownership of means of transport	
3.4. Media sources (radio/TV/Newspapers/Other sources) & type of information	
3.5. Other assets to support livelihood (shop, milling machine, etc)	
3.6. Marketing system for tea (channel/prices/services)	
3.7. Equipment and tools for facilitating IGA (increasing asset base)	

4. Sources of household income and expenditure patterns (Financial Capital)	
4.1. Major sources of household income by proportion	
4.2. Major expenditure items by proportions	
4.3. Status of household savings & main sources of savings	
4.4. Access to credit facility	
4.5. Major expenditure for on tea production	
4.6. Income from tea production	

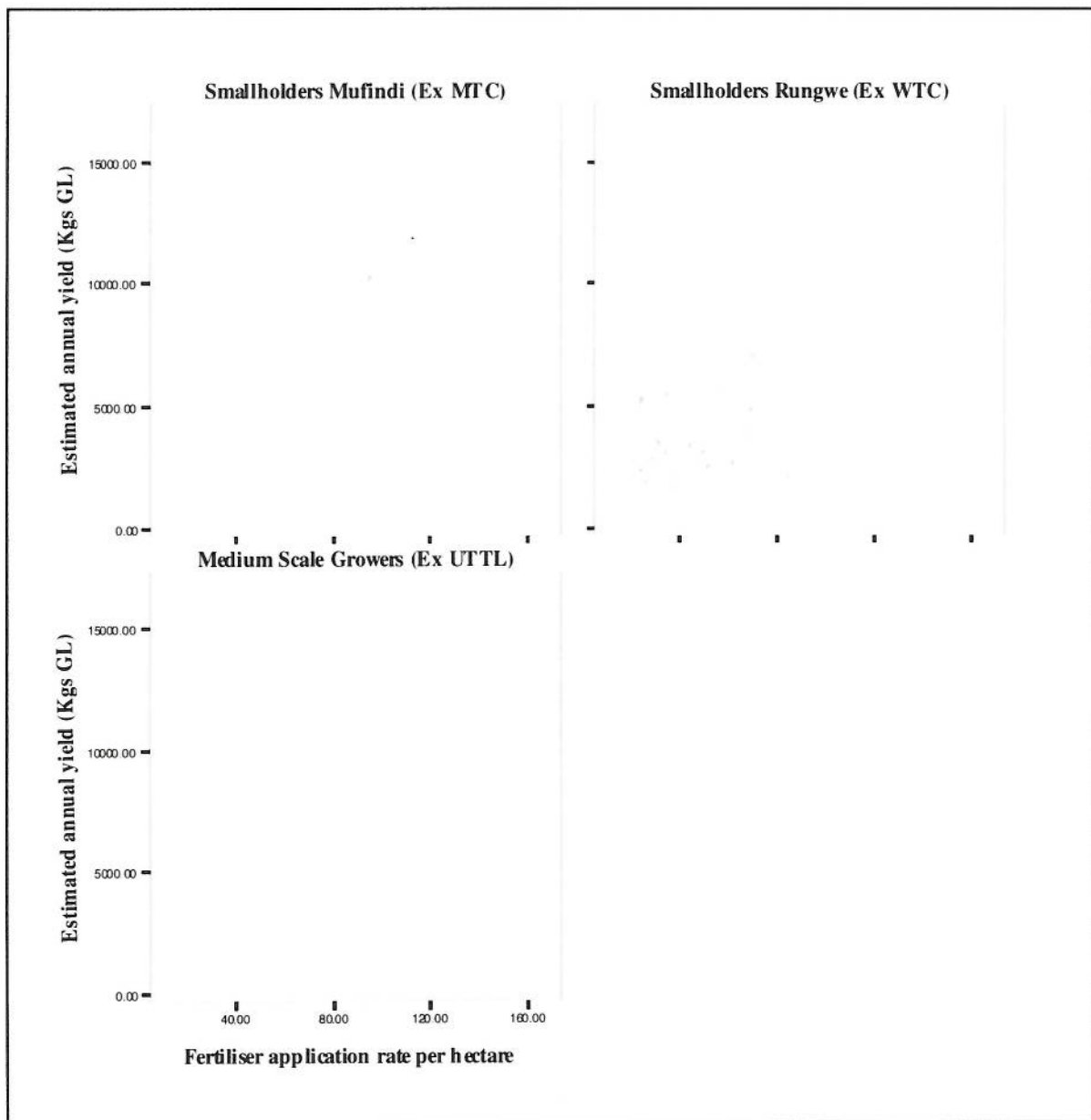
5. Access to information and knowledge base (Human Capital)	
5.1. How did you learn about tea production?	
5.2. Ever worked in a tea estate	
5.3. How close are you to the tea estate /business?	
5.4. Attendance to tea estate	
5.5. What are the knowledge gaps in tea production?	

6. Affiliation to other tea growers, societies and infrastructure (Social Capital)	
6.1. Existence of any tea based institution (level, size, objectives)	
6.2. Are you a member?	
6.3. What are the motivating factors?	
6.4. What benefits and how do you access them?	
6.5. What costs and how do you incur them?	

7. Positive impacts due to involvement in tea production	
7.1. Human capital	
7.2. Social Capital	
7.3. Physical Capital	
7.4. Financial capital	
7.5. Natural Capital	

8. Negative impacts due to involvement in tea production	
8.1. Human capital	
8.2. Social Capital	
8.3. Physical Capital	
8.4. Financial capital	
8.5. Natural Capital	

8.4. Appendix 4: Estimated yield vs Fertiliser use Scatter plot for three case study areas



8.5. Appendix 5: Correlation matrix for variables associated with the greenleaf yield

		Age of the household head	Number of household members	Total labour (MDha ⁻¹)	Total household land (ha)	Tea farm size (ha)	Fertiliser application rate per hectare	Estimated annual yield (Kgs GL)	How long yo've been growing tea	Total value of the credit	Distance to the nearest estate	Soil type
Age of the household head	Pearson Correlation	1	-.052	-.027	-.165(**)	-.185(**)	-.143(*)	-.165(**)	.682(**)	-.160(*)	.113	-.165(**)
	Sig. (2-tailed)		.373	.640	.004	.001	.013	.004	.000	.011	.051	.004
	N	301	301	301	301	301	301	301	299	253	301	301
Number of household members	Pearson Correlation	-.052	1	.384(**)	.322(**)	.345(**)	.137(*)	.097	-.061	.273(**)	.048	.126(*)
	Sig. (2-tailed)	.373		.000	.000	.000	.017	.093	.290	.000	.408	.029
	N	301	301	301	301	301	301	301	299	253	301	301
Total labour (MDha ⁻¹)	Pearson Correlation	-.027	.384(**)	1	.397(**)	.424(**)	.391(**)	.470(**)	-.138(*)	.259(**)	-.130(*)	.146(*)
	Sig. (2-tailed)	.640	.000		.000	.000	.000	.000	.017	.000	.024	.011
	N	301	301	301	301	301	301	301	299	253	301	301
Total household land (ha)	Pearson Correlation	-.165(**)	.322(**)	.397(**)	1	.939(**)	.480(**)	.481(**)	-.218(**)	.351(**)	-.171(**)	.235(**)
	Sig. (2-tailed)	.004	.000	.000		.000	.000	.000	.000	.000	.003	.000
	N	301	301	301	301	301	301	301	299	253	301	301
Tea farm size (ha)	Pearson Correlation	-.185(**)	.345(**)	.424(**)	.939(**)	1	.513(**)	.528(**)	-.265(**)	.487(**)	-.216(**)	.263(**)
	Sig. (2-tailed)	.001	.000	.000	.000		.000	.000	.000	.000	.000	.000
	N	301	301	301	301	301	301	301	299	253	301	301
Fertiliser application rate per hectare	Pearson Correlation	-.143(*)	.137(*)	.391(**)	.480(**)	.513(**)	1	.549(**)	-.139(*)	.306(**)	-.284(**)	.051
	Sig. (2-tailed)	.013	.017	.000	.000	.000		.000	.016	.000	.000	.374
	N	301	301	301	301	301	301	301	299	253	301	301
Estimated annual yield (Kgs GL)	Pearson Correlation	-.165(**)	.097	.470(**)	.481(**)	.528(**)	.549(**)	1	-.314(**)	.304(**)	-.318(**)	.302(**)
	Sig. (2-tailed)	.004	.093	.000	.000	.000	.000		.000	.000	.000	.000
	N	301	301	301	301	301	301	301	299	253	301	301
How long yo've been growing tea	Pearson Correlation	.682(**)	-.061	-.138(*)	-.218(**)	-.265(**)	-.139(*)	-.314(**)	1	-.159(*)	.153(**)	-.315(**)
	Sig. (2-tailed)	.000	.290	.017	.000	.000	.016	.000		.011	.008	.000
	N	299	299	299	299	299	299	299	299	251	299	299
Total value of the credit	Pearson Correlation	-.160(*)	.273(**)	.259(**)	.351(**)	.487(**)	.306(**)	.304(**)	-.159(*)	1	-.103	.179(**)
	Sig. (2-tailed)	.011	.000	.000	.000	.000	.000	.000	.011		.102	.004
	N	253	253	253	253	253	253	253	251	253	253	253
Distance to the nearest estate	Pearson Correlation	.113	.048	-.130(*)	-.171(**)	-.216(**)	-.284(**)	-.318(**)	.153(**)	-.103	1	.068
	Sig. (2-tailed)	.051	.408	.024	.003	.000	.000	.000	.008	.102		.240
	N	301	301	301	301	301	301	301	299	253	301	301
Soil type	Pearson Correlation	-.165(**)	.126(*)	.146(*)	.235(**)	.263(**)	.051	.302(**)	-.315(**)	.179(**)	.068	1
	Sig. (2-tailed)	.004	.029	.011	.000	.000	.374	.000	.000	.004	.240	
	N	301	301	301	301	301	301	301	299	253	301	301

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

8.6. Appendix 6: Selected statistical results for the quantitative household survey

Cross Tabulation Output for selected variables

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Purchase of assets from tea income * Tea processing factory	301	99.3%	2	.7%	303	100.0%

Purchase of assets from tea income * Tea processing factory Crosstabulation

			Tea processing factory			Total
			Mufindi Tea Company (MTC)	Unilever Tanzania Limited (UTTL)	Wakulima Tea Company (WTC)	
Purchase of assets from tea income	Yes	Count	41	23	100	164
		% within Tea processing factory	53.2%	100.0%	49.8%	54.5%
		% of Total	13.6%	7.6%	33.2%	54.5%
	No	Count	36	0	101	137
		% within Tea processing factory	46.8%	.0%	50.2%	45.5%
		% of Total	12.0%	.0%	33.6%	45.5%
Total	Count	77	23	201	301	
	% within Tea processing factory	100.0%	100.0%	100.0%	100.0%	
	% of Total	25.6%	7.6%	66.8%	100.0%	

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.077 ^a	2	.000
Likelihood Ratio	29.789	2	.000
Linear-by-Linear Association	1.298	1	.255
N of Valid Cases	301		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.47.

Ever worked in the estate? * Tea processing factory Crosstabulation

			Tea processing factory			Total
			Mufindi Tea Company (MTC)	Unilever Tanzania Limited (UTTIL)	Wakulima Tea Company (WTC)	
Ever worked in the estate?	Yes	Count	37	14	73	124
		% within Tea processing factory	48.1%	60.9%	36.3%	41.2%
		% of Total	12.3%	4.7%	24.3%	41.2%
	No	Count	40	9	128	177
		% within Tea processing factory	51.9%	39.1%	63.7%	58.8%
		% of Total	13.3%	3.0%	42.5%	58.8%
Total	Count		77	23	201	301
	% within Tea processing factory		100.0%	100.0%	100.0%	100.0%
	% of Total		25.6%	7.6%	66.8%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.143 ^a	2	.028
Likelihood Ratio	7.075	2	.029
Linear-by-Linear Association	4.125	1	.042
N of Valid Cases	301		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.48.

Mean Summaries for the selected Variables

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Age of the household head * Tea growing district	107	100.0%	0	.0%	107	100.0%
Total family size (number of people) * Tea growing district	106	99.1%	1	.9%	107	100.0%
Total household land (ha) * Tea growing district	107	100.0%	0	.0%	107	100.0%

Report

		Tea growing district		
		Mufindi	Rungwe	Total
Age of the household head	Mean	35.37	40.71	39.36
	N	27	80	107
	Std. Deviation	9.435	11.344	11.099
Total family size (number of people)	Mean	4.44	5.11	4.94
	N	27	79	106
	Std. Deviation	2.006	2.913	2.718
Total household land (ha)	Mean	1.6815	1.0613	1.2178
	N	27	80	107
	Std. Deviation	1.12105	.88767	.98426

ANOVA Table

		Sum of Squares	df	Mean Square	F	Sig.
Age of the household head * Tea growing district	Between Groups (Combined)	576.101	1	576.101	4.847	.030
	Within Groups	480.684	105	118.864		
	Total	1056.785	106			
Total family size (number of people) * Tea growing district	Between Groups (Combined)	9.019	1	9.019	1.223	.271
	Within Groups	766.641	104	7.372		
	Total	775.660	105			
Total household land * Tea growing district	Between Groups (Combined)	7.765	1	7.765	8.590	.004
	Within Groups	94.924	105	.904		
	Total	102.690	106			

Regression Model output for the selected case study area

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Fertiliser application rate per hectare		Stepwise (Criteria: Probability-of-F-to-enter <= .05 Probability-of-F-to-remove >= .100).
2	Tea farm size (ha)		Stepwise (Criteria: Probability-of-F-to-enter <= .05 Probability-of-F-to-remove >= .100).
3	Total labour used per hectare(MD)		Stepwise (Criteria: Probability-of-F-to-enter <= .05 Probability-of-F-to-remove >= .100).
4	How long yo've been growing tea		Stepwise (Criteria: Probability-of-F-to-enter <= .05 Probability-of-F-to-remove >= .100).
5	Distance to the nearest estate		Stepwise (Criteria: Probability-of-F-to-enter <= .05 Probability-of-F-to-remove >= .100).

a. Dependent Variable: Estimated annual yield (Kgs GL)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.567 ^a	.322	.319	831.38285	.322	118.003	1	249	.000
2	.643 ^b	.413	.408	639.29276	.091	38.564	1	248	.000
3	.677 ^c	.458	.452	540.38690	.045	20.687	1	247	.000
4	.692 ^d	.478	.470	497.49978	.020	9.556	1	246	.002
5	.701 ^e	.491	.481	471.54355	.013	6.194	1	245	.013

a. Predictors: (Constant), Fertiliser application rate per hectare

b. Predictors: (Constant), Fertiliser application rate per hectare, Tea farm size (ha)

c. Predictors: (Constant), Fertiliser application rate per hectare, Tea farm size (ha), Total labour used

d. Predictors: (Constant), Fertiliser application rate per hectare, Tea farm size (ha), Total labour used yo've been growing tea

e. Predictors: (Constant), Fertiliser application rate per hectare, Tea farm size (ha), Total labour used yo've been growing tea, Distance to the nearest estate

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9E+008	1	946001134.3	118.003	.000 ^a
	Residual	2E+009	249	8016728.838		
	Total	3E+009	250			
2	Regression	1E+009	2	607315892.3	87.185	.000 ^b
	Residual	2E+009	248	6965866.251		
	Total	3E+009	250			
3	Regression	1E+009	3	449378638.3	69.633	.000 ^c
	Residual	2E+009	247	6453565.587		
	Total	3E+009	250			
4	Regression	1E+009	4	351935086.3	56.422	.000 ^d
	Residual	2E+009	246	6237505.162		
	Total	3E+009	250			
5	Regression	1E+009	5	289115474.5	47.330	.000 ^e
	Residual	1E+009	245	6108527.520		
	Total	3E+009	250			

a. Predictors: (Constant), Fertiliser application rate per hectare

b. Predictors: (Constant), Fertiliser application rate per hectare, Tea farm size (ha)

c. Predictors: (Constant), Fertiliser application rate per hectare, Tea farm size (ha), Total labour used per hectare(MD)

d. Predictors: (Constant), Fertiliser application rate per hectare, Tea farm size (ha), Total labour used per hectare(MD), How long yo've been growing tea

e. Predictors: (Constant), Fertiliser application rate per hectare, Tea farm size (ha), Total labour used per hectare(MD), How long yo've been growing tea, Distance to the nearest estate

f. Dependent Variable: Estimated annual yield (Kgs GL)

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2252.545	380.733		5.916	.000
	Fertiliser application rate per hectare	58.763	5.410	.567	10.863	.000
2	(Constant)	2973.681	373.418		7.963	.000
	Fertiliser application rate per hectare	38.789	5.981	.374	6.485	.000
	Tea farm size (ha)	249.983	40.255	.358	6.210	.000
3	(Constant)	1437.017	493.288		2.913	.004
	Fertiliser application rate per hectare	32.608	5.915	.315	5.513	.000
	Tea farm size (ha)	196.133	40.515	.281	4.841	.000
	Total labour used per hectare(MD)	9.696	2.132	.245	4.548	.000
4	(Constant)	2375.313	572.118		4.152	.000
	Fertiliser application rate per hectare	33.197	5.818	.320	5.706	.000
	Tea farm size (ha)	166.999	40.931	.239	4.080	.000
	Total labour used per hectare(MD)	9.335	2.099	.236	4.447	.000
	How long yo've been growing tea	-42.236	13.663	-.149	-3.091	.002
5	(Constant)	3578.174	744.405		4.807	.000
	Fertiliser application rate per hectare	30.072	5.893	.290	5.103	.000
	Tea farm size (ha)	160.389	40.592	.230	3.951	.000
	Total labour used per hectare(MD)	9.436	2.078	.238	4.542	.000
	How long yo've been growing tea	-39.501	13.566	-.139	-2.912	.004
	Distance to the nearest estate	-402.179	161.596	-.120	-2.489	.013

a. Dependent Variable: Estimated annual yield (Kgs GL)

8.7. Appendix 7: List of interviewed people/institutions during exploratory survey

Sn.	Stakeholders category	Organisation	Specific people interviewed
1.	Factory/Estate owners	Unilever Tea Tanzania Limited (UTTL)	1. Dr. N. C. Kelly (Managing Director) 2. Mr. D. Malavanu (Estate superintendent) 3. Ms. S. Rutatina (Research Assistant) 4. Mr. Mlela (ag. Accountant BBT)
		Mufindi Tea Company (MTC	1. Mr. Noel L. Smith (General Managing) 2. Mr. Mtekele (Chief Accountant) 3. Mr. L. Nyagawa (Outgrowers Manager)
		Wakulima Tea Company (WTC)	1. Mr P. Rowland (General Manager) 2. Mr R. Shedafa (Accountant) 3. Mr R Kambasila (Factory Manager)
2.	Service providers	TRIT	1. Prof. B. Ndunguru (Executive Director) 2. Mr. J Mhagama (Extension Manager.)
		DALDO Mufindi	1. Dr. Mbunda (DALDO)
		DALDO Rungwe	1. Dr. A Faya
3.	Tea Farmers Organisations	RSTGA	1. Mr. R. Mwakajila (Chairman)
		MVTBF	1. Mr. M. Nyunza (Chairman) 2. Mr. S. Mdeta (Secretary) 3. Mr. Makarius Ngae (Tresurer)
		TAT	1. Mr. D. Mgwasa (Executive Secretary)
4.	Policy makers and regulators	TBT	1. Mr. S Mijinga (Managing Director)
		MoAFS	1. DRD 2. Documentation Unit
5.	Representative farmers	Mufindi	15 representative farmers (8 smallholders, 5 medium scale growers and 2 non tea farmers)
		Rungwe	20 Representative farmers (15 smallholder tea growers and 5 non tea farmers)

8.9. Appendix 8: List of variables included in the quantitative survey

Position	Variable Name	Variable Label	Measurement Level	Value Label
1	DISTR	Tea growing district	Nominal	(1) Mufindi, (2) Rungwe
2	SUBSCH	Tea Sub scheme (Rungwe)	Nominal	(1) Rungwe N, (2) Rungwe S, (3) Kapugi, (4) Masebe, (5) Segela, (6) Nditu Suma, (7) Mwakaleli, (8) Manow Itete,
3	VILL	Tea growing village (Mufindi)	Nominal	(1) Mkonge, (2) Sawala, (3) Luhunga, (4) Kasanga
4	FACTORY	Case study tea processing factory	Nominal	(1) Smallholders Mufindi (Ex MTC), (2) Medium Scale Growers (Ex UTTL), (3) Smallholders Rungwe (Ex WTC)
5.	ENUM	Enumerator name	Nominal	(1) Simbua, (2) Komba, (3) Urio, (4) Nyanzali, (5) Makweta, (6) Maina, (7) Boaz, (8) Betram, (9) Mulenga
6	RESP	Respondents	Nominal	Name of the respondent
7	GENDER	Gender of the household head	Nominal	(1) Male, (2) Female
8	AGEHH	Age of the household head	Scale	Number of members in the age group
9	AGEGR1	Less than 10 years	Scale	Number of members in the age group
10	AGEGR2	11-18 Years	Scale	Number of members in the age group
11	AGEGR3	19-40 Years	Scale	Number of members in the age group
12	AGEGR4	41-60 Years	Scale	Number of members in the age group
13	AGEGR5	Above 60 years	Scale	Number of members in the age group
14	FAMISIZE	Number of household members	Scale	Number of members in the age group
15	TEALAB	Members available for work in tea farm	Scale	Number of members in the age group
16	HIRED	Do you use of hired labour in tea?	Nominal	(1) Yes (2) No
17	LABOUR	Total labour used per hectare(MD)	Scale	Number of mandays
18	TOTLAND	Total household land (ha)	Scale	Number of hectares
19	TEFASIZE	Tea farm size (ha)	Scale	Number of hectares
17	SOILS	Soil type	Scale	(1) Deep red clay soil (rhodic ferralsol), (2)Wet red clay (humic ferrasol), (3) Red clay and brown loams (humic and chromic andosols), (4)Deep brown sandy clay loams (vitric andosols)
18	LANDTYPE	description of the landform	Scale	(1) Steeply dissected, (2) Rolling to hills, (3) Mostly undulating, (4) Mostly rolling, (5)Undulating lava plains
19	ALTTD	Altitude in metres above sea level	Scale	(1) 900 – 1500, (2)1600 – 2000, (3) 2100- 2500
20	ANYIELD	Estimated annual yield (Kgs GL)	Scale	Number of kgs Greenleaf yield
21	YLD4YRAV	Mean recorded annual yield (2001-04)	Scale	Number of kgs Greenleaf yield
22	FERTAREA	Fertiliser application rate per hectare	Scale	Number of Kgs of N per hectare
23	HLONG	How long have you been growing tea	Scale	Number of years as tea grower
24	LANUSE1	Main land use activity	Nominal	(1)Tea growing, (2)Farming other crops apart from tea, (3)Farming food crops, (4)Residential purposes, (5)Forestry,

				(6)Renting/hiring/temporary use for cash,(7) Other land uses
25	HOWLAND	Method of acquiring land	Nominal	(1)Inherited, (2) Bought, (3) Allocated from public land, (4)Other methods
26	TEALAND	Buy land with tea income?	Nominal	(1) Yes (2) No
27	TEACOST	Major expenses in tea production	Nominal	(1) Agrochemicals (fertiliser & herbicides), (2) Hired labour /farm operations, (3) Plucking/harvesting, (4)Tools and equipments, (5)Other expenses
28	COST1	Cost for agrochemicals (TZS/ha)	Scale	TZS /ha
29	COST2	Cost for hired labour (TZS/ha)	Scale	TZS /ha
30	COST3	Cost for tea harvesting (TZS/kgGL)	Scale	TZS /ha
31	TEAPROF	Is tea growing profitable?	Nominal	(1) Yes (2) No
32	MAJINCO	Major source of household income	Nominal	(1)Tea production, (2) Agriculture (other crops apart from tea), (3) Livestock keeping, (4) Selling labour,(5) Other wage driven sources
33	MAJEXP	Components of household expenditure	Nominal	(1) Farm input and farming operations,(2)Food and domestic needs,(3) Medical and health care, (4) Education expenses, (5) Clothing, (6) Other expenditures
34	SAVING	Do you have savings from revenue	Nominal	(1) Yes (2) Yes
35	SAVTYPE	Type /form of the savings	Nominal	(1) Bank account, (2) Livestock (3)Land & farm properties, (4)Other forms
36	CREDIT	Do you have access to credit	Nominal	(1) Yes (2) No
37	CRESOCE	Sources of credit	Nominal	(1)Tea processing/buying company, (2)Commercial banks, (3)Saving and Credit Associations (SACCOS), (4)Other sources
38	CREFOM	Form of credit	Nominal	(1)Farm inputs (fertiliser, herbicide, planting materials etc.), (2) Loan /cash advances, (3) Technical support (Research & Extension), (4) Other forms
39	CREVAL	Total value of the credit	Scale	TZS
40	TVAVCOST	Total average cost per hectare	Scale	TZS
41	HOWSTAT	How did you learn about tea growing	Nominal	(1)Extension message, (2)Parents at family farm, (3)Copied from nearby estates, (4)Neighbours smallholder farmers, (5)Other sources of information
42	ESTATE	Ever worked in the estate?	Nominal	(1) Yes (2) No
43	ESTDIST	Distance to the nearest estate	Scale	Number of kilometres
44	TEATRAN	Attended formal tea training?	Nominal	(1) Yes (2)No
45	FOTRAIN	Form of training	Nominal	(1) General tea husbandry practices,(2)Quality control & maintenance,(3)Markets and prices,(4)Entrepreneurial skills, (5)Other specific skills on tea
46	INFOSOU	Source of information	Nominal	(1)Tea Research Institute (TRIT),(2)District based extension staff,(3)Factory/estates based extension staff,(4)Other

				extension service providers
47	HOUSE	Ownership of the house	Nominal	(1) Yes (2) No
48	QLTHOUSE	Quality grade of the house (Banded)	Ordinal	(1) Best Quality (Tiles/Iron sheets, cement walls and floor), (2) Good Quality (Iron sheets, burnt bricks walls, cement floor), (3) Normal Quality (Iron sheet/grass thatch, mud bricks, cement), (4) Poor Quality (grass roof, mud bricks, earth floor)
49	TRANSPORT	Ownership of means of transport	Scale	(1) Motorised vehicle and a bicycle, (2) Motorised vehicle only, (3) Bicycle only, (4) Do not own any means of trans
50	TV	Ownership of the TV	Nominal	(1) Yes (2) No
51	TEASSET	Purchase of assets from tea income	Nominal	(1) Yes (2) No
52	MEMBER	Member to tea farmers organisation	Nominal	(1) Yes (2) No
53	ORGPURP	Main purpose of the organisation	Nominal	(1) Linking farmers to the market, (2) Seeking farmers collective bargaining, (3) Facilitating access to credit, (4) Supplying farm inputs, (5) Other reasons
54	ORGBEN	Benefits accrued from being a member	Nominal	(1) Collective bargaining for price, (2) Platform to raise concerns & views, (3) Representation on the business partnership, (4) Access to credit facilities, (5) Marketing outlet for the greenleaf, (6) Other benefits
55	ORGDIS	Disadvantages of being a member	Nominal	(1) Contributions and deductions, (2) No flexibility, (3) No disadvantages (4) Don't know
56	STATUS	Does tea farming bring social status	Nominal	(1) Yes (2) No
57	STATHOW	How is the status derived	Nominal	(1) Can be trusted for credit sourcing, (2) Better lifestyle due to regular income, (3) Perceived higher social strata in the community, (4) Respected due to ability to employ pluckers, (5) Other reasons