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STRENGTHENING RWANDAN FOOD AND AGRICULTURAL PRODUCT CONTROL SYSTEM BY ADOPTING PRIVATE CONTROL SYSTEMS

**A Research Project Submitted to
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In Partial Fulfillment of the Requirements of Degree of Master in
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By

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Acknowledgement

Dedication

To my mother and my family for their continued support in all my endeavors, God bless you all.

Table of contents

List of tables

List of figures

Abbreviations

BSE   Bovine Spongiform Encephalopathy
DEFRA   Department of Environment, Fisheries and Rural Affairs
MINAGRI   Ministry of Agriculture and Animal Resources
RBS   Rwanda Bureau of Standards
FAS   Food Assurance Standards
WHO   World Health Organization
FAO   Food and Agriculture Organization
MINCOM   Ministry of trade and industry
RRA   Rwanda revenue authority
CB   Control bodies

Abstract

The report presents the findings of a study conducted on possibilities of strengthening Rwandan agricultural product control system by adopting private quality management systems.

A practice-oriented study was carried out in Rwanda to assess the feasibility of integrating private quality control systems. For this purpose a case study was conducted through interactive discussions of two groups of expert's one group made of seven experts from private organisations, another group made of public organizations. The discussions were aimed in assessing the perspectives of private and public organisations on current situation of quality and safety control in private organizations and identify areas of improvements for their successful integration in control systems.

The findings of the focus group discussions came up with four models describing current controls and showing that relationships between stakeholders are generally built on mutual agreements without paying attention on ensuring delivery of quality and safe products. The Venn diagram was used by the experts to illustrate limited interaction between the chain actors (input suppliers, producers, traders, and consumers), chain supporters (e.g. financial agencies, NGOs, donor agencies) and influencers (e.g. International standards organisations). The case study highlighted the need for compulsory control for cereals; milk and milk products and fish. Main safety problems associated with the identified commodities were mainly adulteration and food poisoning and microbial contamination. Establishment of private first and second party control systems was recommended by the experts interviewed.

In addition to the case study, the literature review enabled to study responsibilities of both private and public organization in quality and safety control from examples in other countries. Adoption of national control system model that integrates independent control bodies, product boards and chain actors involved from input supply to retailing; and internal control system model, normally used for group certification was identified as a preferred model to be adopted at private sector level but requires a strong partnership between private and public sectors in sharing responsibilities.

CHAPTER 1   INTRODUCTION

1.1 Study background

A practice-oriented study was conducted "on strengthening Rwandan agricultural product control system by adopting private quality management systems". The study aims were to propose an organizational working model with recommendations for enhancing participation of private sector in control of agricultural products though adoption or establishment of private quality control systems in Rwanda.

A case study conducted through eleven experts group discussions on current situation of quality and safety control in Rwandan private companies, with a review of literatures enabled to study the way responsibilities can be shared among private and relevant public organizations to ensure quality and safety control of agricultural products.

The idea to conduct this study derived from the researcher's working experience at Rwanda Bureau of standards (RBS). Due to shortage of manpower resources there is a limitation in controling the whole agriculture chains within required time. This leads to the occurrence of unsafe products that is seen a weakness in ensuring control of agricultural products which falls under responsibilities of RBS. Currently RBS is expected to carryout quality assurance activities for the private sector companies while trends in other countries show that quality assurances activities are much better when are carried out by the private companies.

1.2 Significance of the study

Partnership between public and private sectors is considered worldwide as a basic key in agriculture sector development whereas the private sector forms the main active part of value chain. This is the part dedicated to principal commercial activities of the chain; that are mostly input supply, primary production, processing, wholesaling, retailing, consumption. Apart from being the commercial of part of the chain it is also the part known to be unsurprisingly associated with the potential causes of alteration or contamination of the end product.

Partnership between public and private sectors in agriculture transformation was opted as one of the strategic approaches for the Rwandan government to make a better integration of Agriculture in the national economy to contribute to macro-economic stability and economic growth targeted by 2020 as predicted by ROR (2009). Under this partnership, the government through the Ministry of Agriculture and Animal resources (MINAGRI) believes that it is possible to turn the Rwandan agriculture categorized as subsistence into a professional, profitable, non-seasonal and income generating career.One of the objectives set by the Rwanda Government in the process of agriculture commercialization is to promote rigorous participation of private sector in production, processing, conservation and marketing of agricultural products. This is to be done through incentive measures.

However, compliance of food and agricultural products to markets demands is still another challenge for developing countries like Rwanda that government intends to improve on country economic growth though increase of household's income by commercialization of agriculture.

As global trade emphasizes on standards, quality and safety of products and services, some potential risks to human health due to animals and their products and crop products had to be anticipated by the Rwandan government as barriers in trading of the agricultural products. Especially the global consumers are becoming much worried about food related problems such as contamination, intoxication and poisoning among others (Ergönül and

Günç, 2004; Jevšnik, Hlebec and Raspor 2008); known to be mostly associated with some agricultural and value adding practices along the food chains.

Being aware of these potential risks to human health, the government of Rwanda recognized the importance of encompassing policies and procedures for controlling the quality of the agricultural products from a farm to a table. This prompted the establishment of Rwanda Bureau of Standards (RBS) to ensure conformity of the products and related services to the standards and safety regulations for protection of consumers and enhanced acceptability of the Rwandan products.

One of the roles RBS plays is to ensure quality assurance of agricultural products. Under this mandate RBS is required to establish and ensure maintenance of National agricultural products control systems to protect consummers from dangers of substandard products. RBS is expected to ensure compliance of Rwandan agricultural products to the national, regional and international market quality and safety requirements.

However, incidences of unsafe Rwandan products are still encountered on both local and international markets; diminishing access to wider markets. Additionally, evidence shows that the control services can be time consuming and not easy to carry out the control activities of all products within required time and quite often can be non-tariff barrier (NTB) to trade (RBS, 2008).

Trends in other countries such as South Africa, Northern and Latin American and European countries show that control systems are much better when control activities like inspections and certification for specific products are carried out by the private companies.

As Rwanda government policy is to encourage the involvement of private sector in development actions, this study tackles the integration of private sector in the control system of agricultural products as one of the ways to address the problems of quality and safety of agricultural products along the agro-supply chains in Rwanda.It is considred as an alternative way of enhancing the acceptability of agricultural product on markets since it helps ensuring that the consumer's expectation in terms of quality and safety are met by the product although it may undergo different process in hands of different operators through the chain.

1.3 Research area

The research was conducted in Rwanda a country in central East Africa with a land surface area of 26,388 km^2 and a population of about 9 million (NISR, 2009). Its density of population is 377 people per km^2 which is one of the highest in Sub Saharan Africa. As for private sector development, Rwanda is home to only 240 enterprises and 985 cooperatives which employ 30 to 100 people. Moreover, a lack of infrastructure stalls the development of agricultural export-related industries. Coffee, tea, bananas and potatoes are the main domestic cash crops. Europe has traditionally been the main destination for Rwandan exports, reflecting the dominance of traditional commodity exports, coffee and tea. Coffee growers represent about 400,000 people. Tea production and processing is primarily managed by state-owned factories employing about 53,000 workers (STDF, 2009). Rwanda's Diagnostic Trade Integration Study (DTIS), validated in 2005, acknowledges that in the short-term reinforcement of these sectors through *inter alia* increasing productivity and raising quality is key to poverty reduction. In addition, standards for product safety and quality and opportunities for increasing horticultural exports from Rwanda are sections that feature prominently in the DTIS (STDF, 2008).

In its Vision 2020 document, published in 2000, the Government of Rwanda established targets for GDP growth to a range of 6 to 7 percent over the medium term and poverty reduction, to be achieved by the year 2020; through raising real per capita income from

US$230 to US$900; and raise household incomes by 50 % poverty reduction (National Bank of Rwanda, 2008). The projections were based on the development of the primary production sector and expansion of manufacturing capacity in agro-processing sector. By 2020 the industrial growth is expected to shift from 14 to 16 % and contribute about 33 % to GDP (ROR, 2009). To achieve the mentioned targets by the year 2020, agricultural sector development was set as key priority of the Rwandan government development strategy. This is because the sector is considered to be a back bone of the country since it accounts for approximately 42% of GDP and 30% contribution to country's economy growth while occupying about 80% of the country population.

1.4 Research context

In response to the full trade liberalization that resulted in an increase of international agricultural commodity prices, agriculture has offered attractive business opportunities to Rwanda (World Bank, 2008). This encouraged the government to set strategies promoting commercialization of farming. In this framework the sector is supposed to undergo a transformation from subsistence to commercial means of production. Much effort was put in crop intensification and increased production, diversification of export crops than imports, improvement of quality and rigorous participation of private sector in production, postharvest handling and value addition (ROR, 2009).

World Trade Organisation (WTO) Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) require that both importing and exporting countries ensure good functioning of food control systems (Martha, 2004). FAO (2003) recommends that a national quality control system should be built on principles that promote performance of various activities including:

- Maximizing risk reduction by applying the principle of prevention as fully as possible throughout the food chain;
- Addressing the farm-to-table continuum;
- Establishing emergency procedures for dealing with particular hazards (e.g. recall of products);
- Developing science-based food control strategies;
- Establishing priorities based on risk analysis and efficacy in risk management;
- Establishing holistic, integrated initiatives which target risks and impact on economic wellbeing;

Achieving these along the food supply chains will contribute to sustainability of agri-supply chains while enabling the export of value added food and other agricultural products. In 2006 Rwanda Bureau of Standards (RBS) was mandated to carry out quality control and certification services for agriculture and live stock products. However none of the private companies is involved yet any kind of agricultural product quality control activities such as inspection, certification or trainings while there are signs of weakness in quality and safety control of the products.

1.5 Research problem

Although strategies for controlling imported and locally produced products on day to day inspections have been set by RBS, incidences of unsafe Rwandan products are still encountered on both local and international markets; diminishing access to wider markets. According to customer complaints term reports from RBS (2009), one reason given by local business operators is that the control services offered by RBS are time consuming such that inspection and certifications for all products becomes difficult to complete within the required time. Manpower resources at RBS are in short supply to allow for carrying out control services of which the organization is mandated to. The agro-industry has experienced an increase in the number of operators in response to the Vision 2020 policy in which the agricultural sector was set as key priority of the Rwandan government

development strategy. In order to compete and benefit on local, regional and international markets by local operators, there is need to produce products which conform to quality and safety standards required by the respective markets. Failure to produce and guarantee quality and safe products quite often can be a non-tariff barrier (NTB) to trade considering the global trend whereby consumers are increasingly becoming conscious of health risks associated with food produced without quality management control systems and which cannot be traced. It is there hoped this study will seek to provide alternative approaches in which all stakeholders in the agro-industry strengthen relationships and work together through sharing responsibilities in controlling their products and processes.

1.6 Objective of the research
The main obejectives of the study were:
i)   to assess the feasibility of involving private sector in Rwandan agricultural products control system
ii)   to propose an organisational model that integrates private sector in agricultural products control system in Rwanda",

To achieve these objectives, the study opts for the following aims:
- to conduct interactive focus group discussions for analysis of the current situation of food control systems in private sector,
- to identify and analyze the literatures to come up with succuseful organisational models from experiences of other countries,
- to identify the 3 important commodity chains that should be taken into priority in implementatiom of the identified model,
- to set up a framework of capacity needs basing on curent situation of the control sysems in rganizations of the experts.

1.7 Main research questions and sub-questions
By achieving the above mentioned aims stated in section 1.5, this study has to answer the following main questions and subquestions:

Question 1: What are the views of private and public organizations on quality and safety control systems in Rwandan agriculture chains?
i)   What are quality and safety problems faced by agro-industry in Rwanda?
ii)   What are the factors that influence quality and safety control systems in Rwanda?
iii) What are possible improvements can be made on existing control systems Rwanda?

Question 2: What is the feasibility of integrating the private sector in Rwandan agricultural products control system?

iv)   What are possible organisational models in national food safety control systems that can be applicable to the current situation in Rwandan
v)   In what ways can quality control responsibilities be shared between private and public organizations?
vi)   What are the criteria for having successful national control system that integrates private control systems?
vii) What would be the working approach in an improved national agricultural products quality control system?

CHAPTER 2   LITERATURE REVIEW

2.1 Introduction

The concept of systematic approach of consumer protection from deception and potential health risks was introduced in 19th century (Theuvsen, 2007). However Deodhar (1999) reported that quality control and management is an issue with a long tradition in food business. In Figure 2.1, Luning and Marcelis (2009) describes the evolution of industrial quality management in two pathways of development; a quality assurance pathway and a total quality pathway. Quality assurance systems contributed to the development of systems that form framework for control of different quality aspects including food safety.

QUALITY MANAGEMENT HISTORY
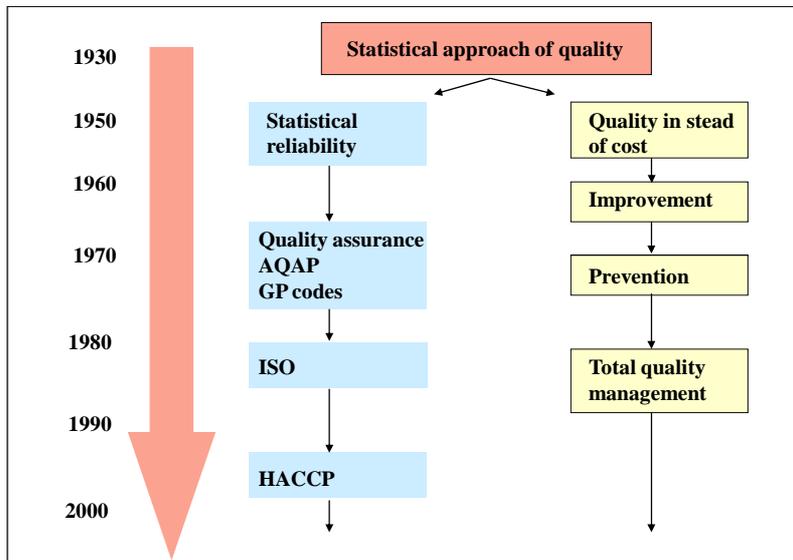
Figure 2.1 Historical overview of developments in quality management
Source: Luning and Marcelis (2009)

Historically, the quality management has evolved though four main ideologies (beliefs) and these gave raise to four categories of quality management systems.

The four main ideologies are:

i) ***Quality instead of cost*** according to which quality management decision making was based on statistical reliabilities. Around the fifties, statistical analysis along different phase of the product life cycle were used by manufacturing industries in product development to identify and set measures to prevent potential failure (Luning *et al.,* 2009). Statistical data may include defect rates, error rates, rework cost, etc. However this was associated with some limitations being time consuming (Jayant *et al.,* 2007).

ii) ***Improvement and prevention*** A time came when quality was assured through establishment and implementation of systems that are intended to preventing potential failure and help in improvement as much as possible.

iii) ***Total quality management***

Beginning 1980 it was recognized that there was a need to ensure safety of food and food product along the whole chain in the context of farm to table principle. This implies adopting a holistic dynamic approach "total quality management (TQM)" by agro-businesses. It integrates all aspects of quality into an organization (Baxter *et al.,* 2010). When it comes to agri-food production chain, the quality becomes more problematic along the agribusiness and industries due to increased consumer worries and increased institutional demands (Luning and Marcelis, 2009). Therefore agribusinesses are then more and more judged on nothing else other than their overall performance in products quality. This brought about an idea of farm to table principle along with practices ensuring the safety of the product along the whole chain. However, when the performance may not meet the targeted specifications then there is need for checking or inspections and applying the corrective actions (Luning and Marcelis, 2009). Total quality management focuses on:

- Customer satisfaction
- Involvement
- Continuous improvement

The need for safe food supply resulted into developments of ISO standards and HACCP systems (Figure 2.1). On the total quality pathway focus was on quality as an output factor rather than only looking at quality costs. Developers of this idea emphasized on the role of top management which if it committed itself fully to quality issues, then it would be possible to achieve continuous quality.

2.2 Total quality management in value chains

The concept of quality is seen in different perspectives from which people consider it depending on different criteria. Evans and Lindsay (2005) identified five criteria as described in Table 2.1.

Table 2.1 Five areas of quality perspectives

	Judgmental	Judgmental criteria represents those judgements made on a product or service that represent our perception or image of the product or service we expect quality when we purchase a BMW, or when we shop at Nordstrom
	Product-based	Specific characteristics of a product that is inherent to the product. For example, the number of weaves in a cotton sheet or shirt. The higher the weave count, the higher the quality
	User-based	Customer believes on quality to be. For example, a quality automobile to a CEO might mean a Mercedes-Benz, while a quality automobile to a Forest Ranger might mean a Jeep Wrangler
	Value based	Value-based criteria represent quality in terms of value. An example of this would be the bottom shelves
	Manufacturing based	This criterion represents quality from the manufacturing point-of-view. For example, the tight fit-and-finish, or the low tolerances allowed on the space between body-parts of a Lexus.

Apart from health problems resulting from food born diseases, many other trends highlight the need for quality management as a strategic way in food business. Luning et *al.,* (2002) identified the following distinctive features that imply the need for quality management:

- Perishability and susceptibility to decay of some agricultural products due to different process like physiological process, microbiological contamination. Since they may lead to health risky effect, there is need for sound knowledge of the product.

15

- Heterogeneity of most agricultural products in terms of desired quality parameters like sugar, colours etc that are dependent on different factors such as crop varieties season factors that are not easily controlled.
- A large number of small scale farmers involved in primary production of agricultural products

In studies on relationships of quality, profitability, and market share Luning *et al.,* (2002) noticed that quality is a driver to market share as far as the business performance is a concern. From that they concluded that customers are prepared to pay more for a product of higher quality than the costs required to achieve the quality. Luning *et al.,* (2002) further stated that in food production systems quality pays instead of costing extra money. They explained this statement by saying that costs arise when defective products are manufactured in way that require more work in different form because this extra work needs extra costs for special services like inspection, product recalls that would have not been considered in case investment had been done in quality management before.

The interest is always put on enhancing basic quality management along the food production chains from supply of raw materials, food manufacturing, packaging, and embedded services such as transportation and logistics, research and development, training and education. Since food safety is becoming a more important issue for all stakeholders in food production, consumer awareness is being raised among consumers themselves and other stakeholders due to increasing reported food disasters and incidences. There have been cases where toxins and other contaminants have been found wide spread in food products following errors in production processes as well as use of contaminated raw materials or improper production conditions.

The global worries about food safety have become a great deal in both developing and developed countries especially when it comes to commercialization of agricultural production. The commercialization of agricultural production involves more practices than those mentioned above for food chains since it includes the agricultural practices. The difficulties mostly based on the fact that guaranteeing the safety of agricultural products to the public health have been always associated with setting up and maintaining transparency (Adrie, Beulens, Broens, Folstar, Hofstede, 2005). Adrie *et al.,* (2005) further stated that for developing countries more problems are linked to limited infrastructure, limited skills and knowledge.

Some countries have managed to strengthen their systems of controlling their agricultural products with the main target of ensuring food safety. This achievement seems to be resulting from the emphasis on partnership between private and public sector that leads to appearance of private quality management initiatives.

The information in this chapter provides the reader with brief review of quality management and quality control perceptions from perspective of agriculture chains. This chapter intends to provide the reader with lessons from literatures on:
- Private-public partnership in improving quality control systems
- The ways responsibilities in quality control systems can be shared among the private and public sector
- Preconditions to integrate private sector in quality control systems
- Working approach to improved national agricultural products quality control system

Also in this chapter incentive, costs and benefits of private sector in adopting or establishing quality management and control schemes will be discussed. Quality management, quality control and value chain development are the leading concepts of the chapter.

2.3 National food control development

Provision of safe food is a shared responsibility where different stakeholders including government, the food industry, consumers and their organizations, academic and scientific institutions, must play a role to achieve a national control system that is strong at all levels as described in Figure 2.2 (Hopper Boutrif, 2007). Food control plays an important role in assuring a high quality, safe and nutritious food supply for the public, for their good health and for the economic benefits derived from trade in safe and high quality food.

The primary functional units of a food control system, at the basic and minimal level, include an inspectorate, an analytical service, and a regulatory compliance unit. The inspectorate inspects and investigates an industry's performance in complying with official control requirements. The analytical service tests and examines products to determine compliance with mandatory requirements of law and regulations, including food standards, established quality and safety limits for chemical and biological contaminants, packaging requirements and other factors for which testing is required. The compliance unit serves as the enforcement function to oversee the bringing of legal cases when warranted. Other functional units support these activities including administrative, planning, programming, research and information, and education and training support, to assist both internal agency units and, when resources permit, affected external sectors.
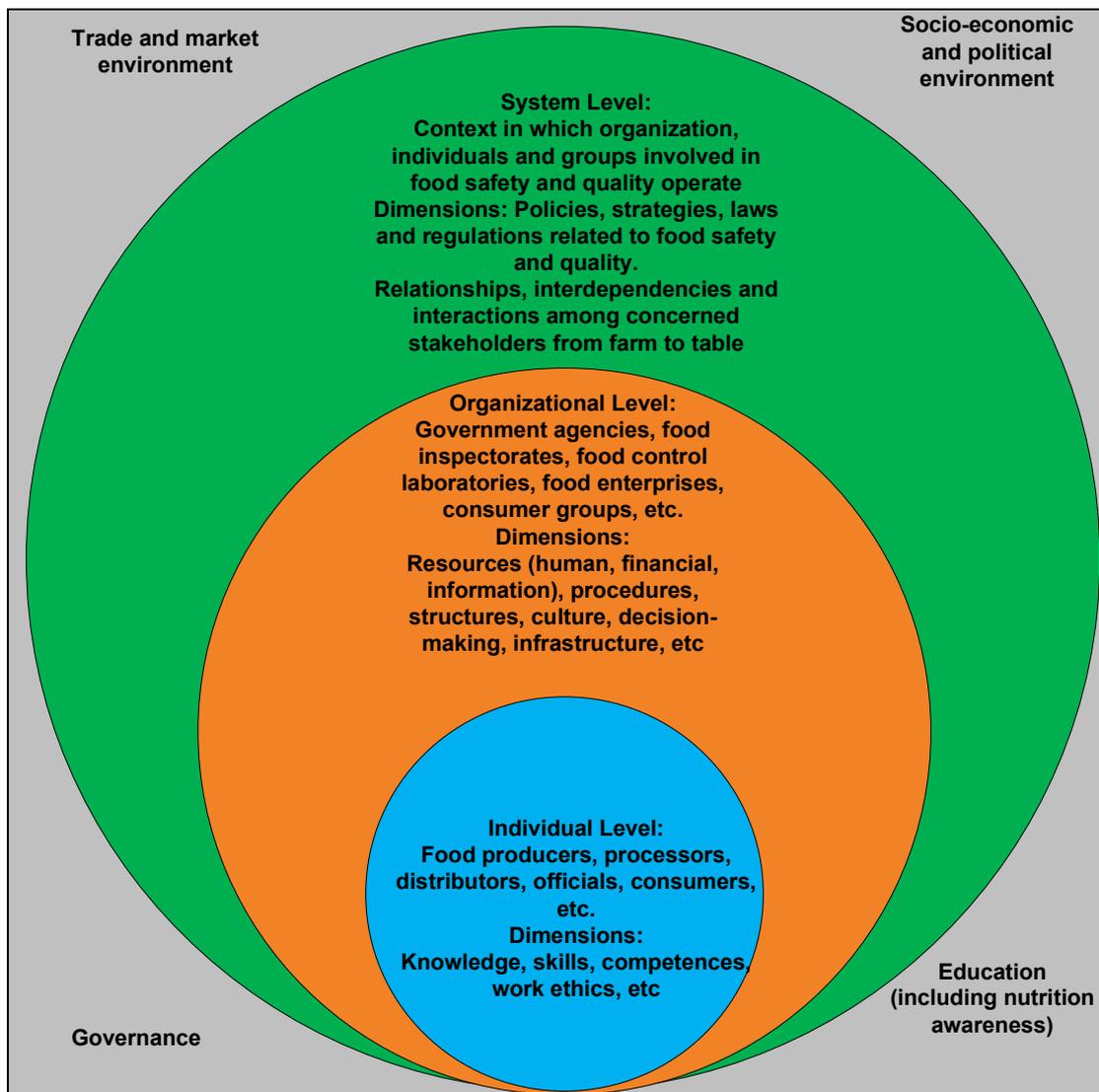
Figure 2.2 Levels and dimensions of capacity in food control systems

Adapted from Hopper and Boutrif, 2006

As illustrated in Figure 2.2, it is necessary to make sure that all levels are effectively, efficiently and sustainably performing their functions in order to provide safe and quality food. This diagram suggests much an integration of all value chain stakeholders in strengthening the national food control systems i.e. producers organizations as well as individual producers, value chain actors up to consumers, chain supporters, enabling institutions, government agencies, NGO's etc.

The functions of different individuals and organizations shown in Figure 2.3 reveal that agri-products markets and value chains are systems involving many different interlinked institutions (VHL, 2010).
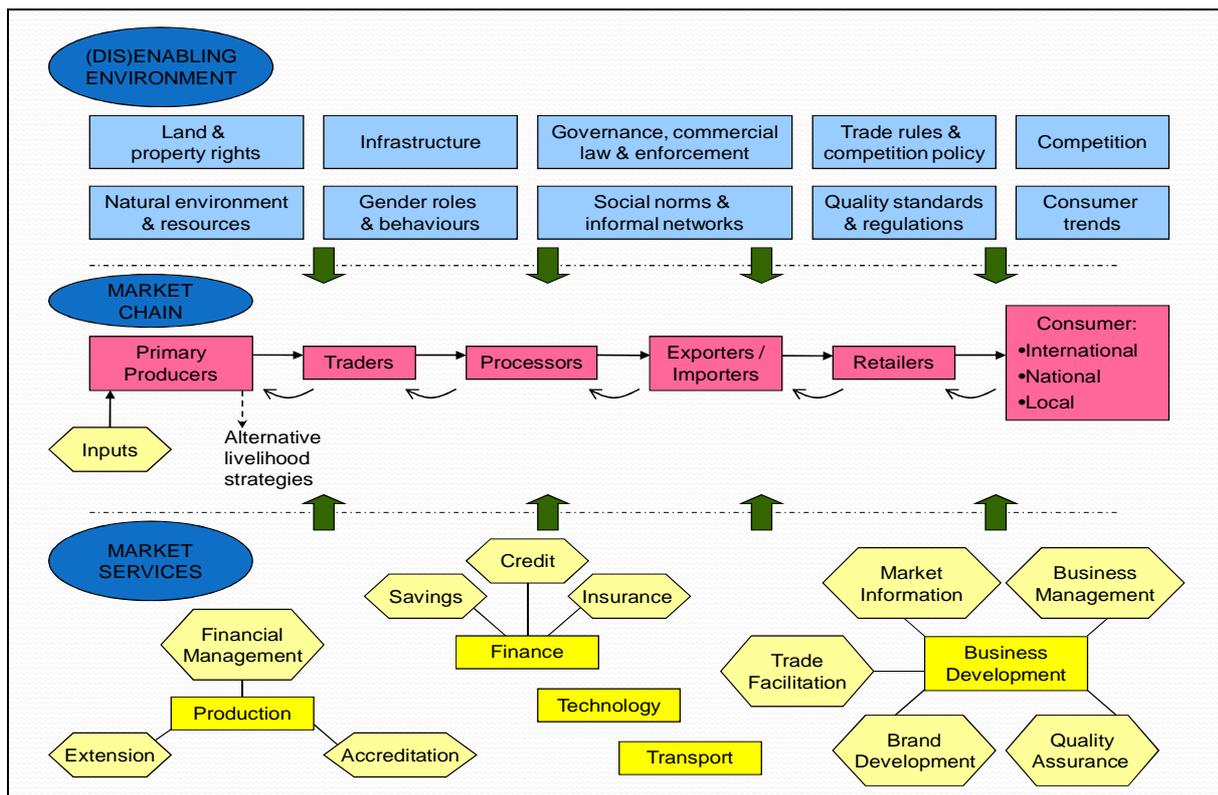
Figure 2.3 Value chain map showing working environment

Culture, business practices, government laws, regulations and many different organizations interact to shape the way a market works. All markets, whether traditional or modern, are governed by a set of informal and formal institutionalized rules and agreements. Without these it would be impossible for the actors involved to co-ordinate their market activities. There is therefore need for strengthening private organization in order to play their role in   food quality and safety control.

The research on "Integration and self-regulation of quality management in Dutch agri-food supply chains" conducted by van Plaggenhoef (2007) found that integration of quality management has an indirect positive effect on buyer satisfaction. Also (Tunçer, 2001) found that establishment of private quality management schemes was opted as strategic way for European private companies to comply with European food regulations and bring back a good reputation on safety of their product among consumers.

2.4 Approaches in quality control systems among the private and public sectors

According to Coulibaly and Lui (2006), developed countries have got two main ways of controlling agricultural products; the first way through establishing and enforcing technical regulations by governments. The second one is through voluntary schemes certification which varies from producer to another depending on the targeted consumer preferences. The exporter or producer must first comply with the technical regulations prior to entry to the market in an importing country while some times; depending on the targeted buyer there may be no need to be certified against any voluntary scheme or standards. According to Coulibaly and Lui (2006) this can be explained as follows;

2.4.1   Approaches by public sector

According to the Ministry of Agriculture, Nature and Food Quality (LNV) and the Food and Consumer Product Safety Authority paper presented in Bangkok (2004), in

certain countries the responsibility of food control is decentralized and mandated to regions or provinces, whereas in other countries food safety control is in the hands of just one central organization. The paper goes on to say that in recent years many countries in the European Union have established a National Food Safety Authority. Again, the responsibilities and tasks of this organization may vary from one country to another.

According to FAO/WHO (2010) government has the responsibility of developing laws and regulations on food that facilitate integrated controls across the food chain. In addition it should provide a working environment in which basic infrastructure such telecommunication and transport networks exists for the effective management of controls. Small-scale operators, because of their limited assets, are particularly dependent on public services and infrastructure. An official laboratory network must also be provided to monitor the food chain and to support the food inspection and food-borne disease surveillance systems.

Public sector provision

Services	Infrastructure
Advisory (extension services and market intelligence systems)	Road and rail
Business development	Local market facilities
Market information	Communication
Public transport	Electrification

Accreditation is mostly known as common tools for identification of competent organization in case private organizations are involved in control activities such as analytical services. In the context of regulations three main types of technical regulations are commercial quality and labeling regulations, food safety regulations and sanitary and Phytosanitary regulations.

i) Commercial quality and labeling regulations
These are basic regulations that set minimum requirements for products with focus on quality in terms of physical properties of the products such as colour, size, grade, maturity, physical damage and shape. They also prescribe information to be contained by the label such as country of origin, product name, variety, information on allergy and quantity. In case of export to the EU markets, control is carried out by an inspection body at import entry point. It is also possible for an inspection to be done at exit point in some exporting third countries but it requires being approved (Coulibaly and Lui, 2006).

ii) Food safety regulations
These are regulations that set and control the maximum levels of pesticide residues, biological contamination in food. They are also containing provisions on traceability of the product and chemicals that are allowed and registered for use in specific production. Hazard Analysis and Critical Control Point (HACCP) system has been adopted as way of reducing the contamination risks in order to ensure compliance these technical food safety regulations. For case of United States of America (US), the government under Bioterrorism Act imposes registration of all imports by Food and Drug Administration (FDA) prior to product arrival in the United States of America (Coulibaly and Lui, 2006).

iii) Phytosanitary and environmental safety regulations
These are used to determine the risk level of an imported product and inspect products on arrival to ensure that the level of risk is not exceeded. In many cases, import permits and/or Phytosanitary (plant health) certificates are needed. The government of the producing country issues Phytosanitary certificates, which are required for regulated

products such as plants, seeds, fruits and vegetables, and cut flowers (Coulibaly and Lui, 2006).

2.4.2 Approaches by private sector

Due to increased worries about of the social and environmental problems associated with the production and trade of the food, consumers are, becoming interested in different types of voluntary certification schemes such as Fair-Trade, SA8000 and EUREP GAP considered as one of the ways to reduce the impact of these problems. Claiming compliance to these schemes requires a certification by and independent body to officially state that a product has been produced in a certain way or has certain characteristics.

Even though the worldwide concern is food safety, the complexity of ensuring the safety of the final products that reaches the consumer requires management practices that start from the farm to the end user point, the principal known as" Farm to table" This principle is rather based on preventives measures and encompasses assurance of animal and plant health, quality and safety of agricultural input materials and manufacturing process.   It also require that food safety management be a joint effort, where private sector committees its self in producing safe food and government provides regulatory system as a background for control of safety. Consequently, safety controlling environment incorporates both private and public responsibility (IOM, 2009).

According to FAO/WHO (2010), the "farm to table" principle integrates food controls at all stages of production and in all sectors by allowing the creation of a systematic, comprehensive system covering all food in all sectors, replacing the current sector specific or mixture of rules". The farm to table principle brought about the emerging of different private quality assurance schemes that help in self regulation of the private sector. This was a result from loss of confidence by agro- food producers due to increase in reported foods related scandals that drained out consumers trust. In this context, apart from the national technical regulations, the producers must also comply with the private quality and safety standards required by a supplied distribution centre. These producers have to operate under a recognized certification body that carries out the initial certification and annual verification audits operations.

Tunçer (2001) has categorized these quality assurance schemes into 8 categories; these are briefly described below in Table 2.1.

Table 2.1 Main categories of private quality management initiatives in EU (Tunçer, 2001)

Initiative category	Orientation principle (claim)	Focus
Organic agriculture certification schemes	Claim environmental friendliness by referring to the practices of organic agricultural production	Primarily on the primary production phase
Integrated production certification schemes	Claim environmental friendliness by referring to integrated crop management, respectively	
National or sector level farm quality assurance schemes	Health and safety aspect through compliance with national environmental legislation	Put emphasis mostly on the primary producer level activities to accomplish safe food production with rare referral to the activities of processors and retailers
Food processor/ manufacturer led quality initiatives	Claim to address organic agricultural production, practice and eco-efficiency measures downstream in the chain	Emphasis "corporate citizenship" leading to a wider perspective in addressing quality aspects such as inclusion of ethical issues or social and human capital or more strict environmental criteria development
Retailer led quality assurance schemes	Refer to integrated methods of primary production	Emphasis "corporate citizenship" leading to a wider perspective in addressing quality aspects such as inclusion of ethical issues or social and human capital or more strict environmental criteria development
Retailer house brands	Claim to address environmental friendliness through organic farming organic agricultural production, practice and eco-efficiency measures downstream in the chain	Use of product brands allows the schemes to deliver consumers a single coherent quality message and provides the opportunity to develop brand loyalty and in turn increase in consumer confidence
Traditional or regional quality aspect schemes	Claim to assure environmental friendliness mainly through less intensified production and processes, which follow strict criteria or traditional ways, together with an emphasis on decreased transportation distances.	Address a whole different set of quality aspects whilst managing to build full credibility with shorter supply chain coverage. However, they still lack international referral and performance evaluation systems, which would assist in continuous improvement
Benchmarking initiatives		Can be seen as quality management tools, which possess the advantage of forming a pool of best practice applications and illustrations of supply chain collaboration.

According to Tunçer (2001) some of the quality control schemes are mostly sector or environmental based or initiatives with the main aims of ensuring product integrity, transparency and harmonization of global market requirements. This includes the

requirements for safe and high quality food, respect for workers' health, safety and welfare, and environmental and animal welfare issues.

However, more initiatives might have made from the time the source of the literature was made (Table 2.1). The initiatives focus on improved market access and trading conditions of marginalized producers. By putting the Fair Trade labeled products on shelves, the distribution centres or supermarkets call the consumers to pay extra in order to support production at supplier's level. Private quality assurance schemes are used as part of a commercial contract that forms a basis of relationship between suppliers and distribution centres, and give a good impression to the distribution centre that the supplied products comply with the national technical regulations governing food safety and consumer protection.

These quality assurance schemes are based on private standards which have a considerable impact on:
- Implementation of codes of good agricultural practices (primary production) and good manufacturing practices (secondary production) and a food quality and safety system such HACCP,
- Providing education and training services to all employees in the areas of food handling and food quality and safety system ,
- Be involved in research in developing technologies for food control,
- Provide information to consumers through food labeling and advertising,
- Ensuring that the industry is included in national food control activities that can be instrumental in overcoming potential problems,

In this level of the chain, quality assurance schemes are now forming an important part of ensuring food safety and meeting quality requirements. This comprises of private standards, which are audited and certified independently and are stricter than legal requirements. Based on their impact, private control systems can be divided into two different types:
1) Private control on official standards and procedures;
2) Private control on private criteria and quality schemes.

The first type refers to the private standards or procedures officially adopted by the governments. They are helpful for governmental control bodies and for companies to meet standards. In this case the government verifies that the private controls and control bodies are reliable. Accreditation of certifying control bodies is a usual method for reliable verification. Internal control systems in hazard identification and control HACCP system, serves as an example of control of the first type. HACCP is being enforced in different countries especially those of EU because it has been proved to help in the reduction of food safety risks (Ministry of Agriculture, Nature and Food Quality and the Food and Consumer Product Safety Authority, 2004).

The second type refers to non-official requirements intended to enhance confidence of consumers. In responding to the demands of consumers, retailers and their global suppliers have created and implemented a series of quality control programs in which implementation of technical regulations compliance is ensured. In line with this a paper by the Ministry of Agriculture, Nature and Food Quality and the Food and Consumer Product Safety Authority (2004) of the Netherlands pointed out that the private sector may also set criteria and quality standards from their suppliers, not based on official standards.

2.4.3 Fundamental drivers in private quality control programs
Henson and Humphrey (2009) noted that two important questions should be asked so as to find out the reasons leading to the rapid development of private food safety standards in

recent years. Firstly there is need to know the drivers of increased controls along global agri-food value chains. The second question is why the need to control is expressed in the form of an increase of private standards, rather than to increasing use of public standards or direct business-to-business partnership to ensure food safety.

Henson and Humphrey (2009) identified four key drivers for increasing control in agri-food value chains. The drivers must be found within processes of regulatory change and the reorganization of agricultural and food markets across the world.

i) First, reforms of food safety regulatory systems respond to real and/or perceived risks in food production, transport and processing which are the result of a series of food safety crises and increasing consumer anxiety.

ii) Second, heightened interest among consumers and businesses in food production processes and changes in their conceptions of food safety and quality are reinforced by company competitive strategies around provenance, environmental and social impact.

iii) Third, the globalization of food supply and increased role of coordination economies in defining competitiveness create new risks and new challenges for value chain coordination and control.

iv) Fourth, responsibility for ensuring food safety has been devolved from the state towards the private sector.

These drivers discussed merge to create an environment in which operators are required to provide food safety and to maintain the images of their companies. This requirement can be achieved by private standards. The key role of standards, whether public or private, mandatory or voluntary, is to facilitate the coordination of agri-food value chains. In relation to food safety the major functions of private standards relating is risk management.

Market liberalization and deregulation
According to World Bank (2008), market liberalization and deregulation is, to minimise (economic) inefficiencies, to encourage cost-reducing techniques and institutional innovations, to reduce (fiscal) costs, to reduce corruption and decrease vested interest etc. But these factors led to expanding horizontal and vertical concentration of market power throughout "free markets", which implied competition among retailers (Vermeulen *et al.,* 2008). In this competition, raising quality of the products is pledged by retailers since it has been taken as a strategic way for international competitiveness. Newly established retailers take an advantage of quality assurance on traditional markets.

Need for dominance in modernized agri-business
Modernization of agri-business has leaded to market dynamism characterized as "supermarket revolution". In this revolution, a combination of worldwide and countrywide factors led to changing way of food production, processing, wholesaling and retailing. For retailers, the ability to set private standards (GlobalGAP, BRC) and quality management schemes for a whole sector was taken as a strategic way to dominate the whole chain (Vermeulen *et al.,* 2008).

2.4.4   Information technology
Information technology especially media are key tools for information sharing among the chain actors. It acts much on the consumer's behavior by raising their awareness on the changes along the chain and making them more demanding. Increasing consumer demand and pressure for quality and safe food with high quality and stable shelf life implies retailer's responsibility of establishing product traceability mechanisms along the chain. Information technology also made possible for product tracking and tracing by the operators along the chain and warehousing systems.

2.4.5   Institutional influence

As the consumer safety in relation to food and other agricultural products is getting a significant influence on trade relations, this affects the economy development. This is in a context that food-borne diseases have been reported to be one of the factors that can lead to economic losses. Therefore both the policy-makers and private traders and industries establish standards to enhance and maintain safety of food and other agricultural products.

Basing on "Sanitary and Phytosanitary Measures (SPS)"agreement, the World Trade Organization (WTO) sets international legal framework as guidance to establish the national standards while SPS agreement refers to the international food safety norms of the joint FAO/ WHO Codex Alimentarius Commission (GTZ Eschborn, 2007). Main importing markets (USA, EU, and Japan) have set their strict regulations for controlling food safety.

However, it has been noticed that standards-setting process of public and multinational based standards such as codex standards was slow and complex so that these standards could not be established and revised at the rate required by private companies who need to adopt them. Henson and Humphrey (2009) explained how quick development in private standards is as compared to development in codex standards with the following illustration;

> *"The Recommended International Code of Practice – General Principles of Food Hygiene has been revised four times since its original adoption in 1969, while the BRC Global Standard for Food Safety has been revised five times since its initial implementation in 1998."*

The move to annual rather than biennial meetings of the Commission should mark a significant improvement in this regards. From this background there has been emergence of the private standards such by supermarket chains and international business organizations with EurepGAP (GlobalGAP) dominating the market for fresh produce. This was to protect the reputation of these supermarkets by controlling the safety of the final products through whole chain. The emergence of these private standards emerged from the lessons gained by retailers and the food industry from food scandals.

2.4.6   Use for private standards
According to Moller (2007), the list of incentives for implementation of quality assurance standards is long, but there is one common one of internal harmonization among the users. This would lead to the reduction of duplication of control activities on quality assurance standards user level. Farina and Reardon (2001) identified the incentives of implementing the private standards as follows:

i)   Tools for product differentiation and communication about along the chain
Consumers, retailers and farmers rely increasingly on logos and certification schemes to help them identify and distinguish food produce. A wide range of quality certification schemes currently operate in Europe and their number continues to increase.

Over the last decade, European agriculture has made an important shift, emphasizing quality and specialization. Globalization will only increase this tendency. Farmers and producers know and care about production and processing techniques, ingredients, and origin of raw materials. In the EU, they also have to follow high animal welfare, environmental and labour standards that cannot be imposed in respect of imported foods. Certification schemes provide a means by which producers can inform their ultimate customers about their products and give guarantees that the information is well founded.

Public available standards did not manage to resolve the market failures that lead to food scandals. The traders needed to establish and maintain grade and hygiene standards. Labeling and certification schemes play an important role in product quality and safety communication.

ii) Tools for chain coordination and efficiency improvement
Private process standards like HACCP and ISO9000 for management systems became increasingly tools for chain coordination.

2.4.7 Impact of meeting private standards along the food chain

Impact on producers
The introduction of certification based private food safety standards has many effects on agri-food value chains which include among other things, changes to established methods of production and the allocation and sharing of costs along the value chain.

Standards schemes have the following basic principles:
- Control of risks through introduction of control points and use of procedures specified in the standard.
- Verification of application of specified process controls through documentation. Internal audit by the business operator.
- External audit by a certification body, which is generally itself accredited by an (often official) accreditation body.

However the existence of these standards does not present a major shift from pre-existing controls after farm gate especially at processing level. Similar systems of control exist and are more a part of the public regulations governing production and processing of food. According to Humphrey (2009), there are some private standards e.g. GlobalGAP requiring big shifts in practices and controls at the level of the farm. The major effects of these will be focused under three elements with particular attention being made to GlobalGAP as its impacts have been studied (Humphrey, 2009) in Africa which makes it a good reference point for this study. Private food safety standards only affect those business enterprises which decide to apply them, or which are integrated into the supply chains of firms that make them compulsory for their suppliers.

a) Complexity of implementation
The introduction of process-based food safety standards for many small farmers creates a major shift from their normal practice. However this does not include farmers who were already integrated into exporter out-grower scheme, with related systems of technical support (Humphrey, 2009). A process standard has as its objective limitation of risk through implementation of process controls and associated procedures for their verification. Important to note is that these procedures also relate to the decision-making method involved and the proficiency of staff. Establishment and maintenance of record systems is also a requirement. As a way of reducing inspection and certification costs, it is possible with GlobalGAP for small farms join together to obtain group certification but there still remain some constraints which need to be overcome relating to the development of a Quality Management System (QMS) so as to maintain the integrity of the control system (Humphrey, 2009).

b) Costs of implementation
This tries to look at the financial requirements starting from scratch which are needed reach the level required to obtain GlobalGAP certification. The costs of introducing GlobalGAP include:
  i) Changing farming practices which incorporates using non-chemical pest controls and crop rotation.

ii) Training farmers in the principles of GlobalGAP.
iii) Capital investments in infrastructure
iv) Soil and water analysis.
v) The costs of certification itself.
vi) Investments in control systems and the costs of maintaining the system

According to a paper by Humphrey (2009),

> *"The costs of introducing GlobalGAP are substantial, although they vary considerably. Graffham et.al., (2007) calculated the cost of various schemes introduced by exporters to meet the EUREPGAP standard in the run-up to its introduction for Kenyan exports to some EU supermarkets in January 2005. The cost per farm of different schemes ranged from £100 per farm to £2,800. These variations are partly the result of different scales: schemes involving more farmers reduce the individual farm cost and the cost per farm reduces substantially when more than 50 growers are involved (Graffham et al., 2007). However, it seems likely that, in addition to inconsistencies in the way that companies calculate costs, these estimates reflect substantial differences in the preparedness of different exporters. Exporters with highly organized out-grower schemes would already have had in place many of the elements required by GlobalGAP".* Humphrey (2009)

Certification by international standards agencies can be costly for developing-country producers. For this reason, the agro-industry is recommended to engage development agencies (e.g. FAO/WHO, EU) to supporting the development of local certification capabilities in the country. According to Humphrey (2006), industry sources in Kenya acknowledge certification by a new local company, AfriCert, results in lower level of fees charged for EurepGAP as well as reductions in the fees of international certifiers. AfriCert which is based in Kenya is the first certification company in eastern Africa to have gained accreditation according to the international ISO 65 standard. The organization was developed for the government of Kenya by an expert from the Dutch organization GTZ.

c) The potential exclusion of small producers.

The economics of certification for global standards has raised concern particularly as it applies to small producers as barriers to market access. Compliance with these standards especially those of technological aspects require a considerable investment (Table 2.2). In studies done on small holder farmers in Kenya, Humphrey (2009) concluded that, it is not useful for small farmers to invest their resources to meet the requirements of the GLOBALGAP standard. According to Trienekens J.H (2006) in Figure 2.4 it is difficult for small and medium size enterprises from developing countries to comply with standards as required. Some of the reasons mentioned include:

- Lack of awareness and adequate information about specific demands of western standards
- The multitude of standards in industrialized countries differ from country to country and from market to market;
- The lack of harmonization of national MRL (maximum residue level) requirements in these countries;
- Costs of certificates are in many cases barriers for non-western producers.
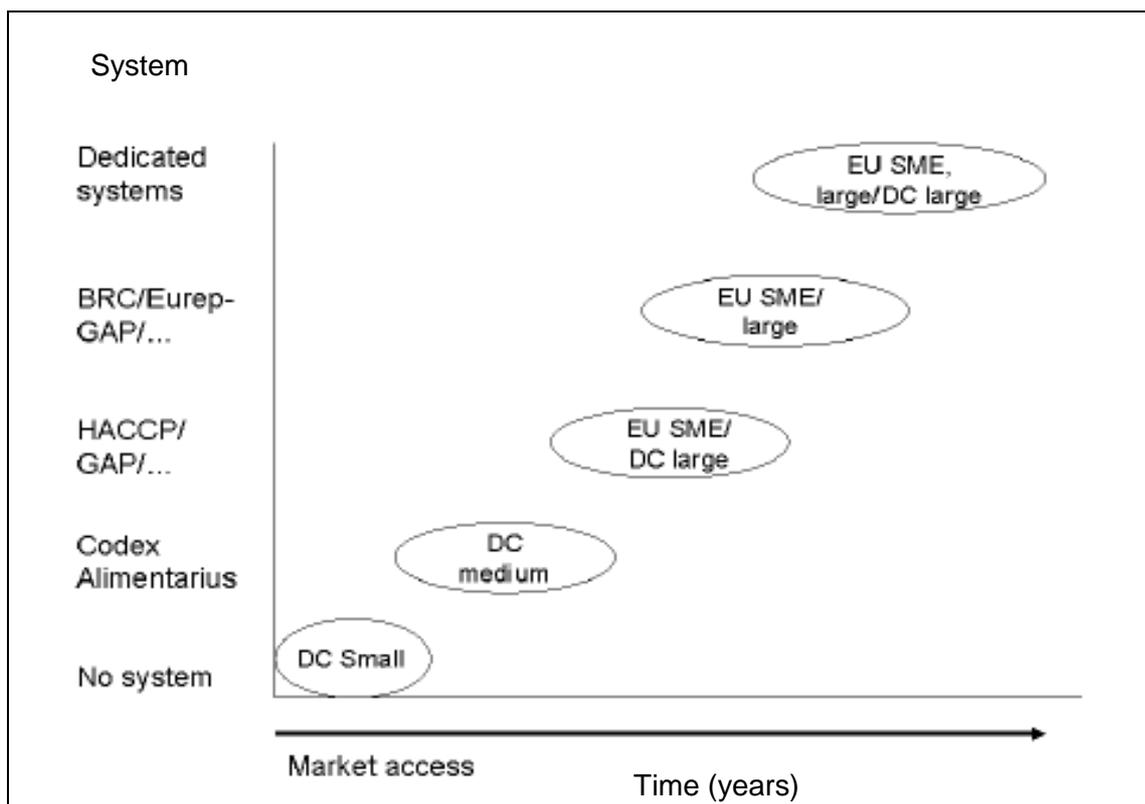
Figure 2.4 Market access for producers using different food safety standards
Source: Trienekens J.H (2006)

Table 2.2 Examples of laws and regulations that affect small-scale producers (FAO, 2008)

Relevant areas of laws and regulations	Description	Implications for small-scale producers (SSP)
Food safety and Quality	Public standards on hygiene and food safety, standards on traceability	Need for systems suitable and affordable for SSP Require human capacity and capital investment in order to comply
Certification and Labelling	Private standards and certification schemes	Need for systems suitable and affordable for SSP Fair trade labelling favours SSP

Successful small-scale producer compliance with private sector standards depends on partnerships with primary marketing organizations (typically large producers/exporters) and the development and application of procurement systems which meet private sector standards' requirements (FAO, 2008). Successful compliance by small-scale grower groups to private standards has been achieved by having close linkages with primary marketing organizations (PMO) and a procurement system re-organized to meet requirements.

A number of PMO-centered procurement systems can be differentiated based on who owns the PMO:
- Farmer-owned;
- Exporter-owned;

- An independent marketing organization.

The most common type of procurement model is one involving an export company taking the role of PMO, with the following key features:
- Exporter takes overall legal responsibility for standards compliance individual growers sign a contract with the exporter to comply with all of the requirements of the standard; farmers are responsible for putting in place standards compliant infrastructure on their farms and in most cases for central systems such as central storage of agricultural
- Inputs and produce collection centres; exporter controls the system via an out grower
- Management team (OMT), and pays for operational costs of the OMT, training, documentation, laboratory analyses, overheads and certification audits.

The key for all of the exporter-controlled schemes is the level of resources available to the exporter especially in the area of out grower management teams (OMT), as the staff in the OMT are responsible for operation of the Quality Management System, monitoring standards' compliance, training and technical advice, sampling for laboratory analyses, farm inspection and internal auditing. Large companies have well staffed teams, but smaller companies vary in the resources they devote to technical support. Schemes without a proper OMT are unlikely to be sustainable.

However, group certification systems known as internal control systems (ICS) were found as an alternative for to reduce certification costs by an estimated ten times (Preibel and Reckling, 2010). According Helga and Yussefi (2006), International Federation of Organic Agriculture Movements encourages small scale to implement quality control through group certification scheme known as internal control system (ICS). This locates the responsibility for regular trainings, inspections, documentation, and produce separation and tracing in the hands of producer organizations, be it cooperatives or export companies working with contract farmers (Figure 2.5).

ICS operator (Company/ processor/NGO)

- Holds certificates
- Develops manages the an ICS
- Provides technical supports
- Arrange and conducts internal and inspections
- Facilitate external
- (storage, processing sites and transportation
- Contracts the Suppliers (mostly the farmers)
- Buys the production

Option 1a

A group (cooperative or association of farmers) Manages the ICS and holds a certificate

The Group responsible for collecting and supply produces to the buyer

The buyer responsible of collecting produces him/ herself

The Group contracts buyer for production and buying the produces

Buyer

Option 2c

Buyer

Option 2a

Option 2b

Figure 2.5 Internal control system organization model

Adapted from: IFOAM, 2004

There are many different options for how an organic project can be organized. The important factors are:
- Who is in charge of the ICS (an exporter/ an NGO/ a farmers association)?
- Who has ownership of the goods along the chain of production until export?

The following options are the most common ones for smallholder organizations (Figure 2.5):
Option 1: "Contract production": exporter or processor contracts farmer to sell him organic produce; exporter or processor is ICS operator and organizes purchase, processing, sales. The operator can be either an NGO/non-profit operator or a commercial processor/exporter.

Option 2: Cooperative or farmers association holds certificate and is ICS operator.
This has three typical project layouts:
- *Option 2a:* The ICS operator is also the buyer and organizes the processing (sometimes with help of contract processor; remains owner of goods during processing) and markets the organic products himself.
- *Option 2b:* Processor buys the products directly from the farmer certified under an ICS (neither very common nor easy to organize)
- *Option 2c:* Organization collects (buys) the products and then sells them to a processor or exporter who deals with the marketing of the produce.

30

In all cases the certification can be paid by a third party (an importer in Europe), but this usually means that this party also owns the certificate, and the project can only sell products labelled as organic to this partner. This leads to a high level of dependence and is not recommended.

2.4.9 Case study examples of quality control initiatives

Case of IKB of Netherlands

The following according to Bekman (1998) is a brief description on the events leading the introduction of IKB in the Netherlands. The need for an integrated quality control in Netherlands was developed when players in the livestock and meat industry realized the need to change from a product oriented to a more market oriented production (from quantity to quality). This followed international developments such as competition, declining meat consumption and consumers pressures. It was therefore realized that in order to offset these developments the only possibility was if every part of the production chain contributed (in collaboration with each other) to accomplish a better control of the whole production process: from "farm to fork". This was followed by years of an extensive research program which was carried out to set up a system of Integrated Quality Control (IKB). This resulted in a "total quality concept" which comprises of the production method, the safely and quality of the product and concern for the environment, and human and animal welfare. Implementation of the IKB-concept depends on the particular sector (Bekman, 1998).

Years following its implementation saw an improvement in image aspects such as animal welfare, tenderness and sensory quality. As a result of its success story, it was decided to have the scheme would be open also for participation by the retailer (Bekman, 1998). A consumer logo for IKB was developed in order to have the products visible to consumer in the retail markets.

The IKB-schemes in each sector are financed by the industry itself. An independent organization runs the scheme and checks are performed on a regular basis at all parts of the production chain. Participation is on a voluntary basis. The scheme has achieved greater success and has managed to give local and international customers much greater confidence in the quality of the product (Bekman, 1998).

Cost/ benefit of IKB

For the individual producer participation in IKB the most important long-term benefit in the long run is a stronger competitive position in the market due the increased demand by customers of products produced in a QAS-production chain (Bekman, 1998). It requires that the producer frequently improves himself and to look forward to new developments so as to be more competitive which in itself is an important profit. However it is not easy to determine whether IKB will result in higher prices. Bekman, (1998) states that a known and proven fact is that IKB does result in lower production costs for the producer (less veterinary drugs, better growth, better feed conversion and lower incidence of inspection abnormalities).

Case of Migros and Coop, Switzerland

Réviron and Chappuis (2005) provided information on the example of Switzerland, where on the initiative of the two main retailers; Migros and Coop, the structure of the Swiss food supply chains has changed in depth, with the construction of "normed systems," characterized by quality insurance guarantees and of "partnerships" with alliances of producers and processing companies forming vertical integrated organizations intent on protecting the retailer against food safety problems. The buyer's point of view and his

weaknesses regarding the risks on a quality defect although unavoidable by a buyer may be one of the reasons why the Swiss retailers reformed in their buying strategy.

This principle of placing the main responsibility on producers can only work adequately, when effective and efficient government controls are in place (Réviron and Chappuis, 2005). As a consequence all relevant information on the application of process controls, essential for safe food production, should be fully available for government control purposes. The same applies to information that is of importance for proper traceability.

The organization of the official controls differs to a large extent throughout the European Union, as a result of different historical backgrounds and traditions. The differences vary from a completely centralized system (the Netherlands, Denmark, Belgium) to decentralized systems where the competent authorities are working according to a regional (Spain, Germany) or local system (United Kingdom, Ireland) (Réviron and Chappuis, 2005).

2.5 Challenges in private quality assurance schemes

Agri-food chains in developed countries are more regulated and characterized by high levels of governance and long-term vertical co-ordination between the producers, supplier integrators, processors and retailers. The resulting chains have barriers to entry such as voluntary standards, codes and benchmarks. The growing emphasis on quality standards and public concern about food safety have led both governments and retailers to set increasingly high standards on production and processing methods. Although private food safety standards maybe seen to act as barriers to entry for new developing country exporters and firms thereby effectively denying them access to potentially profitable export markets, it is increasingly being recognized that private standards, alongside the regulatory requirements of export markets, can act as catalysts to processes of capacity-building and competitive positioning in global agri-food value chains. Sorsa (2010) highlights how rising private and public standards have posed challenges to the Kenyan fresh produce industry, yet at the same time they have also thrown a 'life line' to the industry in the face of stiff international competition. Sorsa (2010) makes reference to observations by Jaffee and Henson (2004) that also showed how Peru has positioned itself as a globally competitive exporter of fresh and processed asparagus through concerted efforts to upgrade food safety capacity in line with Global GAP. Thailand, Malaysia and Vietnam, were proactive in introducing national GAP standards and were historically less reliant on EU markets than some of their international competitors, have found it relatively easy to comply with private standards such as Global GAP (Sorsa, 2010). From this it can be seen that in this environment there will be some countries that will face problems in complying with private safety standards whilst others will be thriving. At the same time, however, the huge investments and technical skills needed for implementation have economies of scale that favour larger firms than for small businesses. Thus, we are likely to see exports from developing countries increasingly commanded by a smaller number of larger and more able enterprises. According to Trienekens (2006) for developing country producers an important barrier to take part in international chains is the lack of an enabling environment (institutional and infrastructure facilities).

Figure 2.6 Structure of agricultural products control

Having described the three groups of technical regulations for quality control, a schematic diagram (Figure 2.6) summarizes **the structure of agricultural products control** systems.

The tables below adopted from from Word Bank (2008) outlines the way responsibilities are mostly shared between government and private sector in order to achieve the controls in sustainable way.

Private and public responsibilities to enhance quality management capacity

Public sector	Private sector
Policy and regulatory environment Pursue international dialogue; adopt domestic food safety legislation and standards consistent with local conditions and preferences, WTO, and other trade obligations **Risk assessment and management** Strengthen national or sub national systems for pest, animal disease, and market surveillance; support research on food safety and agricultural health concerns **Awareness building and promoting good practices** Support consumer awareness campaigns on food safety; promote good agricultural hygiene, and food processing practices to be integrated into extension programs; invest in appropriate laboratory infrastructure; accredit private laboratories **Infrastructure investments** Improve water supply and sanitation and marketing facilities	**Good management practices implementation** Implement appropriate management practices (hazard analysis and critical control point, "good" agricultural practices); obtain formal certification where viable **Traceability** Develop systems and procedures to enable traceability of raw materials and intermediate and final products **Develop training, advisory, and conformity assessment services** Strengthen human capital, physical infrastructure and management systems to supply support services to agriculture, industry, and government related to quality and food-safety management **Collective action and self-regulation** Self-regulate through adoption and oversight of industry "codes of practice"; alert government to emerging issues; advocate for effective government services

Adapted from Word Bank (2008)

2.6 Dutch food quality and safety control systems

In the Netherlands, Ministries with competence for food and feed safety, animal health and welfare and plant health have a centralized structure and direct their policies through agencies and bodies with mostly regional implementation (FVO, 2007).

Dutch legislation provides for establishment of independent administrative bodies (ZBOs) which have given specific tasks to implement with regards to public interest. These bodies are able to make independent decisions although they fall under external control of line Ministries. ZBOs may either be public bodies or private bodies with decisions made by them being legally binding. Different sectors have their own ZBOs e.g. Central body for dairy quality (COKZ), Supervisory board for poultry eggs and egg products (CPE), Inspection service for quality of fruits and vegetables (KCB) to name just a few.

According to FVO (2007) product boards have authority to formulate statutory rules in specific areas and impose levies for a particular sector with regulations made being

binding for the entire sector. Besides private law organizations for each professional group, there are usually vertical public law organizations and are involved in all chain activities within a given sector from farm to table. Product boards exist for livestock and meat; fish and fish products; animal feed; dairy produce; and horticulture.

Key:
Ministry of Agriculture Nature and Food Quality (LNV)
Ministry of Health, Welfare and Sports (VWS)
Food and consumer Products Safety Authority (VWA)
General Inspection Service (AID)
Central Body for Dairy Quality (COKZ)
Products Boards for Livestock, Meat and Eggs (PVE)
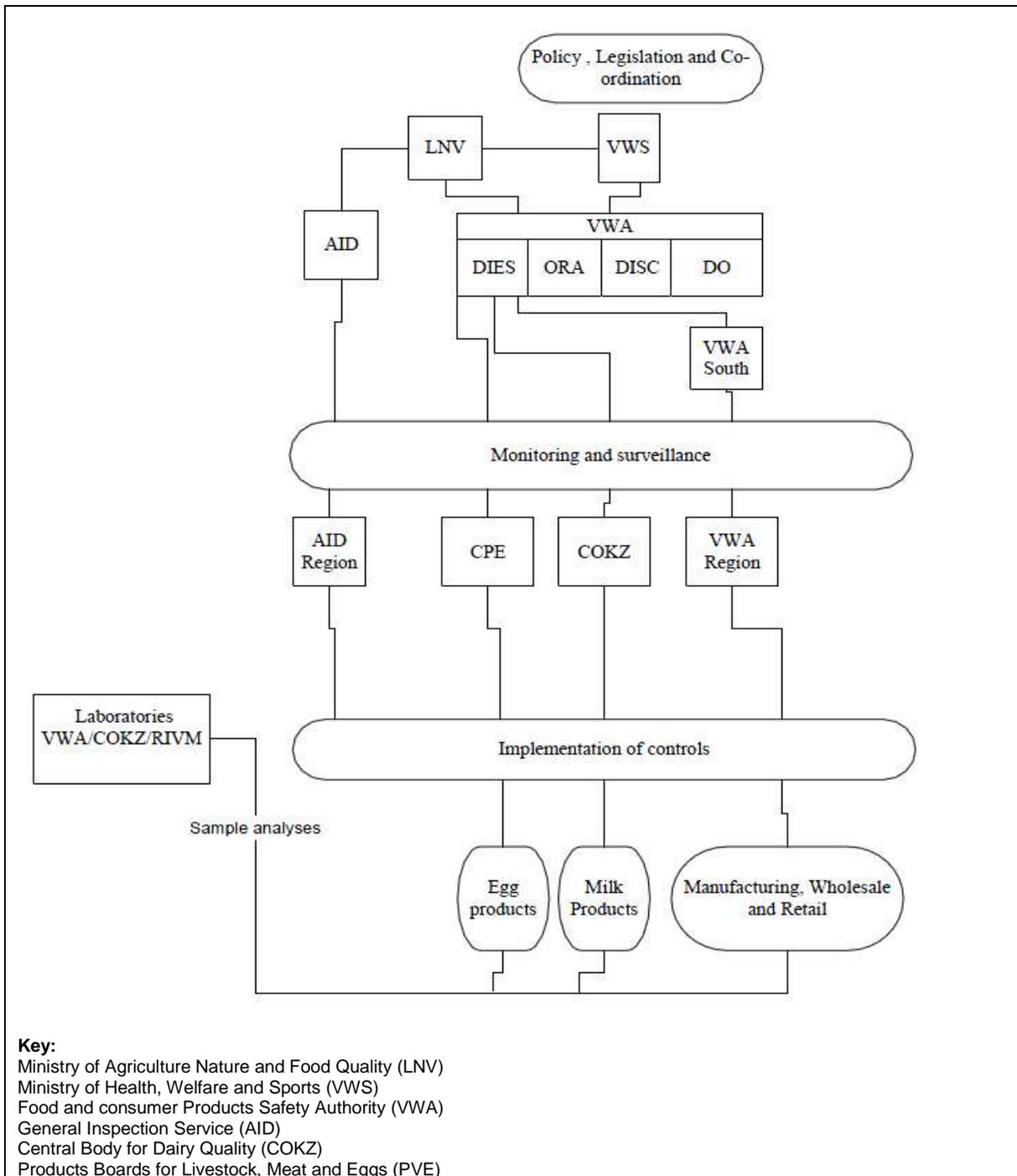
Figure 2.8 Control systems for food stuffs and food hygiene in The Netherlands

The following by FVO (2007) gives major highlights of operation of Dutch control systems for foodstuffs which are illustrated in Figure 2.8
- VWA and the VWS are the main competent authorities and these are responsible for policy advice, coordination, enforcement, production of standard operating

procedures, and coordination of training, risk assessment and communication. They control the whole chain from raw materials through to consumption.

- Communication within VWA is facilitated by an intranet application serving all levels of the organization.
- Monitoring is through risk-oriented procedures focusing official controls on the highest risk areas and operators not using approved quality assurance systems or who present poor records of compliance.
- VWA have regional inspectorates which are responsible for drafting of annual inspection plans and inspection protocols. Each has enforcement and research/monitoring departments. Local inspection units are integrated within the regional inspectorate.
- RIVM: provides specific advice in cases of new risks to public health
- Inspection strategy divided between:
  - ➢ small businesses: focus on specific critical processes based guides to good practices
  - ➢ large businesses: intensive audits of CCPs and HACCP systems

- Laboratories are in each region and all are accredited to ISO 1725 by the Dutch accreditation body and are supervised by COKZ
- Quality assurances schemes have been set up by different sector e.g. KKM for dairy sector and IKB Rund for the beef sector, all of which are supported by government and public organizations.
- Certification independent private organizations e.g. Skal (commissioned by LNV) enforce legislation requirements for organic products.

CHAPTER 3   METHODOLOGY

Qualitative data was collected in Rwanda through interactive discussions among two focus groups of eleven experts while a review of literatures was also conducted. This chapter describes the two main phases of the research process.

3.1 Data collection process

As mentioned earlier in section 1.6, the study intended to make proposals on organizational and recommendations for enhancing participation of private sector in control of agricultural products though adoption or establishment of private quality control systems. For this purpose, the feasibility to establish quality control systems by private companies in Rwanda were assessed basing on requirements for   a successful private-public partnership in a national quality control system. A guiding research frame work is illustrated in figure 3.1
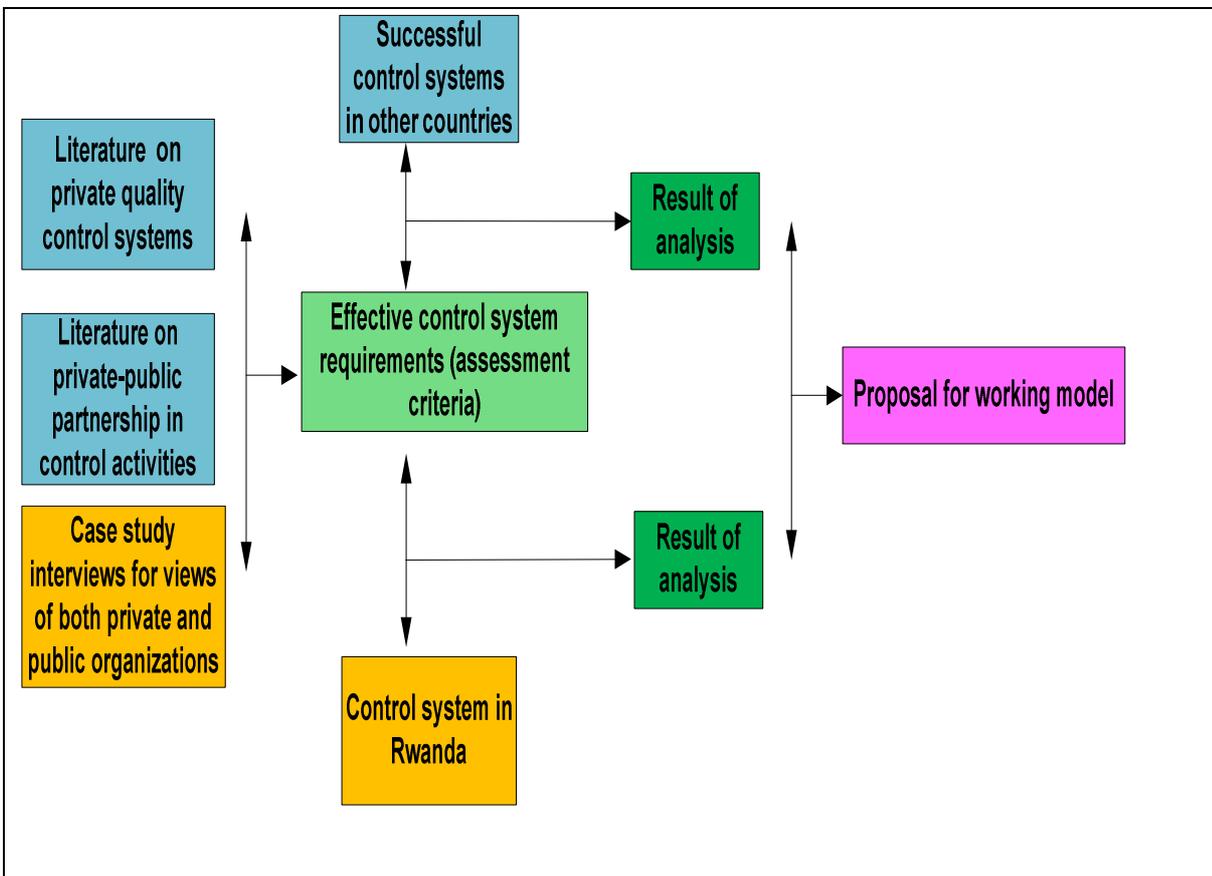
Figure 3.1 Research framework

The study of the role of private and public sector as well as underlying motivating and restraining factors in national control systems, based on experts interviews on current situation of the Rwandan private company in implementation of quality control systems and review of relevant scientific literature formed a basis for capacity needs assessment. A comparison of the findings from literatures and interviews of the experts enabled conclusions with proposals on required interventions to integrate the private sector in control system of agricultural products in Rwanda.

3.1.1 Desk study

The review of secondary data from books, journals and online articles led to the answer of research question 2 and its sub questions. Table 3.1 as well as introduction of Chapter 2 describe the review of literatures .The books and journals were sourced from Wageningen library while reports were sourced from RBS Library. Also some journals and reports were reviewed from different websites.

Table 3.1 Literature review set up

Sub question No.	Information
V	Private-public quality control systems in other countries
Vi	Responsibilities of private and public sectors in quality control
Vii	Pre-conditions to integration of private sector in agricultural control system
Viii	Working organisational models in an improved national control system

The review of literature covered trends on private sector participation in agricultural products control so as to discover drivers, costs and benefits of private sector in adopting or establishing quality management schemes along the agricultural chains in general. Private-public partnership as factor with an impact on the effectiveness of quality management and control systems was also covered by the review.

3.1.2 Primary data collection

The primary data collection was done into three weeks.
The first week was for invitation of experts and to get familiar with the working environment. The works of the week included writing invitations of experts and taking them to the RBS Director General for approval and also calling the invited experts' organisations to conform participation of the experts. This involved getting information on possible important changes especially in RBS and organizations of targeted experts and gathering contact information of the organisations from which experts were expected.

The second week was for preparation of interviews including gethering wirting materials and projector, preparation of discussion room, review of the dicussion guide and conducting the discussions.
.
The study targeted 4 to 8 experts in private sector and 7 in public organizations. However, 3 of the invited organizations although having conformed their participation they did not come on the day of the meetings. The private sector group consisted of an expert from a maize meal supply company, an expert from a company that manufactures different kinds of cereal products, an expert from the milk and dairy product Board, and 2 experts from postharvest handling and storage taskforce, one expert from agriculturist board, one expert from tea processing company and on expert from fruit processing industry. The second group consisted of 2 experts from RBS, one expert from Rwanda Development board (RDB), one Expert from Kigali Institute of Science and Technology (KIST). However, since some of information shared during the discussions included individual experiences, none of the experts name will appear in the thesis report.

The experts were reached through an invitation sent to their respective organizations by RBS followed by explanation on criteria of required experts though the telephone calls to the respective organizations. Organization from which the experts were coming from was selected from the list of RBS Technical Committees (TC) that regularly participates in standard development activities.

The third week was for making follow up of information provided during the discussion. In this process four additional experts were contacted through phone calls as a follow to the focus group discussions. One expert from Rwanda tea agency (OCIR THE) and one primary producer were contacted to verify whether the control purposes in privatized tea estates and government owned tea estates are different. One RBS inspector at the import control point in Gikondo was contacted to know how the private custom clearing agencies work with the Rwanda Revenue Authority (RRA) and his point of view on how it can be applied by RBS. One producer cooperative representative was contacted to get his view on possibility of introducing the internal control systems in his cooperative responsibilities. Two extension workers of Rwanda Agriculture Development Agency (RADA) /MINAGRI were contacted to get their views on current farming practices and possibilities improving primary producer good postharvest handling practices.

Objectives of the focus group discussions
Interviews were the second part of data collection in order to answer the research question1. The main purpose of the discussion was to extract information that enabled the study to assess the current capacity needs of the private sector prior to them playing a role in control of agricultural products. The assessment was done on individual and organization levels considering the experts and their organizations as the representative samples. This approach was chosen based on the idea that quality control has different perpectives as discued in chapter 2.Therfore,finding points of common understanding of the experts would provided through a basis for widely shared support and action.

Interview proceedings
Official interviews were carried out during the month of July and August 2010 at RBS, in Kicukiro district in Rwanda. Interviews were conducted through interactive discussion enabling brainstorming by experts and exchange of information. The interactive discussion were preferred basing on researcher's experience at work for the experts to have different understanding on the quality control aspects. Individual interviews would imply much explanation to every expert being time consuming. Also data collection through surveys could lead to inaccurate information gathering. Interactive discussions helped in limiting time for data collection and extracting accurate information. Therefore, the mentioned limitations of other data collections methods made the interactive discussions preferred.

The researcher started the interviews by introducing herself to the experts, inviting them to introduce themselves to the respective groups this helped to ensure that experts were free to give the information and get used the individual's ways of speaking and expressing the ideas. During the introduction the researcher informed the experts about the objectives of their interactive discussions and together with the experts, set out the rules of the discussions. After setting the rules of the discussion, the researcher introduced the research topic; "Strengthening Rwandan agricultural product control system by adopting private quality management". With the help of Figure 2.3 illustarting map of value chains shown and Figure 2.2 illustrating the levels and dimensions of a national food control control system, researcher introduced the research topic in order draw the attention of experts on the total quality control concept discussed by Luning *et al.,* (2002). The researcher (facilitator) being from one of the expert groups had to maintain neutrality. The discussions involved the following main activities:
- Identifying the main actors and the flows of products and information. This was important to understand where along the agro-food chains most contamination is occurring and identify quality and safety problems experienced by different actors.
- Identifyig key policies and institutions that influence the functioning of the value chain in relation to quality and safety control in the agro-industry.
- Establishing the key factors (driving and limiting) affecting stakeholders in the agro-industry.

- Exploring future scenarios for an improved national agricultural products quality control system with the inclusion of small-scale producers.
- Identifying strategies for supporting change of policies and operation of institutions within the public, private sectors.

During the discussions a discussion guide described in Annex 2 was used to summarize the information provided by the experts. This discussion guide is made of questons to be answered in tables during the discussions cussing. The guide also has additional three questions about communication infrastructures availability and status of relationships between chain stakeholders (traders, producers, consumers, supporters and influencers). To describe the relationships between these chain stakeholders Venn diagrams was explained to the experts and they were asked to use it in describing the degree of interaction between the mentioned stakeholders.

3.2 Finding reporting and discussion
This phase of the study was dedicated to the reporting and discussion of the results from case study inrelation to the findings from different studies and experiences. Tables and illustrations including Venn diagrams and other diagrams drawn with Microsoft visio helped to analyze arrange and summarize the information gathered from primary data and literature reviews to get a framework of requiremets to integrate private sector quality control systems in the national control system. The framework gained from secondary data was used as assessment criteria and enabled make a SWOT analysis of the current situaton. SWOT analysis is used as a strategic planning tool to assess the strengths, weaknesses and opportunities of and threats facing the existing organizations (Hopper and Boutrif, 2007). This led to the answers of research question two and its sub-questions which seek to assess the feasibilities of strengthening the agricultural products quality and safety control systems in Rwanda and propose an organisational model that integrates the private sector in control system.

CHAPTER 4   RESULTS

This is the chapter dedicated to reporting of the study findings from case study conducted through interactive group discussions as mentioned earlier in section 3.3. It consists of a review of the current situation of quality control systems in Rwanda basing on the views of eleven experts interviewed from the private and public organization.

Mainly this chapter intends to answer the first main research question that seeks to highlight the roles played by agro-chain stakeholders especially agro-industries in quality control, the strengths and weaknesses of the quality control systems in operation, and possible improvements that can be made on existing control systems.

In these sections the findings are reported in three main ways. There are findings summarised in tables, these are findings that were agreed upon by both groups of experts (private and public organisations) and summarized by the researcher during the discussions. Other findings were presented into figures provided by individual experts from the private organizations. There is also information considered by the researcher to be very important even though it was not agreed upon by neither of the expert groups or by all the experts. This is information based on experience of individuals.

The findings in this chapter are arranged in following sections:
- Quality and safety problems identification
- Current quality control measures in private organizations
- Factors that may influence establishment and/or adoption of quality management the private sector
- Recommendations on way forward from experts

4.1 Quality and safety problems identification
The results in (Table 4.1) show that both imports and local production are the main sources of food and food product sold in Rwanda.

Table 4.1 Table indicating main sources of commodities sold in the country

Commodity	Operator	Source of commodity	
Maize, sorghum, and soy	MINIMEX	Imports	local production
Black and green tea	Rwanda mountain tea	Imports	
Fruit and juice	Urwibutso	Imports	
Maize	Murenzi supply company	Imports	local production

Most of the experts argued that food safety and quality problems occur especially with imports from producers who have no long-term relationships with the importers and retailers or from small-scale producers. This they attributed to:
• Limited knowledge regarding quality and safety requirements: many producers, especially small-scale producers, have no access to information and, therefore, are not well informed about requirements for their products.
• Limited training: many producers have not received training on proper cultivation and post harvest handling methods

• Limited of capital: a large number of small-scale operators have limited access to capital to invest in production techniques e.g. cooling, transportation facilities, and communication equipment.

Source of the products can be linked in one way or another with the contamination of products. However, in this case it is not possible to conclude on whether the contamination occurs either from imported products only or from locally produced products. Table 4.2 suggest that adulteration and microbial contamination are common in the different agro-food chains of Rwanda while food poisoning frequently occurs in agro-processed products.

Table 4.2 Identifying common problems in the different chains

Commodity	Safety and quality problems	Responsible agent	Decision on counteractive action	Acting agent
Cereal and cereal products	- Adulteration (rotting of grains and flour) - Pest attack - Microbial contamination due to poor storage or post-harvest handling	- Producers - Transporters - Processors	Rejection	Trader or processors
Agro-processed products	- Adulteration - Microbial contamination - Food poisoning	- Producers - Transporters - Processors -Consumers (do not respect labelling indications)	-Rejection - Reprocessing (heating, etc) - Close of the operations	- Processors - RBS
Animal products	- Adulteration - Food poisoning	- Producers - Transporters - Processors - Consumers (do not respect labelling indications)	- Closing of the operations	RBS

It was mentioned that producers, transporters and processors and consumers are the main actors responsible for contamination of the identified products (Table 4.2). Also as shown in Table 4.2 processor and traders are the actors who take corrective action including rejection of products with problems. Therefore, having processors identified as responsible agent for contamination at same time being active for counteractive actions, gives hope that it can be easy to introduce implementation of HACCP system or other quality management systems along the cereal chains (Table 4.2). However, for other agro-processed products and animal products, chain actors are not active in quality and safety management.

Normally, RBS conducts day to day inspections among Rwandan industry premises and farms to provide operators with advice on standard requirements. It also conducts seminars for commodity focus groups as one way of communicating standards requirements to the operators. Different technical regulations as described in section 5.2.1. Good agricultural practices (GAPs), Good Manufacturing Practices (GMPs) and Good Hygienic Practices (GHP) provide a basis for RBS to advice operators. However when an

operator does not comply with the mentioned standards and does not show a feasible plan on improvement, the premises are closed until a plan for improvement is in place. Unfortunately, such decisions are not yet possible to apply to primary producers who are not in cooperatives although they sell the produce on the same markets as the cooperatives. RBS also conducts inspections at these markets.

Though not mentioned in the table 4.2, traders were seen by the experts to have the biggest share in failure of the products to comply with quality and safety standards as they are often in the habit of mixing substandard goods with better ones so that customers would not detect the defects in the products. From this it can be seen that both traders and consumers are responsible for the quality and safety problems in most of agricultural value chains as they do not seem to exercise the power they have to demand high standard products.

> *"However some operators are still managing to hide substandard products from RBS and sell them in its unawareness. These substandard products bring unfair competition against our products. This is a big challenge to us as operators who have chosen to sell standard products. It would be much easier for an operator to identify other operators who sale substandard products since our business is   being affected in that way" (Expert from Cereal Company)*

During the discussions, all the experts were in agreement that the majority of the chain actors are responsible for contamination of agricultural food products (Table 4.2). On the side of the consumer, experts discussed that consumers do not play their role to stop buying unsafe products and they do not pay attention to the labeling instructions of food products they buy. Experts argued that it may be due to ignorance of consumers for the sake of getting products on lower price. On the other hand, literatures show that a large number of consumers may not be able to ready the labeling information as a result of high degree of illiteracy in the country. According to the Rwanda Ministry of Education (2010) and UNICEF (2010), approximately 65 % of Rwandans above fifteen years are illiterate, 71.5% are men and 60.1 % are women. This is a big challenge in Rwandan society since literacy serves as basic instrument for people to communicate market related information and participate effectively in food safety related improvements.

4.2 Quality management systems in private organisations

In the Table 4.3, three of the experts mentioned that they had not adopted quality management systems. One expert's organization relies on control programs of World Food Program (WFP). The information collected shows that WFP standards for locally purchased grain are high in comparison with the quality of the grain marketed locally but out of line with those in the region, most importantly with regards to maximum moisture content. WFP may sometimes show some flexibility in the application of its standards for grain to avoid disrupting supplies and causing financial losses to suppliers. one other expert's organization was still working according to hygienic requirements that are not documented yet and the standards in which these requirements are stated was not specified during the interview. Only two experts' organizations, "Rwanda Mountain Tea and Urwibutso" have already adopted international standards "ISO 9001 and ISO 22000". These two standards together are the most recognized by the processing organizations. According to the discussions, the two experts' organizations which have adopted ISO standard were mainly driven by the need to satisfy their international markets. This can be interpreted that only exporting organizations can feel much concerned with the quality and safety issues while safety management is normally every one's responsibilities as discussed earlier in section 1.2. Another explanation for this can be related to the observation by Sorsa (2010) who stated that huge investments and technical skills needed

for implementation of private safety standards have economies of scale that favour larger firms than for small businesses.

Table 4.3 showing the quality management systems adopted by the expert's organization

Company	QMS
MINIMEX	Basic hygienic requirements but not documented
Rwanda Mountain tea	ISO9000, ISO 22000
Urwibutso	ISO 9001,ISO 22000
Murenzi supply company.	ChemiPhar (pam controls)

4.3 Factors influencing food quality and food safety

The identified factor influencing food quality and safety were classified into bottlenecks (restraining factors) and success factors. Section 4.3.1 reports the bottlenecks while section 4.3.2 reports the success factors.

4.3.1 Bottlenecks

The bottlenecks identified are listed in table 4.4 below and compared according to the extent of their effect on private control systems.

Table 4.4 the bottlenecks in private control systems

Bottlenecks	Extent of effect	
Weak stakeholders relationships and price oriented controls instead food safety oriented controls		High
Limited purchasing power of consumer		High
Limited professionalism	Low	
Private organisation culture and individual habit (difficult to change)	Low	

Agro-chain stakeholder's relationships and private control systems

Figures 4.1-4.5 are illustrations drawn by experts to show relationships between chain stakeholders in private control systems. Although there is vertical and horizontal interactions the stakeholders are poorly the linked are weak due to the limited frequency of these interactions. By forming strategic partnerships between private and public institutions this will allow for strengthening of linkages of participation. The value chain concept emphasises the need for improved relationships between stakeholders in the chain as a way of promoting chain development. This is evidenced in Richter's (2005) definition of a value chain in which the chain can be considered as systematic supply chain within which different actors work together.
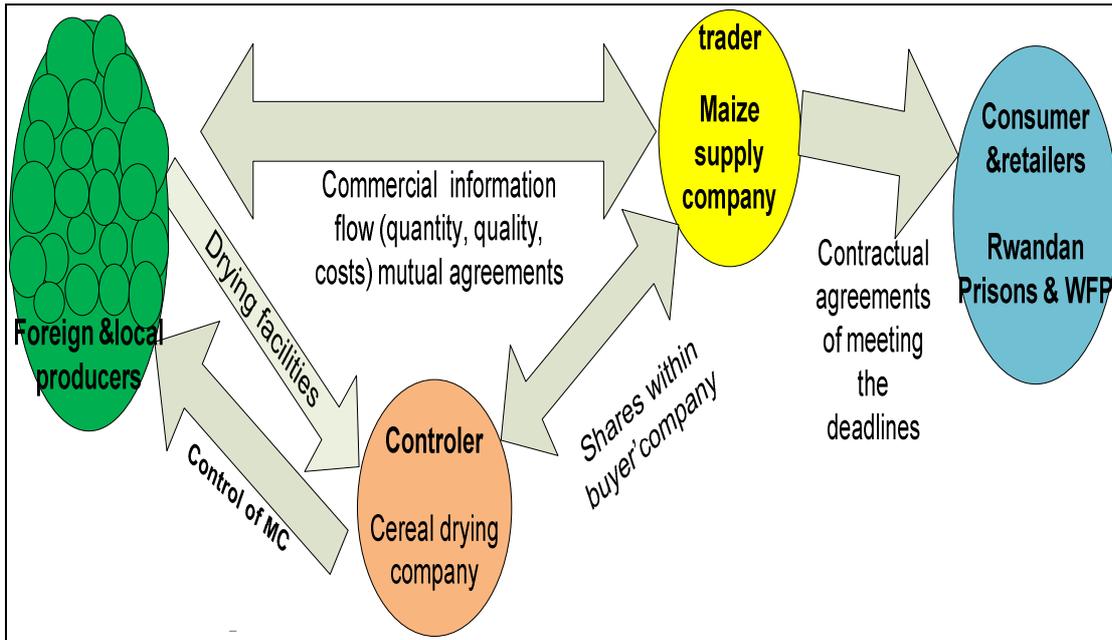
Figure 4.1 Control of moisture content (MC) in maize supplied to and from one of maize supply companies

In figure 4.1, the relationship between the producers and the supply company referred as the buyer is built on mutual understanding and does not go beyond ensuring the supply of maize with standard moisture content. The contractual agreements are the basis of the relationship of the same buyer with other organizations that can be considered as consumer organizations, but their relationship only deals with meeting the supply deadlines without taking care of the quality and safety of the supplied maize.
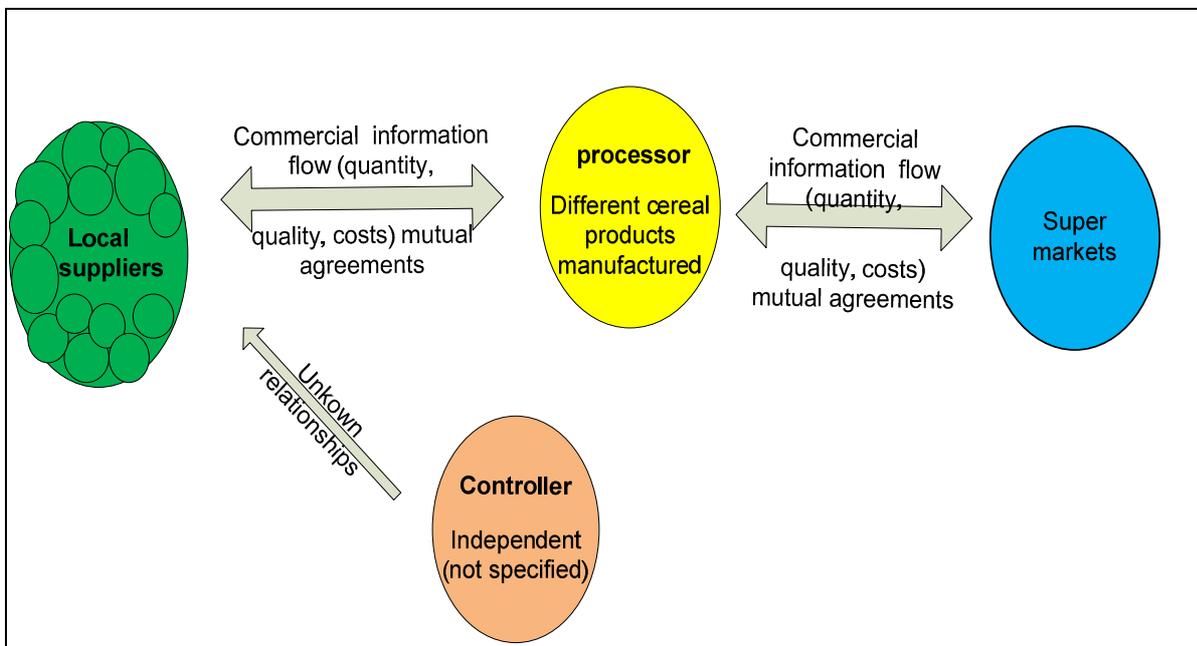
Figure 4.2: Control of cereals and cereal products supplied to and from one manufacturing companies

As shown in figure 4.2, the relationships and information shared between controllers and were not specified by the experts. The relationship is based on the mutual understanding

on quality and quantity required by the processors. The processor assumes that control has been done at the production phase but there no process for verification on how the control is done and who does it. The quality parameter in this relationship is not defined neither.
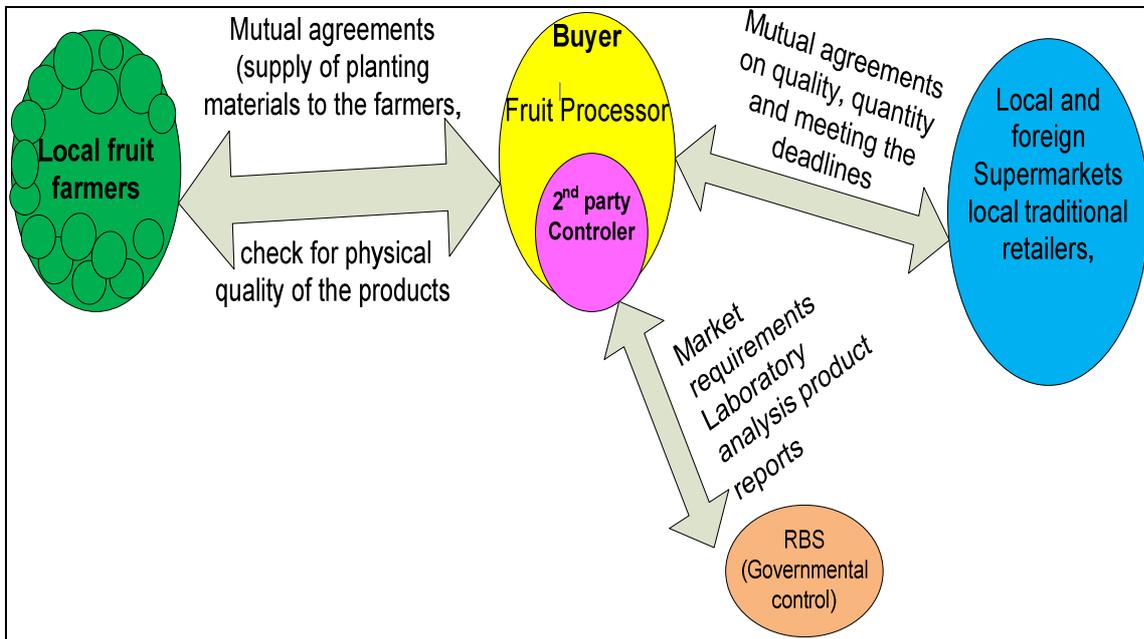
Figure 4.3 Control of fruits and fruit products to and from one of the fruit processors

Figure 4.3 above highlights three relationships brought about by the customers of the buyer referred to as fruit processor. The relationship was established between the buyer and the government controller but the buyer does not mind about the relationship between his suppliers and this controller.
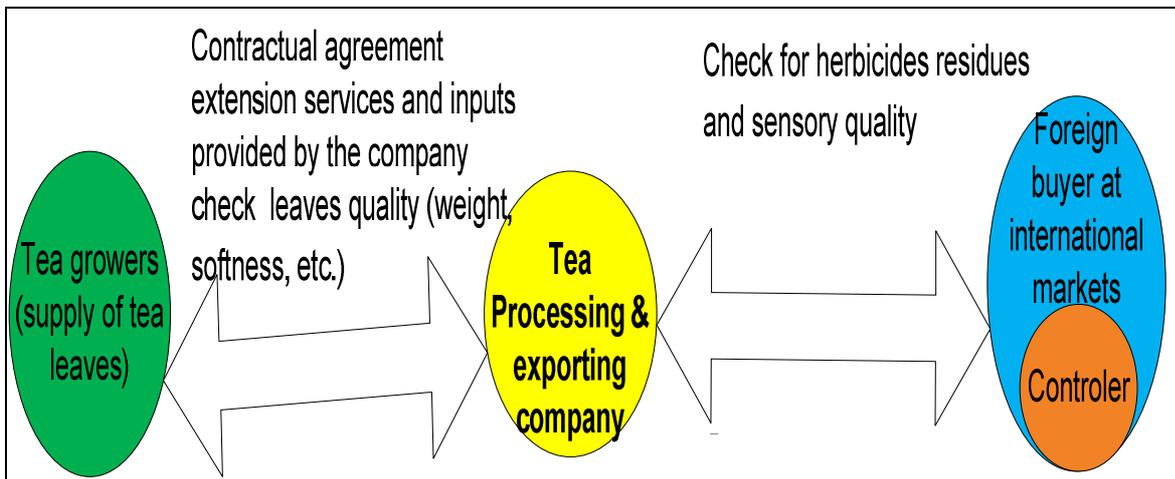
Figure 4.4 Control of tea supplied to and from one of the tea companies

In figure 4.4, foreign buyers at international markets enforce the food safety compliance with food safety requirements. Generally the models presented in the above figures show that controls done in the Rwandan private organizations are for better price rather than food safety assurance.
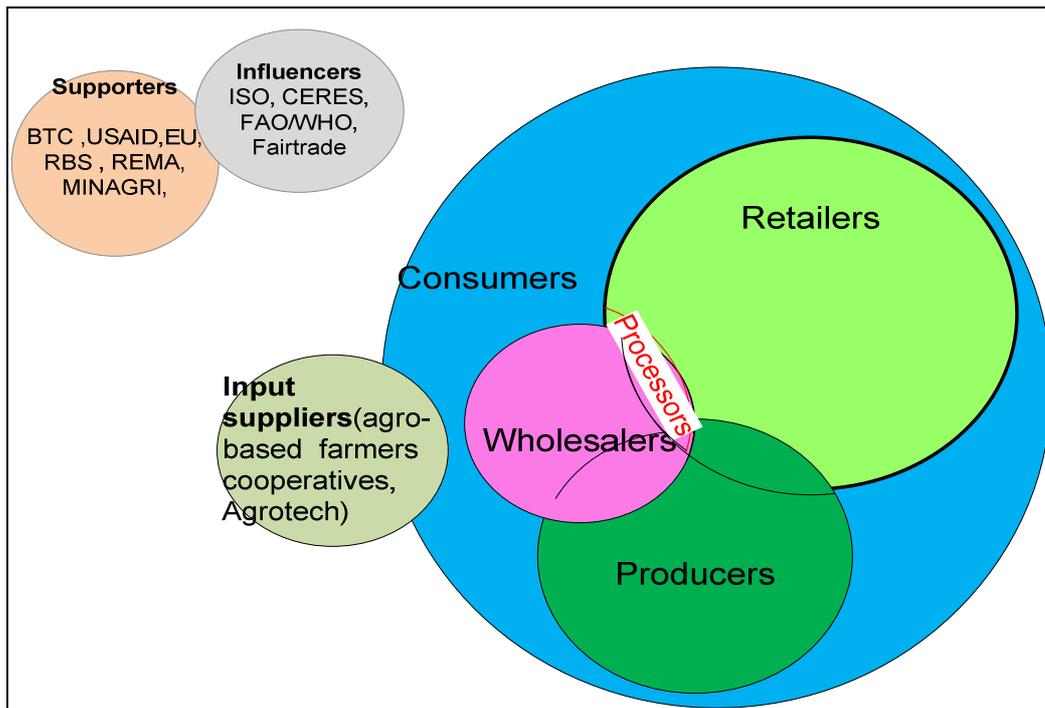
Figure 4.5 Venn diagram illustrating stakeholders interactions

In figure 4.5 the venn diagrams show overlaping activities at the level of processors. Most of processor makes a part of producers, wholesalers and retailers at the same time. Of course all actors are all consumers. Overlapping of activities may be the main reason in lack of interest in controlling the safety of product. Much complexity comes into being when it comes to identify the processor's role from the other actor's roles. The importance of the governmental organizations is still poorly perceived by the chain actors. Figure 4.5 shows that donor agencies are more linked to the public organizations than to private organizations. This may lead to poor use or inaccessibility of the support for promotion of safety standards implementation especially when it comes to improvement of technology and managerial aspects along the chains.

Private organization culture and individual habits
Experts mentioned poor habits of local producers in mishandling the production as a challenge the safety of commodities their organization deal with. Here, one of the experts has reported

> *"It is not always easy to avoid a kind of such problems because most of them are occurring from the producers. The producers just produce and keep the products in traditional containers like pots that were previously used for cooking because they do not have suitable storage and do not seem to show any intention buying these facilities. Most of the producer's sale their produce after having seen that it was starting to develop signs of rotting or attack by insects". (Expert from Cereal Company)*

ROR (2002) reported that Rwandan producers are generally small scale producers; farmers are still relying on subsistence farming.

> *"Over 58% of households have holdings of less than 0.5 ha and …
> 83.2% of plots of less than 0.5 ha use inputs, compared to 5% of plots
> of 1-1.5 ha and to 0.4% of plots of 3-5 ha…" (*ROR, 2002)

The problem of not having appropriate handling and storage facilities for producers may be linked with the limited purchase power discussed below in section 4.3.3

Also some traders are not willing to stop selling poorquality products also one of the experts has reported in the following words.

> *"The number of traders who reject substandard products still remains is
> very low."* (Fruit processing company)

This statement was supported by experience from most of the experts as they were agreeing that they use to buy products and come to discover later that the products were of poor quality. It was mentioned examples of products such as milk that are sometimes adulterated with water or poor quality flour being mixed with good quality with the intention of maximizing on profits.

Apart from the individual habits reported in this section, some organizations culture does not favour rapid changes based on some decisions from development meetings and other events. One of the participants has reported bellow.

> *"In most of the companies, the decision is made at the strategic apex
> level while most meetings and events discussing important issues like
> quality and safety managements, are attended by operating staff. The
> meetings conclusion reports submitted by these operating staff are not
> always considered in their organizations." (Expert from Maize processing
> organisation)*

Farmers, by the nature of their work, tend to have an individualistic outlook that can make organizing group activities difficult. However, many very positive examples of farmers working together do exist (FAO, 2008).

Purchasing power
The experts indicated that consumers have limited purchasing power (Table 4.4) and therefore this could affect control systems to a high extent. This can be explained by the fact that the majority of the total population of Rwanda lives below the poverty datum line surviving on less than US$1 per day (Nkunda, Nkurikiyinka and Poston 2007). More than two in five people do not meet their dietary requirements (ROR, 2002) this therefore explains why most of consumers can opt for affordability of a product rather than quality as reported in section 4.1, and how traders get encouraged to continue selling poor quality as reported in section.

4.3.2 Success factors
Adoption of the quality control system which integrates the private sector requires the assessment of factors in the working environment which will work in favour for the success of the intended goal. The experts interviewed identified the following factors as being present in the local agro-industry which can facilitate the implementation of quality control system involving the private sector:
- Government policies Agricultural transformation and privatisation policies
- Government Policy involving private sector in development actions.

- Government policy which aims to eradicate illiteracy (Rwanda Ministry of education, 2010), thus will improve on consumer awareness and comunication which will increase pressure for quality and safety assurance and control

Agricultural transformation and privatisation policies
As highlighetd in section 1.4, the Rwanda Vision 2020 is to improve the country economy gorowth and poverty up to the 50% poverty reduction. It also intends to negatively the impact the income thehousehold. Within this context the follwing objectives have to be achived.

The transformation of agriculture will be marked by achievement of a number of objectives but specifically:
- Diversification of export crops through development of horticulture chains and introduction of new products
- Improved quality and increased production of traditionally exported crops; specifically coffee, pyrethrum, tea;
- Promote rigorous paricipation of private companies, postharvest and handling and value addition of the agricultural products

Achieving these objectives will improve on consumer purchaisng power that was seen as a challenge insection 4.3.2.

Also as seen earlier in section 1.2, partnerships between public and private sectors in agriculture transformation was opted as one of the strategic approaches for the Rwandan government to make a better integration of agriculture in the national economy to contribute to macro-economic stability and economic growth targeted by 2020 as predicted by ROR (2008). Under this partnership, the government through the Ministry of Agriculture and Animal resources (MINAGRI) believes that it is possible to turn the Rwandan agriculture categorized as subsistence into a professional, profitable, non-seasonal and income generating career.

Communication infrastructures
Information flow forms a key component of quality management systems. The study established that within Rwandan the agro-industry information flow is assisted by the highly improved communication network infrastructure within the country. Electronic mails, mobile and fixed telephone as well as print and electronic media are the main channels of communication between private and public organizations. Communication and information flow is very vital for product tracking and tracing by the operators along the chain. According to FAO/WHO (2010) provision of information, education and advice to stakeholders and consumers across the farm-to-table field is an important role for public and private organizations involved in administration and implementation of the food control systems. This allows for a transparent and accountable control system.

Institutional supports
RBS as a public organisation is responsible to ensure quality establishment and maintenance of food quality control programs (RBS, 2008) is in a right position to advocate for setting up of regulations and othe enbling conditions for the private quality cotrol systems in Rwanda.

Existing research, development and education institutions (e.g. ISAR, IRST, UNR, ISAE Busogo, and KIST) are available in the country and were identified and it was agreed that they were in a position to provide scientific assistance and knowledge quality management. In additional to these graduates from the UNR, ISAE busogo and KIST are considered as potential proffesionals for private quality control systems.

4.4 Way forward from discussions
Compulsory control
This table 4.6 summarises advantage and limitations of the controls inspections identified from the discussions. Suggested organizations for the control activities are shown in Table 4.7

Table 4.6 Describing advantages and limitations of control parties

No.	Commodity chain	Recommended control system(party) to be adopted	Advantages	Limitations to the efficiency of the control party
1	Cereal and cereal products(flour)	both 1st and 2nd party	Inspections by these control parties may be cheaper than the inspections of in 3rd party control. The nature of these parties is more encouraging	2nd party can result in conflict of interest. There is need for the product boards to ensure transparency in the control and assist the operator in addressing issues highlighted by the inspections
2	Cassava flour	2st party		
3	Milk and fish	2st party		There still need for RBS to enforce the implementation

Coming to modalities of the control systems, the experts suggested that compulsory control should be done through second party inspections by retailers or processors since the processors are placed in the right position for interactions with producers while the retailers are in interaction with consumers and therefore will be answerable to safety problems of products purchased from them by consumers. The participants also realized that there is also a need for specific product boards. The group of experts from public organizations was of the opinion that compulsory control should be done through first party inspections. This however differed to the ISO (2008) interpretation of control parties.

An expert from the private sector suggested that, RBS should establish a system to work with clearing agencies as was the case with Rwanda Revenue Authority (RRA). In this system a private company's known as "agence en doine" helps importers to have an efficient and fast clearing of goods at customs at points of entry. These small agencies play a role of intermediate between RRA officials known as "checker" and customers (importers). The "checker" is there to verify the information provided by the clearing agency about the declared goods. However according to one expert from RBS,

Establishing a kind of system is too risky since it requires expertise for these proposed agencies. (Expert from RBS)

Potential companies for control
In the interviews with the experts, an assessment of operators in the agro-industry was done to identify specific operators who are likely to have resources required for implementing quality control systems. The experts looked at equipment, technical skills and financial capability. Technical skills were seen as being available for operators who identified in the discussions (Table 4.7). Only one company (Inyange) was identified as being in a position to have the financial requirements for implementing private quality control systems.

Table 4.7 Showing potential companies for adopting or establishing private quality management systems

Type of service	Companies	Capacity elements			
		Staff qualifications	equipment	Financial capacity	Other
Certification	Bralirwa (for cereals)	Available	Available		Buy more cereals than others companies
Inspection	MINIMEX for cereals	Available	Available		
Standards adoption	Urwibutso Inyange Pembe MINIMEX	Available Available Available	Available Available Available	Available	international
Quality management extension cervices	Urugaga Imbaraga Murenzi Supply company	Available Available			

4.5 Private versus public sector perspectives on current quality control systems

The table (Table 4.5) is sumary of genal perpectives of experts from both private and public organisations.Discussions with the experts on various issues is showing a certain related to quality and quality control highlighted areas in which the perspectives of both private and public sectors were common or either differed (Table 4.5). The observed perceptions could be attributed to the different cultures of the two sectors in which private sector is more inclined to profit realisation whereas public sector is more concerned with provision of goods and services at affordable prices to the general public. However both do agree on the need to provide high quality and safe products which do not compromise public health.

Table 4.5 Perspectives of private and public sectors on control systems

Issue	Perspectives		
	Public sector	**Private sector**	**Public and private (common)**
Quality and safety problems	- Processors and traders are responsible for safety problems	- Producers, transporters and mainly responsible for contamination of agro-products - Processors taking counteractive action	- Many traders ignore the importance of products quality and safety - Less stakeholders feel concerned about safety of products
Current quality and safety control systems	- Limited responsibility by actors in food chains	- Control and command type - Time consuming Price oriented instead of food safety oriented controls among stakeholders overlapping activities of chain actors makes control difficult	-Ineffective - High level of substandard products on market

		- limited interaction between direct actors and supporters -Has some restrictions in terms of bureaucracy	
Factors (Bottlenecks)		Private organisation culture and individual habit (difficult to change)	-Limited prchasing power -Limited knowledge regarding quality and safety requirements -Limited training - Limited technical and financial capacity
Success factors	- communication infrastructure being established	-Favourable for growth of all operators due to existence of government policies promoting development actions	Existence of companies potentiality to offer some control activities
Area of improvements required	First party control to be enforced all along the chain	Second party control to be enforced at level of traders	- Sharing responsibilities (e.g. trainings, analytical services, inspections, certification) - Need for greater interaction between stakeholders
Quality control schemes		-Price oriented control systems -require a certain extent of expertise -Smallholder participation is difficult - quality management system standards available are expensive to implement (ISO 9000, 22000)	- Necessary and important - Implementation costs high - Smallholder participation is necessary

CHAPTER 5   DISCUSSION

This chapter discusses the findings from literature review as well as the findings presented in chapter 4 on the current status of the control systems in the agro-industry of Rwanda. The main objective is to assess possible working approaches and organisation models to ensure successful integration of private sector in quality control activities which is the second objective of the study. Factors which are pre-conditions to private and public sector control systems will also be considered in the discussion. Discussions will further explore ways of sharing responsibilities in quality control between the private and public sectors. The above discussions will point towards whether there is a possibility of integrating private control systems in the current control system.

5.1 Working approach in an improved national agricultural products quality control system

To discuss about the approaches to an integration of private sector within a control system, it is better to highlight that a successful control system is expected to be established with consideration of principles that promotes the performance of various activities listed in FAO and HWO (2003) as follow:

- Maximizing risk reduction by applying the principle of prevention as fully as possible throughout the food chain;
- Addressing the farm-to-table continuum;
- Establishing emergency procedures for dealing with particular hazards (e.g. recall of products);
- Developing science-based food control strategies;
- Establishing priorities based on risk analysis and efficacy in risk management;
- Establishing holistic, integrated initiatives which target risks and impact on economic well being;
- Recognizing that food control is a widely shared responsibility that requires positive
- Interaction between all stakeholders
- Certain key principles and related issues are discussed below.

From the need to perform the above listed activities, the same literature suggests that a successful control system needs to have the main following building blocks which are: food law and regulations, food control management, inspection services, laboratory services: food monitoring and epidemiological data, information, education, communication and training.

5.1.1 Control system arrangement

As seen in literature establishment of quality assurance initiatives is the most favoured way of enhancing quality control through the agro-chains. The question can be how it would be working. The case of Netherlands in control system for food staffs in section 2.6 shows that a certain level of national arrangement is necessary to ensure that the objective of controls which is quality and safety of products is achieved. FAO and WHO (2003) gives three possibilities of arranging the national activities basing on the responsible agency administrative structures. According to these models RBS as an organization mandated to ensure good functioning of the control systems control, needs to integrate in its administrative units a section that would accommodate scientific committees and ensure use of their views. With this section private sector advice may play an important role in managing the whole control system.

5.1.1 Total quality control approaches

Discussions on the current status of food quality control systems in the Rwandan agro-industry chains have revealed possible areas of intervention and have provided ideas from participants on how the control systems can be improved. However there is now need to

examine food quality control systems employed in agro-industries in order to get an understanding on what approaches are applicable to the local situation in the country. Literature review provided the source of information on existing and successful quality control systems. According to Luning and Marcelis (2009) there is need for organizations in food chains to influence the performance of other organizations in the value chains to guarantee the quality of food products that reach the end user as the quality of the product does not only depend on one organization's activities in the chain. There is need for collaborations among all organizations involved in the food chain. From a chain perspective and taking into consideration the three core developments in food quality management discussed by Luning and Marcelis (2009), the total quality control gives a better option of managing quality of products as it places the role of inspection on being applied on the process and not the product as explained by Baxter et *al.,* (2010). This from an economic point of view is desirable as it identifies gaps in production methods and provides possibilities of preventing them from recurring. The costs of product recall and failures are greater as compared to investing in efficient quality systems (Luning et.al, 2002). Adoption and implementation of the total quality control system and the three core developments in food quality managements will involve organizational changes.

5.1.2 Internal control system approach

As discussed in section 2.4 the control of agricultural products involves commitment of private sector through quality management systems initiatives that enable the private agro-business organizations to adapt to regulations, a process described by (Van Plaggenhoef, 2007) as self-regulation and self-control.

According Helga and Yussefi (2006), International Federation of Organic Agriculture Movements encourages small scale of implementing quality control through group certification scheme known as internal control system (ICS). This locates the responsibility for regular trainings, inspections, documentation, and produce separation and tracing in the hands of producer organizations, be it cooperatives or export companies working with contract farmers (Figure 5.1) help the produces by sharing the costs of implementation. These group quality management schemes can be applicable to Rwanda mainly through cooperatives. This calls the operators in the four models (figure 4.1-4.4) to be engaged in business with contractual relationships focusing on quality and safety management.
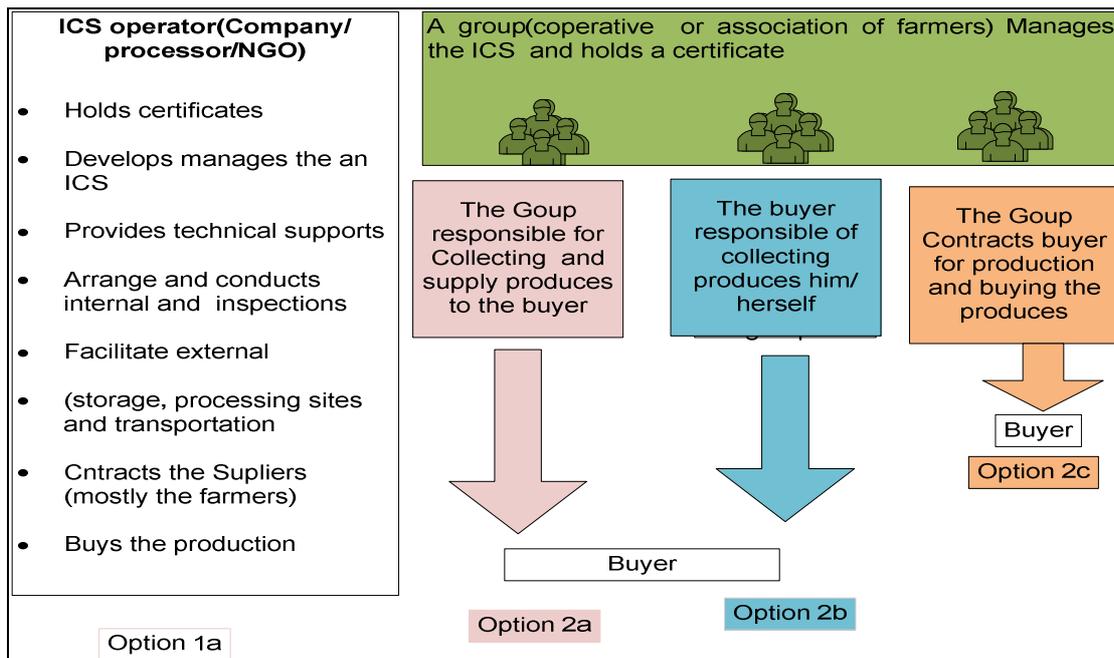

Figure 5.1 Internal control system organisation model

54

5.2 Pre-conditions to integrated quality control system in the Rwandan agro-industry

In order to get an understanding of factors which could play a role in the success or failure of the intended goal, this section discuss some of these factors which must be considered prior to integrating the private sector in agricultural products control system. In chapter 4 it was suggested that some of the reasons leading to there being a small number of agro-business organizations which have implemented quality management systems may be a result of bottlenecks associated with setting up these systems. Therefore there is need to address these constraints as a pre-condition to integrating the private sector in quality control system of Rwanda.

5.2.1 Favourable government policies

The common practise in developing countries is that most food control systems are regulatory with implementation being carried out by government institutions. As already highlighted in previous chapters, in Rwanda, RBS is having as one of its roles to ensure quality assurance of agricultural products through establishment and maintenance of national control systems. As this research aims to find approaches to involving private sector in national control systems, there is therefore need to have policies which accommodate this initiative. Section 4.3.2 of chapter 4 outlines some of the policies present in Rwanda. The Agricultural transformation policy is one such policy which is encouraging the involvement of private sector in development actions.

5.2.2 Legal structures

All agro-food chains, whether traditional or modern, are governed by a set of informal and formal institutionalized rules and agreements. In order for the proposed quality control systems to be a success there was need for guidelines drafted to which everyone would be bound by and this supported by legal structures. RBS as the institution which has as one of its responsibilities the drafting and recommending legislation on food quality and safety can work with stakeholders in the agro-industry to come up with possible legal structures that recognize private-public sector control systems.

5.2.3 Agro-chain stakeholder's relationships and private control systems

As previously stated in chapter 4 of results, stakeholder relationships in the Rwandan agro-industry are poor and have weak linkages. This is in agreement with a study carried out in Rwanda in 2004 by Martha highlighted that the major constraint faced by medium scale processing establishments is the weak linkage between producers and processors. The study showed that there was no formal relationship with the processors, resulting in unreliability of supply in terms of quantity with such relationship it leading to high operational costs that processors pass on to consumers.

The success of an integrated control system strongly depends on interactions between stakeholders. Stakeholders need to form strategic partnerships among themselves. By forming strategic partnerships between private and public institutions this will allow for strengthening of linkages of participation. The value chain concept emphasises the need for improved relationships between stakeholders in the chain as a way of promoting chain development. This is evidenced in Richter's (2005) definition of a value chain in which the chain can be considered as systematic supply chain within which different actors work together.

From the discussions all participants were in agreement that the current control system required involvement of players in the agro-industry in order to ensure effective systems of control which would result in quality and safe products for the customers. The results from the discussions indicate that there exist weaknesses in the local control system leading to substandard products on the market. RBS which is mandated to carry out checks and

inspections is being limited by manpower resources. Involving the private sector in quality management would likely benefit the government as it would lead to reduced costs of regulatory control which is supported by literature provided by Laffont and Tirole (1993) where they stated that an important motivation for governments to adopt quality control management systems is that it also reduces the costs of regulatory enforcement. In some literature it has been observed that around the world the trend has been to commercialize and privatize the delivery of regulatory control services so that they can be run in a financially self-sustainable way, however in practice it is very necessary for all the services to be offered in an integrated manner. A publication by Gadaga (2003) points out that traditionally food safety measures have been government regulated systems that require a great deal of inspection, policing and enforcement. The more operators there are the more difficult is to do this effectively, and cost tends to be at high levels that cannot be met by regulatory bodies thus enforcement becomes less effective.

As the four models of control have been observed in the section 4.1-4.4 there is possibility of strengthening them in the way they the operators can control each other under supervision of RBS. The literatures suggest promoting the private quality assurance scheme which has been useful in EU agro-chains. The figure 5.2 describes the new approaches of the controls in which quality and safety management is also important element of the contracts between suppliers and buyers.
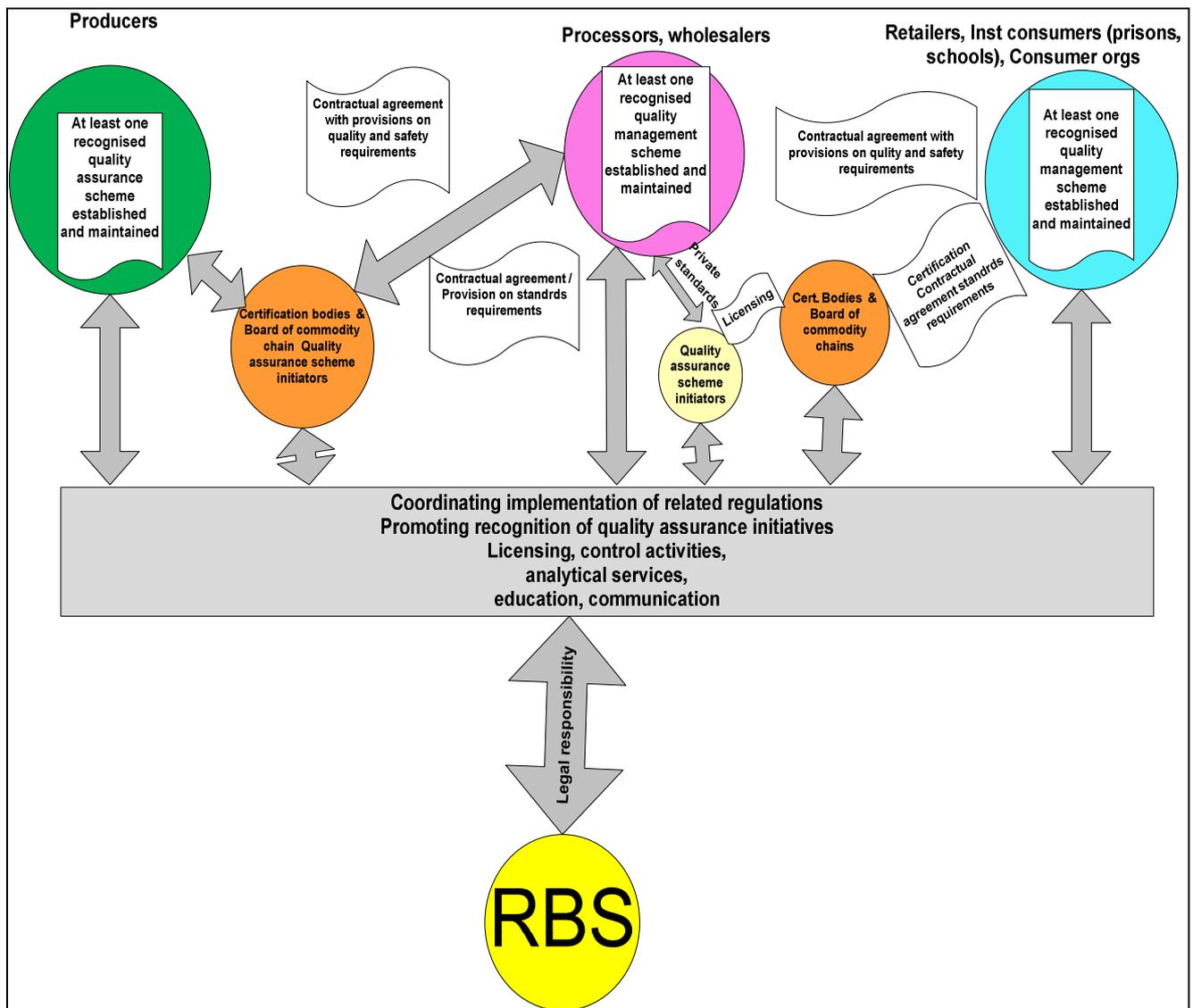
Figure 5.2 Strengthening relationships in agriculture quality and safety control systems models

5.2.4 Purchasing power

Chapter 4 suggested that limited purchasing power is one of the major bottlenecks that can hinder quality controls. This is supported by arguments by Humphrey (2009) who identified some of the constraints which need to be overcome relating to the development of a Quality Management System (QMS) so as to maintain the integrity of the control system. These include costs of implementation such as capital investments and training costs. Therefore, limited purchasing power is a great challenge for trading organisations as they are faced with a decision on whether to incur all the costs associated with QMS or to share the costs with the consumer. The latter option is however less favourable when faced with a consuming public with low purchasing power.

However some companies have established niche markets maintaining quality and guaranteeing safety to give them an advantage over other competitors. Studies by Luning *et al.,* (2002) on relationships of quality, profitability, and market share found out that quality is a driver to market share as far as the business performance is concerned. From that they concluded that customers are prepared to pay more for a product of higher quality than the costs required to achieve the quality. However, as noticed earlier in section

4.2 the literature by Sorsa (2010) argues that implementation of the enormous investments and technical skills needed for implementation of quality management systems have financial implications that favour larger firms than for small businesses. The later argument is explaining the case of Rwanda where the trading organization do not find a way to invest in quality managements systems before they get guarantee that the consumer have power to bear to bear the additional costs from the quality management system implementation. This brings about to the need for a better relationship between the chain stakeholders that will enable to develop better trading conditions and securing rights of every stakeholder (fair trade partnerships). Fair trade organizations, backed by consumers, are engaged actively in supporting producers, awareness raising and in campaigning for changes in the rules and practice of conventional international trade. A good relationship between producers and traders can be promoted by government and non-governmental organizations by conducting and publishing surveys on expenses of producers for specific production seasons this will help in maximizing the profit of producers by selling their produces on the right price (WFTO, 2009).

Financial requirements
Through RBS there is full commitment by the government for establishing appropriate constitution and developing policies to deliver the optimal level of consumer protection. Under this commitment RBS intends to ensure establishment of the earlier mentioned five building blocks of a successful control system. RBS is still fully sponsored by the government. Its cost of building the building blocks are possible to recovered from for licensing fees and other control related services such as inspection activity, and food analysis and products compliance certification. This is expected to be successful since the Rwandan trade policy is to promote investment in the country by either foreign investors or local investors.

5.2.5 Professionalism
The development of train-the-trainer programmes should form part of the activities of food control agencies so as to address the specific training needs of their food inspectors and other staff involved. This will result in impacting of skills and expertise to individuals and organizations involved thus serving as an important preventative function. RBS in its administrative unit of Standards education, it is to promote a close relationship with research and development and education institutions to improve on professionalism in areas related to the quality control such inspections , certification, product analysis, etc.

5.3 Quality control responsibilities for stakeholders in the Rwandan agro-industry
This section discusses ways in which quality control responsibilities can be shared between private and public organizations within the framework of a national approach (Figure 5.1) as previously discussed in section 2.5.4. According to FAO/WHO, having national policies on food control allows for the development of an integrated and effective food safety control system that clearly identifies the role of each agency so that there is no duplication of work as well as brings about consistency between them. As a way of ensuring consumer health through provision of safe food, there is need for a positive interaction between all stakeholders involved from production to retailing.

5.3.1 Responsibilities of government
The role of the Rwandan government is to provide an enabling environment as mentioned by Eschborn (2007) who highlighted the following three typical areas in which government should support the private organizations;
- The development of supply chains, especially through supplier qualification programs
- The development and application of standards and codes of conduct

- The qualification of service providers in quality control, technology transfer and training

In chapter 4, RBS was identified as the public organisation which should advocate for setting up of regulations and other enabling conditions to facilitate integrated controls across the food chain. In addition the government has a responsibility of providing a working environment in which basic infrastructure such telecommunication and transport networks exists for the effective management of controls. An official laboratory network must also be provided to monitor the food chain and to support the food inspection and food-borne disease surveillance systems (Figure 5.1). The existing facilities and technical resources at RBS although requiring improvements, are able to meet the requirements for monitoring the food chain. Currently there are six operating public laboratories for food control in Rwanda although some equipment still needs to be acquired. The reliability and image of a food control system largely depends on having qualified, trained, competent and honest food inspection service responsible for verifying control system being implemented by industry in the whole chain. The Rwandan government through RBS should include as its responsibilities the following:
- Auditing food safety management systems;
- Developing code of best practice;
- Ensuring inspection programmes meet international quality standards;
- Promoting training and education in food safety;
- Continuous professional development;

According to FAO (2008) governments are usually faced with a difficult task of developing standards for agricultural products for the domestic market. They need to decide on whether to use the same standards as those for international markets or develop different standards for the local market. The latter option can become a constraint to operators who desire to produce for both markets.

5.3.2 Responsibilities of producers
What takes place on the farm will reflect on the safety and quality of foods all the way through the rest of the food chain because it is with farmers that the first step in the food chain begins. Farmers therefore need to put more effort on ensuring that they use safe and quality inputs and raw materials as well as practicing good production methods. Good record keeping will form an important part meeting traceability requirements which critical in cases of product recall. However it is reported in literature that following these general principles is usually a challenge for small farmers in developing countries. Information presented in section 4.2 of the previous chapter highlights the challenges faced by processors in the local food chains due to poor production practices by producers. The experts highlighted the problem of post harvest handling as one limiting factor for producers. However it can be seen as indicated in chapter 4 that producers are still able to sell their products dispite them being of inferior quality as the number of traders who reject substandard products is low. This differs with the situation in UK as shown by Humphrey (2006) where supermarkets base their competitive strategies on increasing the variety, quality and seasonal availability of produce and securing continuous, year-round availability. These retailers specify how products should be grown and harvested, and the conditions under which they are transported and stored. This can be done through sanctions by buyers on suppliers' e.g.; rejection of access to the market. An important positive sanction is the ability to pay higher than average prices to suppliers.

5.3.3 Responsibilities of processors and manufactures
In this level of the chain, quality assurance schemes are should form an important part of ensuring food safety and meeting quality standards. This can comprises of private standards which are audited and certified independently. Processors need to check and

verify the quality of their inputs and also make sure they have good tracking records. Basing on findings shown in section 4.2, it can be seen that the local processors and manufactures are lagging behind in implementing quality management systems. The experts interviewed indentified only two operators who have adopted international quality standards in their quality control systems.

5.3.4 Responsibilities of retailers

Retailers as with processors should implement food safety management to control the safety of their food products. It is essential that food retailers like processors adopt a food safety management system so as to manage the safety of their food products (Figure 5.3). Although it is difficult at this level of the chain to adapt quality assurance programmes e.g. HACCP, there is need for these operators to work with other stakeholder in order to simplify and facilitate implementation of the control systems. During discussions with the experts interviewed, it was mentioned by an expert from the fruit processing company that traders were in the habit of supplying inferior quality produce mixed with good quality produce which they would only discover later. Examples provided by literature (Henson *et al.,* 2001) showed that in order to protect their reputation some supermarkets chains have introduced private standards e.g. EurepGAP which dominants the market for fresh produce. The case study of Migros and Coop discussed in section 2.5.6 demonstrates the initiatives of retailers to take responsibility for quality control and food safety.
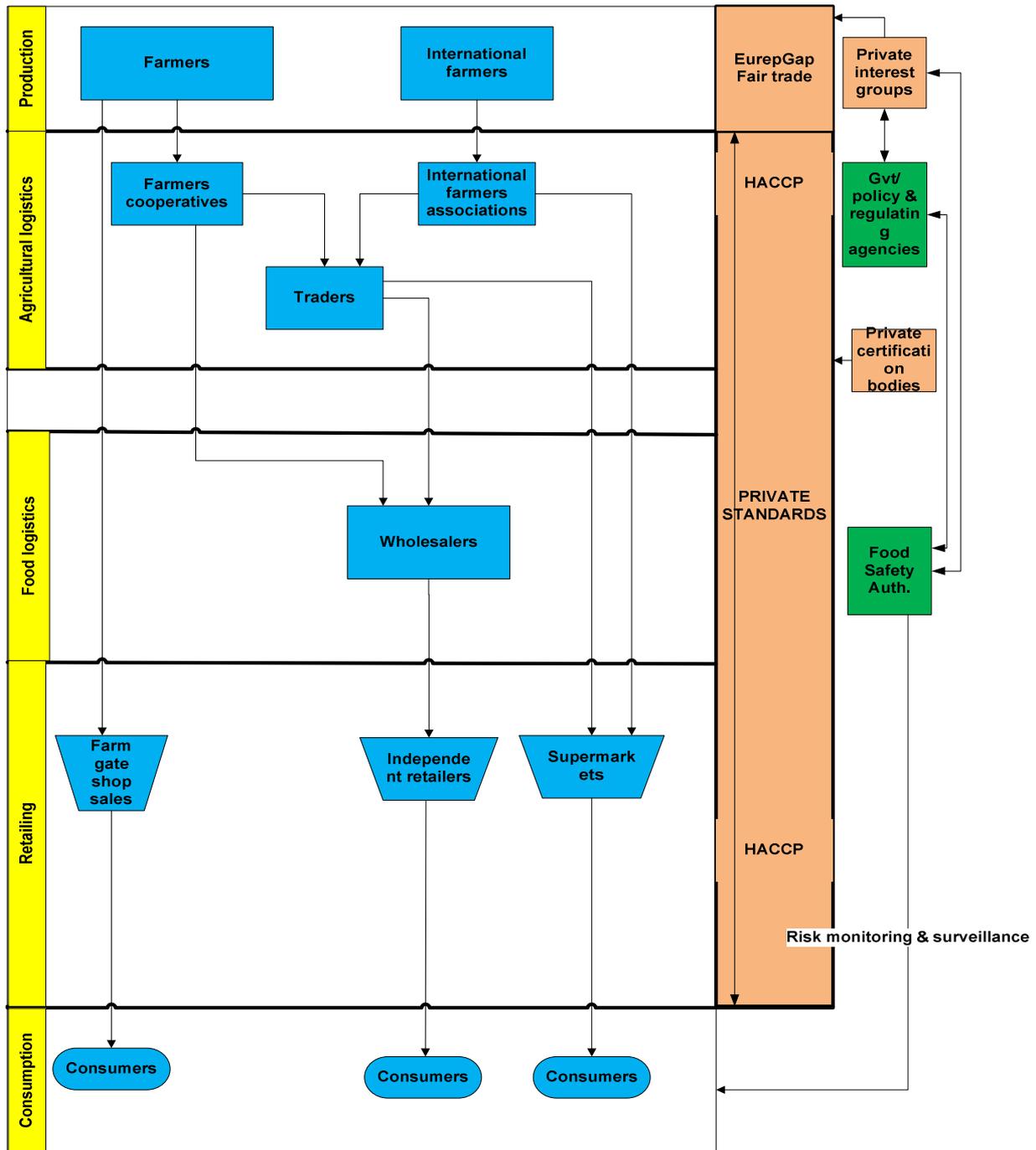
Figure 5.3 Example of private-public sector integrated control system

Humphrey (2006) stated that the development of public and private standards involves interventions at multiple points along the value chain. Figure 5.3 illustrates how different standards are applied for fresh fruit and vegetables in UK. This involves the carrying out of controls by different agents (private and public) at different points along the value chain.

5.3.5 Responsibilities of chain influencers

International organizations have a very important responsibility providing technical assistance to developing and developed countries in strengthening food control systems. Examples of organizations involved in these activities are FAO and WHO and these should play a major role in developing countries in the area of food safety.

5.4 SWOT analysis of the Rwandan agro-industry

Strengths	Weakness
• Potential willingness of private sector to be involved in control activities • Availability graduates with sufficient academic knowledge in Agriculture sciences, food Science • Existing research, development and educational institutions • Availability of technical manpower • Availability of equipment required for quality and safety control systems in most companies	• Limited professionalism both in private and public sector • Private organization behavior does not encourage quick adoption of changes • Incidences of substandard products on market • Limited adoption of quality management systems by operators • Weak linkages between chain supporters and direct chain actors • Producers with inappropriate storage and handling facilities • Limited purchasing power of consumers • Limited financial resources for most business operators in agro-industry
Opportunities	Threats
• Majority of small scale producers under cooperatives • It is possible to apply group Internal Control System (ICS) • RBS is able to advocate for establishment of relevant legal structure which recognizes involvement of private sector in quality and safety control • Government policy promoting private sector involvement in development actions	• Most agro-business operators are small scale • Gaps in the coverage of food safety control activities. • Limited number of supporters focusing on private sector • Weak purchasing power of Rwandan consumers

Chapter 6 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The findings of the study show that there is adulteration, food poisoning and contamination of agro-food products due to limited participation in food quality and safety management of products by all chain actors. This is resulting from the high costs of implementing quality management systems standards already in place while the control system by RBS is weak therefore operators are able to sell substandard products on markets. Adoption of quality assurance programmes by operators in the agro-industry has mainly been done only by operators who are into export.

Limited purchasing power; training; technical and financial capacity have been identified as factors that influence quality and safety control systems in Rwanda by discouraging participation. However success factors including institutional support resulting from Agriculture transformation and trade policies offer possibilities to integrate private sector in quality and safety control systems and share the costs of implementation of quality management system standards.

Adoption of internal control system for small scale holders and national control system model that integrates independent control bodies, product boards and chain actors involved from input supply to retailing can help in sharing responsibilities between private and public organisations. Adoption of these systems can lead to possible improvements on existing control systems Rwanda.

6.2 Recommendations
Findings of the study provided a guideline for coming up with a proposed organizational model that integrates private sector in quality and safety control of food and agricultural products.

Possible organizational models in national food quality and safety control systems applicable to the current situation in Rwandan
The Netherlands control system (Figure 2.2) discussed in sections 2.1 and 5.1 is recommended for national food quality and safety control system in Rwandan ago-industry. The internal control system model (Figure 3.33) is recommended for small scale producers.

1) **Requirements for quality and safety control system in agro-industry**
- Government to make legislation that incorporates private sector in quality and safety control systems.
- Agro-industry to set up product boards
- Agro-industry to set up independent bodies
- Accreditation body

2) **Responsibilities sharing**
a) *MINAGRI and MINCOM*: to be responsible for policy formulation
b) *Chain actors from input supply to retailing*: adopt and implement quality assurance schemes
c) *Product boards*: formulating internal regulations for the entire sector and quality assurance schemes; coordinating and training of specific chains
d) *Private and public control bodies*: implementation of quality control i.e. assessment and certification of compliance to quality assurance schemes by chain actors

e) ***RBS***: supervision of control bodies and risk assessment, management and communication; education and coordination of training agro-industry stakeholders

f) **Accreditation body:** assessment and approval of control bodies

3) Working approach

- RBS and MINAGRI to enforce first and second party control systems on agro-products identified to have high quality and safety risks such as cereals and; milk and milk products.

- Government can provide incentives for the adoption of a quality assurance schemes. If an operators have implemented an approved quality assurance scheme that complies government could choose to provide participating firms with public recognition, preference in contract allocation or flexibility in regulatory enforcement. The government can make awareness that it will look favourably on sectors or operators that develop and implement quality assurance schemes.

- The Rwandan government is to provide the start-up funds which should be supplemented and supported by donor agencies, civil society and the private sector.

- Local producers should examine the possibility of becoming part of some niches for small farmers in global markets, and initiatives such as Fair trade and local branding.

- A good relationship between producers and traders should be promoted by government and non-governmental organizations by conducting and publishing surveys on expenses of producers for specific production seasons this will help in maximizing the profit of producers by selling their produces on the right price and address the issue of purchasing power.

- RBS to put quality logo/mark for products meeting set down requirements ensuring independent third party product certification, which is only achieved after stringent and continuous testing therefore the mark will be recognized as a symbol of credibility,

- Consumer awareness and education for the public to look for the RBS logo/mark as a guarantee for quality when purchasing products.

6.3 Limitations of the study

The researcher had to pursue the option of informal interviews over the phone in order to get additional data for the study. This limited the ability to use visual observation of body language which is very useful to verify information being given. There was limited amount of literature material on approaches used in integrating private sector in control systems from an African perspective although such approaches have been used in countries such as Kenya and Uganda. The research therefore relied more on experiences from agro-industries in developed countries thus more time was spent to adapt the systems to the local environment.

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Annex 1   Glossaries

Contol system
For the purposes of this thesis, the term control system refers to the established procedures designed and established to check, record, regulate, supervise, authenticate, and (if necessary) restrict, the access to an asset, resource, or system (Business dictionary, 2010).

Food Control System is used in this study to describe the integration of a mandatory regulatory approach with preventive and educational strategies that protect the whole food chain.

"**Food**" means any substance, whether processed, semi-processed or raw, which is intended for human consumption, and includes drinks, chewing gum and any substance which has been used in the manufacture, preparation or treatment of 'food' but does not include cosmetics or tobacco or substances used only as drugs.

"**Food control**" is defined as a mandatory regulatory activity of enforcement by national or local authorities to provide consumer protection and ensure that all foods during production, handling, storage, processing, packaging, transportation, distribution and sale are safe, wholesome and fit for human consumption; conform to safety and quality requirements; and are honestly and accurately labelled as prescribed by law.

Private standard: The term "private standard" has been used to refer to particular labels used by private companies to differentiate their products and to indicate superior quality features. These vary in the food products they cover, in the points in the value chain on which they focus and the extent to which they rely on certification and third-party verification.

Quality: In this report quality refers to meeting or exceeding customer and consumer expectations (Luning and Marcelis, 2009).

Supply chain analysis: According to Keyser (2006), a supply chain analysis is a downstream concept that looks at the flow of goods from the supplier to consumer.

Value chain is considered as systematic supply chain within which different actors work together from the provision of specific inputs for production to retailing and finally consumption to ensure satisfaction to the consumer demand (Richter, 2005).

Annex 2   Guidelines for discussion group

a) Quality and safety problems identification

Table identifying common problems in the different chains

Commodity	Safety and quality problems	Responsible agent	counteractive Action taken	Acting agent

Table indicating mentioning main Sources of commodities sold in the country

No.	Commodity	Operator	Source of commodity	
			locally produced	Imported

b) Recommended control parties and their advantages and limitations

Table describing advantages and limitations of control parties

No.	Commodity chain	Control party	Advantages	Limitations

Adoption of quality management by the participants

Table showing the quality management systems adopted by the experts' organization

No.	Operator	Quality management system

Table showing potential companies to adopting or establish private quality management systems

Type of service	companies	Capacity elements			
		Staff qualifications	equipment	Financial capacity	other

Factors that may influence establishment and/or adoption of quality management by the private sector

Success factors

Table categorising the bottlenecks in private companies

	Rating	
Bottlenecks	Low extent	High extent

Annex 3   Case example on food safety issues

Melamine and dioxin contamination
Two topical food safety issues that have recently hit the headlines are melamine and dioxins, both of which have been found in finished food products. Melamine is an industrial chemical that is used as a binding agent and flame retardant in the manufacturing of cooking utensils and plates. It has a high nitrogen content (66% by weight) and is used as a fertilizer in some parts of the world.

It was added to animal feed as a cheap protein source in China before October 2008, and it was intentionally added to pet food and infant formula to mimic protein, despite never having been approved for pet and human food. Because humans and animals cannot metabolize melamine, a variety of illnesses result from its consumption. Melamine contamination has been linked to several deaths in China.

The toxicity of melamine results from the formation of insoluble crystals between melamine and cyanuric acid (a byproduct of melamine), which can cause the development of kidney stones in pets and babies. Besides melamine and cyanuric acid, two melamine-related compounds, ammeline and ammelide, were also found in adulterated pet food.

Due to the severe consequences of melamine adulteration in milk products, government food safety agencies around the world, including the General Administration of Quality Supervision, Inspection, and Quarantine of the People's Republic of China, the US Food and Drug Administration (FDA), and the UK Food Standards Agency have established limits of 1 mg/kg and 2.5 mg/kg MRL for melamine in baby formula and milk products, respectively.

Because it has been used as a fertilizer and was added to animal feed, other products may also have been contaminated by melamine. For example, eggs exported from China to Hong Kong were found to be contaminated by this compound. The testing list for melamine now extends beyond milk products or products with milk powder to meat, poultry, eggs, and vegetables (Fintschenko and Lu, 2009)

Annex 4 Examples of high profile food safety events in industrialized countries

Year	Event/Issue	Country
1987/1988	Beef hormones	Italy/European Union
1988	Salmonella outbreak/scandal in poultry and eggs	United Kingdom
1989	Alar in apples	United States
1993	E.Coli outbreak in fast-food hamburgers	United States
1996	CJD linked to BSE and human health	United Kingdom
1996/1997	Microbiological contamination of berries	United States, Canada
1996	E. Coli outbreak in cooked meat	United Kingdom
1995- 1997	Avian flu spreads to humans	Hong Kong, Taiwan
1999	Dioxins in animal feed	Belgium
2000	Large-scale food poisoning from dairy products	Japan
2001	Contaminated olive oil	Spain

Annex 4: Examples private control schemes compliance costs, case of EurepGAP

EUREPGAP has fixed charges for certification. In 2004 the registration fee per grower was 5€ and the cost for certification 20€, giving a price of 25€ (US$30) for a grower going for certification under Option 1. For EUREPGAP Option 2, costs are related to the number of growers in the scheme. Some costs were obtained from a pineapple outgrower scheme in Ghana. Thus, for an Option 2 scheme involving 32 outgrowers, the following fees applied:

5€ per registered grower x 32 growers = 160€
20€ for PMO system check = 20€
20€ per audited grower, where take $\sqrt{32}$ = 5 x 20 = 100€
Total fee for EUREPGAP = 280€ (US$336)

The certifying body collects this fee on behalf of EUREPGAP and also charges its own fee to cover the cost of the audit. For the group of 32 growers, a Ghana-based certifying body charged US$3,500 for a 6-day audit and US$1,900 each for 2 preaudits of 2 days duration, giving a total of US$7,300.

The same certifying body charged US$1,155 (US$30 for EUREPGAP) to carry out a 1-day audit on a large commercial farm under Option 1. A South African based auditing company charged US$3,650 (US$30 for EUREPGAP) for a 2 day pre-audit and 1-day external audit of an Option 1 grower in Ghana. Thus, the day rates for the Ghana and South African-based certifying bodies were US$1,125 and US$1,207 respectively.

A European-based certifying body was asked to quote for the audits described above; the day rate given was US$900. For the Option 2 scheme only 3 days would be required for the audit (a realistic figure), giving a total of US$3,036 (US$336 for EUREPGAP), as compared to US$3,500 for the Ghana-based company.