

# Possibility of improving income of small-holder pig farmers through value chain development

*An impact study of Thika Pork Centre value chain in Thika District, Kenya*



Research Project submitted to Van Hall Larenstein University of Applied Sciences

In partial fulfilment of the requirements for the awards of master degree in Agricultural Production  
Chain management specializing in livestock production chains

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Above, I thank God for giving me strength and sustenance in this beautiful foreign land away from home and family.

September, 2010  
Wageningen, the Netherlands.

## **Dedication**

This research work is dedicated Almighty God for divinely enabling me to complete my study and to my beloved wife Beth Gikonyo for her endurance shown in my absence, I love you and our two children.

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## Equivalents

1 EUR = KSh. 102



## Abbreviations

AEZ	-	Agricultural Ecological Zone
ASDS	-	Agriculture Sector Development Strategy
CDW	-	Cold Dressed Weight
DAPO	-	District Animal production officer
DLPO	-	District Livestock production Office(r)
DVO	-	District Veterinary Office(r)
EU	-	European Union
FAO	-	Food and Agriculture Organization of the United Nations
FMD	-	Foot and Mouth Disease
GDP	-	Gross Domestic Product
GMP	-	Good manufacturing Practice
HCCP	-	Hazard Critical Control Points
IKB	-	Integrated Quality Management system (Dutch - <i>Integrale Keten Beheersing</i> )
ISO	-	International Organization for Standardization
KSh	-	Kenya Shilling
KEVEVAPI-		Kenya Veterinary Vaccine Production Institute
MDGs	-	Millennium Development Goals
MoA	-	Ministry of Agriculture
MoLD	-	Ministry of Livestock development
NALEP	-	National Agriculture and Livestock Extension Programme
SGM	-	Simplified Gross margin
SMS	-	Subject Matter Specialist
TPC	-	Thika Pork Centre
VCA	-	Value Chain Analysis

## Abstract

The pig sub sector in Thika district has grown considerably over the years; currently Thika town has the highest number of pork retail points in the province. The sector is however poorly organized with the mostly small scale farmers practicing semi intensive pig production system supplying pigs to over twenty pork traders retailing between 1 to 8 pigs per day.

The theme of the research is “Possibility of improving incomes of small scale pig farmers through value chain development” and uses an impact study assessment of Thika pork centre, a steadily growing value chain. The study was carried out in Thika district, Kenya. The objective was to explore the possibilities of improving profits of small-scale pig farmers in Thika district through comparing formal Thika pork centre value chain and the informal supply chain.

The study was carried out between July 13<sup>th</sup> and August 20<sup>th</sup> 2010. The study examined the current status of the pork sub sector and assessed the impact of Thika pork centre by comparing it with the informal chain. Survey questionnaires were administered to thirty three small scale pig farmers in three locations (11 in each location). Seven key stakeholders in the sub sector were interviewed to get in depth information for the study.

The results revealed that actors in the sub sector were not well organized and carried out their activities individually, however actors in Thika pork centre chain were being coordinated by the trader (TPC) which made them more efficient and realised more profits compared to those in the informal chain. It was further revealed that 80% of the farmers in TPC chain accessed more information and from more sources compared to 27% in the informal chain. Indeed farmers in the TPC chain strongly stated that there was strong information sharing between them slaughter house and TPC but farmers in the informal chain completely disagreed having strong information sharing with any actor in the chain. Moreover, the study found out that farmers in TPC chain obtained support such as soft loans, assured market which farmer in the informal chain did not.

Pork quality issues were poorly managed in both chains and although awareness of quality and food safety concerns was high practices that enhance quality and safety at all the levels in both chains were inadequate. One important pork quality attribute that TPC was keen on was lean meat which he achieved by removing the skin and underneath fat from the carcass so to satisfy his customers who did not prefer meat with a lot of fat.

The most constraining factor encountered by pig farmers in both chains was high feed costs in relation to pork prices and poor quality of concentrate feeds. Interviewed farmers stated that they were supplementing feeds with low cost kitchen remains and this led to low productivity and poor quality pork.

The study revealed that farmers from both chains held the view that integrating chain activities such marketing as a group and bulk input purchase would improve their incomes and bargaining position in the chain but they required financial and capacity building support to achieve this.

Finally this study made recommendations aimed at improving incomes of small scale pig farmers. First, sub sector stakeholders to form pig organization at district level so as to improve coordination and organization thus increasing efficiency and profitability. This organization to explore opportunities for pig feed processing as long term plan of tackling feed costs and quality constraints. Secondly farmers to construct pig units that meet basic hygiene requirements guided by structural plans provided by livestock experts in collaboration with the farmers so as to improve hygiene standards at farm level. Third integration of chain activities by farmers to be initiated through support of other chain actors and specifically chain facilitators (NGOs and government/donors) carrying out livestock sector programmes. Lastly, Thika pork centre (TPC) to explore possibilities of diversifying its product range while considering consumer quality and convenience requirements and also initiate an integrated quality management system starting with simple aspects as traceability, grading and labelling.

## Chapter One: Introduction

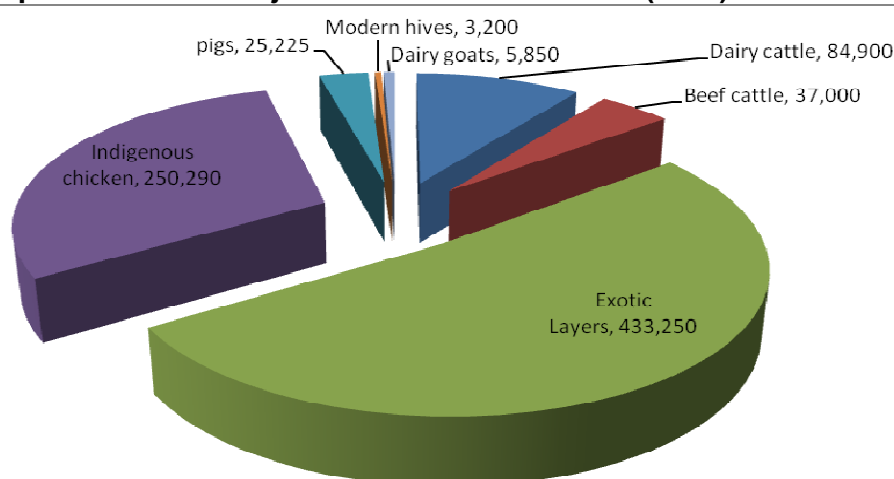
### 1.1 Background Information

The Kenya Agriculture Sector Development Strategy (GoK, 2009) indicates that the livestock sub-sector accounts for about 12 % of the entire Gross Domestic Product (GDP) and about 42% of the agricultural Gross Domestic Product. It also supplies the domestic requirements of meat, milk and dairy products, and other livestock products squarely facilitating attainment of Millennium Development Goal (MDGs) No.1 of eradicating extreme poverty and hunger, while accounting for about 30% of the total marketed agricultural products. The sub-sector earns the country substantial foreign exchange through export of live animals, hides and skins, dairy products, and some processed pork products. In addition it employs about 50 percent of the country's agricultural sector labour-force.

### 1.2 Livestock Production in Thika District

Thika district is one of the seven districts in central province of Kenya occupying 15.4% (2024sqkm) of the total area of the province (13176 sq km). Dairy, poultry and pig rearing is mostly practised in AEZ II (humid) and III (sub humid). Commercial ranching and agro pastoral systems are found in AEZ IV (sub humid to semi arid)

**Population of the major livestock Thika District (2008)**



*Figure 1.1 Major livestock in Thika district (Source: MoLD, 2008. Annual report)*

In this District and elsewhere in rural Kenya, majority of livestock farmers practice subsistence farming characterized by low productivity, low input levels and little contact with markets. This farming is in fact, subsistence system where profit is not the driving force. There are however few commercial farmers keeping large numbers of dairy, poultry and pigs in intensive small scale family farms and commercial farms. Among the challenges these livestock keepers face are inadequate supply of quality feeds and poor marketing.

### 1.3 Pigs Subsector

Although the livestock sector is dominated by mainly of dairy, beef and poultry, pig sub sector has great potential given that it is relatively cheaper than beef in the local market. Out of the national estimated 350,000 pigs currently kept, over 65 % are reared in the outskirts of major municipalities of Central Province which is a key pork production region. Before dairy cooperatives and the main milk processing factory were revived in early 2003 dairy farmers had abandoned dairying altogether. Faced with this situation farmers in this district started to engage in alternative livestock enterprises such as egg/broiler production and pig rearing which have become very popular in the recent past (MoA, 2003)

Forecast by Delgado (2003) indicate that by 2020, the share of developing countries in total world meat consumption will expand from 52% currently to 63%. Further, he explains that the increase is as a result of a steady population growth, urbanization and improved living standards of the middle class of these countries, Kenya being one such country. This explains why there is notable rise in pig and poultry production in the district. Moreover there has been notable increase and expansion of the number of pork butcherries in Thika town with some slaughtering up to 5 fatteners per day.

Despite of the growing demand of pork in the district the growth of the sub sector has remained slow and low. The graph (figure 1.1) below on estimated pigs population in Central province (MoLD, 2008) shows that even though the district has one of the highest number of pigs in the province( above 23,000), the prevailing demand has not triggered a substantial growth.

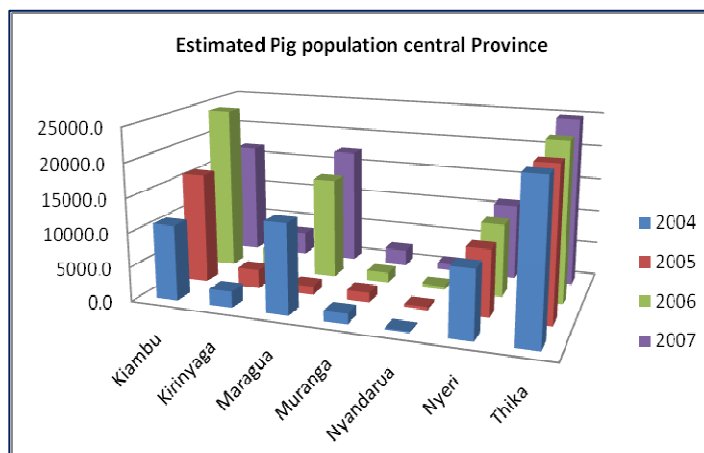


Figure 1.2 Pig population central province

Source: MoLD annual report 2008

#### 1.4 Justification

Although the meat consumption basket in Thika district and indeed elsewhere in Kenya is dominated by beef (76%) MoLD (2007), pork has great potential given that it is relatively cheaper than beef in the local market.

Pig rearing has become an alternative farm enterprise of small holder livestock farmers in the district and has continued to expand in the last decade however it is riddled by low productivity and poor market access. Various attempts by the department of livestock production to develop the pig sub sector in the past have not placed much emphasis on value chain approach which is relatively a new concept in the country. Value chain strategies are market driven and private led, this makes their approach efficient and effective compared to public led development strategies.

This study will provide insight to the department of livestock production and pork sub sector stakeholders in Thika district. The departments objectives among others is to facilitate access to markets, promote increase in livestock productivity and strengthen institutions and stakeholders in the sector, thus the results of this study will provide useful information that the department can use to develop strategies in developing the pork sub sector that is dominated by small scale farmers. The actors in pork chain will use findings to increase efficiency and profitability.

#### 1.5 Problem Statement:

Production oriented pork supply chain in the district has not supported small-scale pig farmers to tap the benefit of increased pork demand and improved consumer prices. This has been caused by inadequate market information, weak support in chain development and high production costs. Consequently, the farmers are not getting good returns. (MoLD, 2008)

The few numbers of pigs sold by individual pig farmers put them in a disadvantaged bargaining position with the pork trader. The farmers therefore receive low price offers per pig. They often lack market information and are mostly involved in production. In addition, KIT et al. (2006) argues that they do not control the terms on which they engage in the chain therefore they have low bargaining power.

Despite these limitations the close to 150 small holder pig farmers in the district have developed chain relationship with Thika pork centre, a trader, delivering pigs some for over 12 years. The success and sustainability of such buyer-supplier relationship depend on the collaboration among the chain actors. Equally important is how each actors interests are met and the bargaining power

they poses to effectively pursue these interests (Omta, 2004). It is however, not clearly understood what impact Thika pork centre and pig farmers (buyer-suppliers) relationship has had on profit and bargaining power of these suppliers which is the aim of this study.

## 1.6 Research Objective

The purpose of this research is to explore the possibilities of improving profits of small-scale pig farmers in Thika district through comparing formal Thika pork centre value chain and the informal supply chain.

## 1.7 Research Questions

Two main research questions are formulated in order to address the research objective. Equally formulated are a set of sub questions which endeavours to address the main questions.

### 1.7.1 Main Research Questions 1

What is the present dynamics of pork value chain in Thika district?

- 1.1 What are the systems of pig production?
- 1.2 Who are the actors in the pork sub sector?
- 1.3 What are current marketing practices and outlets?
- 1.4 What quality control measures are applied by actors in the chain?
- 1.5 What are the problems faced by small holder pig farmers and pork traders and service providers?

### 1.7.2 Main Research Question 2

What is the impact of Thika pork centre on effectiveness and sustainability of pork value chain in Thika district?

- 2.1 What factors are facilitating and limiting the success of Thika pork centre value chain?
- 2.1 What are profit shares and profit margins of actors in the pork chains?
- 2.2 What chain development strategies can improve profit margins of small scale pig farmers?

## 1.8 Definition of Concepts

**Small scale pig farmer-** Is a pig farmers rearing 2-10 sows in an intensive or semi intensive system for income generation.

**Value chain development-** Value chain development is understood to be strategies used to improve small-scale pig farmers' participation in chain activities and their involvement in management of the chain.

**Informal supply chain-** set of linkage between actors in a chain who do not seek to support each other and have no binding relationships either formal or informal apart from when transacting agreements involving exchange of products and money.

**Formal chain-** supply chain where actors support each other so that they can increase their efficiency and competitiveness. They strive to satisfy consumer needs so that they can increase profits.

**Bargaining power-** is the ability to influence the price or terms of a business transaction and can enable producers to negotiate for better prices and terms, such as a long-term supply agreement or access to business services. Bargaining power depends on many different factors but the most important are scarcity, the availability of alternative marketing options, and market information

**Profitability** – It is the return to investment given by profit divided by cost price expressed as a percentage.

**Profit shares-** Profit of actor divided by sum of profits by chain actors expressed as a percentage.

**Stakeholders**-people who are directly involved in pork value chain in Thika district. These include actors, chain supporters and chain Influencers.

## Chapter Two: Concepts of Pork Value Chain

This study was based on a value chain analysis (VCA) concept structured in the conceptual frame work in figure 2.1 below. In order therefore, to lay a foundation for this study, the chapter present a brief review of pig production systems and various concepts of value chain in the pork sub sector. Since there is very little study done in pork sub sector in the study area, review of studies done in other areas with similar circumstances such as geographical locations, level of production and incomes have been used.

### 2.1 Conceptual Frame Work

The frame work shows comparison between an informal and a formal chain. Criteria for assessing the differences being effectiveness and sustainability seen from the basis of information flow, quality management system volume of products and profit margins. These were analysed by use of chain map, stakeholders' analysis, Porters five forces, market mix (5 Ps), simplified gross margins % and cost price determination all within the VCA concept. Finally, conclusions were made based on the results of the analysis and recommendations that would help stakeholders to draw strategies to develop pork sub sector from a value chain approach.

#### Conceptual Frame Work- Value Chain Concept

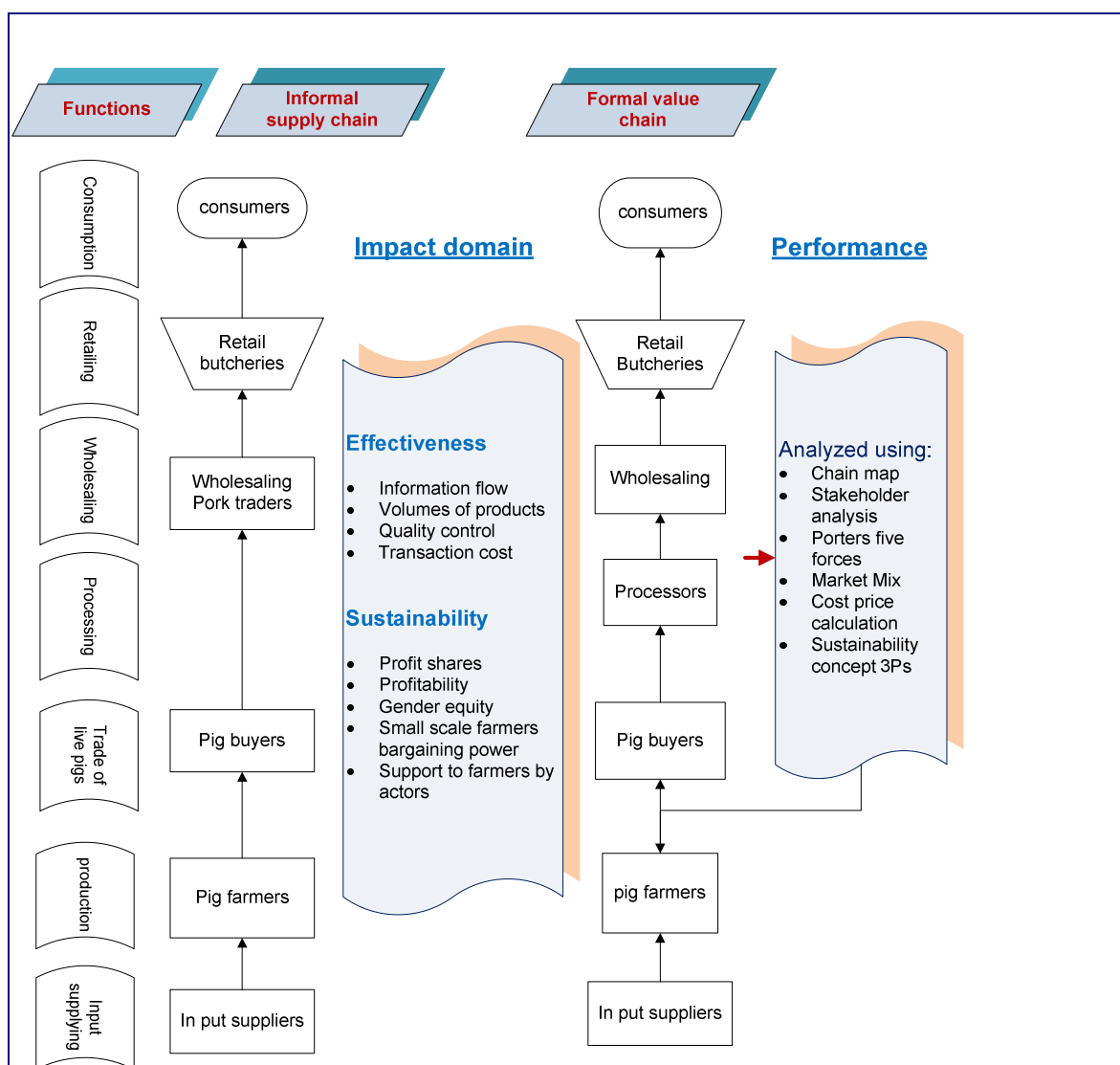


Figure 2.1 Conceptual framework



## 2.2 Pig Production Systems

Muys and Westenbrink (2004) defines three distinct pig production systems common in the tropics namely free range , semi intensive and small scale intensive systems. These three systems are also identified by Gikonyo (2009) as the main systems of pig production in Thika district and elsewhere in Kenya and their description is as here below.

### Free Range

According to Muys and Westenbrink (2004) this system is also referred to as scavenging where pigs roam the around the house or village to find their own food. However, sometimes the food they collect is supplemented with kitchen refuse or agricultural waste products. Indeed minimal capital and labour investments are considered and use of local breeds is predominant usually the number of pigs is very low and little effort is given to improve production.

### Semi- Intensive

This system involves confining pigs to a limited space such that they cannot gather their own food and are completely dependent upon their keeper. Fresh water and fodder (usually kitchen refuse or agricultural waste) have to be brought to the pigs. This system of pig keeping opens up possibilities for improved feed and disease control, which in turn can result in faster growing and healthier pigs and/or in larger litters.

Apart from the economic reasons there are also some very practical reasons for keeping the pigs enclosed. It prevents crops from being damaged by the pigs for example, and it reduces the risk of the pigs being stolen. Although this system of pig keeping demands only low financial inputs, more time and effort needs to be spent on the pigs. More technical knowledge is also required.

### Intensive System

In this system pigs are kept in complete confinement. Buildings are provided to keep fatteners, boars, sows, and sows with their litters separate. More attention is paid to housing rather than just providing a simple shelter. Unlike in free range and semi intensive a larger number of pigs are kept and the pigs are usually well managed. More time and money is spent on the well-being of the pigs. Feeds and medicines are for instance bought in. In return, the intensive systems are aimed to provide a major source of income for a group or household and are no longer kept to serve as a savings account.

## 2.3 Value Chain Concept

Various studies have come up with different definitions of value chains. Vermeulen et al, (2008) describes a value chain as a sequence of all activities that are undertaken in transforming raw materials into a product that is sold and consumed. KIT et al. (2006) defines value chains as set linkages between actors who seek to support each other with the objective of increasing effectiveness and competitiveness.

According to Roduner (2007) value chains analyses the links and information flows within the chain and reveals the strengths and weaknesses in the process. It also analyses the boundaries between national and international chains, takes into consideration buyers' requirements and international standards.

Although this concept is well articulated in almost all sectors in the developed countries of the world, it is rather new in developing country but it is slowly being recognised and promoted by governments and private sector in a few sectors such as agriculture and processing. A good example being the Kenya agriculture sector development strategy GoK (2009) that has given priority to livestock on farm and off farm value addition and promoting mainstreaming of value chain concept in the main livestock enterprises.



### 2.3.1 Chain Players

Input suppliers, producers, traders and retailers of agri- food supply chains are increasingly operating in a globalized world. Indeed these chains and networks are swiftly tending towards globally interconnected units with varying degrees of relationships that are shaping the way food products are being marketed (Zylbersztajn and Omta, 2009). Chain players have been systematically viewed by Roduner (2007) as chain actors, supporters and influencers. Chain players in pork sub sector comprises of players described here below and illustrated in the chain stakeholders in *figure 2.2*

**Chain actors-** These are the chain players who directly deal with the products either through production, processing, trading and consuming. They actually own the products as it passes through their hands in the chain (Roduner, 2007). According to KIT and IIRR (2008), value chain actors include input suppliers, producers, trades, processors and consumers. These are direct actors who are commercially involved in the chain.

#### Pork value chain stakeholders

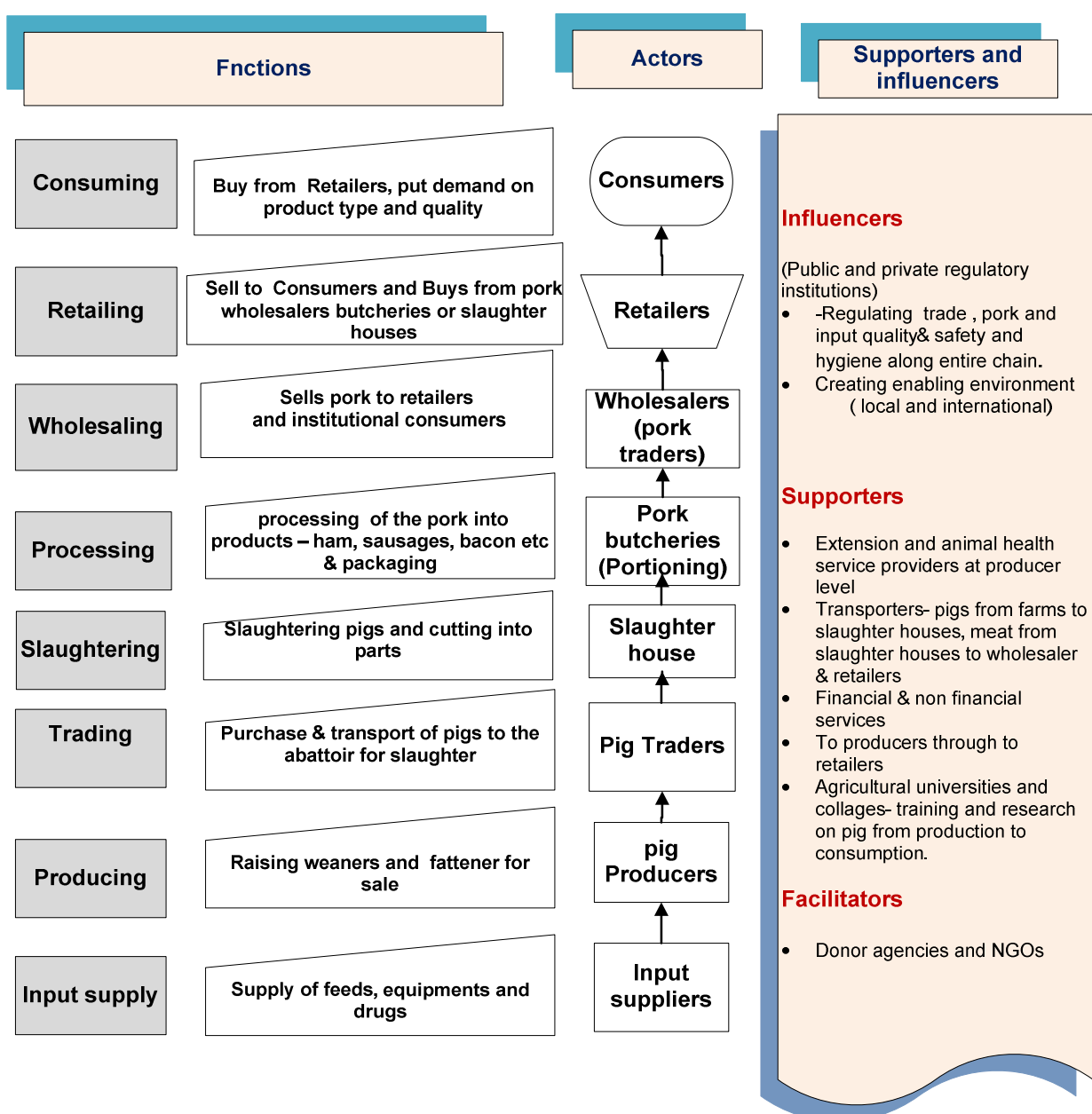


Figure 2.2 Pork value chain stakeholders, Adapted from Roduner (2007) pg 5

**Chain supporters-**These are individuals or organizations that provide services to chain actors and are not directly involved with the product. The services rendered are geared to add value to the product. They include transporters, slaughter service providers, extension and animal health service providers, financial and non financial service providers. Slaughter house/slab is a chain supporter performing a chain function.

**Chain influencers-** These are people, institutions and organizations that are responsible for establishing regulatory framework that creates favourable and enabling environment to do business by providing political, social and economic stability. Public Veterinary health plays a very close attention to food safety. It inspects and licences meat transport vehicles and carriers. It has also been encouraging the private sector to invest in new modern abattoirs. Institutions such as municipalities, ministry of trade and revenue authorities regulate trade license levies and import and export procedures and tariffs. Donor development agencies partnering with local governments and private sector fall in this category of influencers. In order to provide effective support, influencers ensures efficient business operations and low costs of business transactions through setting favourable tax regime and appropriate business procedures (Roduner, 2007)

### 2.3.2 Information and cash flow

Information needs and flows when handling perishable product such pork require a good, fast and adequate information system. It is therefore important to recognize key information system issues to chain management for an efficient flow of physical products, information and money flows since they are vital to creating a transparent and successive value chain (Vorst, 2000).

Material flow is from input supplier to consumer while money flow is from consumer to input supplier, however information flows is both direction with actors proactively sharing relevant information (Heide and John 1992) describes this sharing of information as the bilateral expectation and can be said to be shared between actors as seen in *figure 2.3* below.

Kotabe et al. (2003) found out that communication and information sharing accelerates improvement in chain coordination and efficiency through reduction of transaction costs and fast relaying of necessary information leading to achieving greater operational efficiencies. Similarly, a study by Coronado et al. (2010) concluded that information exchange between chain actors is positively related efficiency. Moreover, sustainable trading relationships are founded on well established information exchange along and within the value chain.

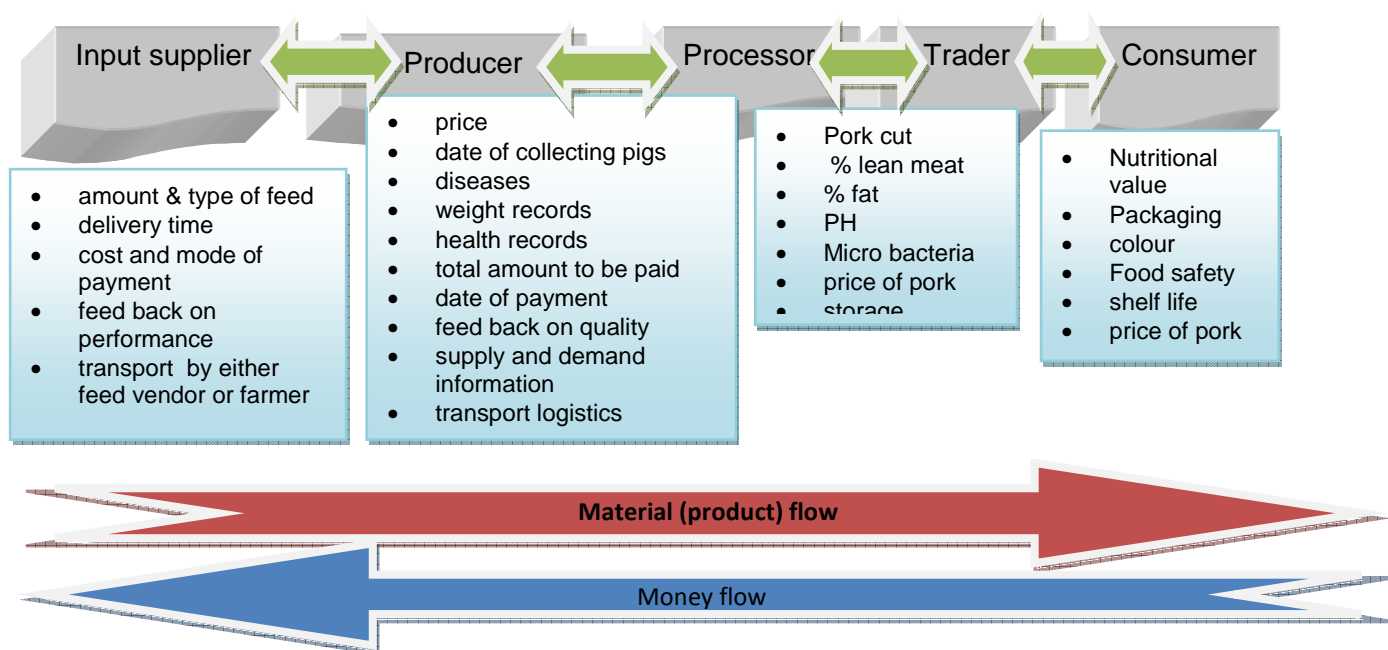


Figure 2.3 information, product and money flow in a value chain

### 2.3.3 Quality control systems

Consumers are currently putting more demands on the assurance of quality and safety of the food products and their production process (Luning and Marcelis, 2009) consequently necessitating establishment of meat quality control system that regulates the measure of extrinsic materials such as chemical residues, toxins, pathogenic microorganisms and putrefied tissues, that could be present in meat and posing disastrous effects to human health (Bali et al., 2007). Great awareness of the risks of poor quality foods and the need to eat and stay healthy especially by high income and educated consumers has stimulated the design and application of quality management systems which according to Kalathas (2007) entails policies, processes, and procedures that aims at supplying, high quality pork that has high safety standards.

The GMP (good manufacturing practice) code are guidelines aimed at assuring minimum acceptable standards and conditions for processing and storage (Luning and Marcelis, 2009) and focuses on buildings and equipments, requirement of raw materials, production processes and knowledge and experience of employees. On the other hand ISO certification relates to quality management systems that include management of resources, products and service delivery. Analysis of this system creates room for improvement.

Value chain actors try to achieve compliance to quality standards by establishing rules and regulations. For example, the Integrated chain control quality management system (IKB) practiced in the pork chain in the Netherlands regulates feed quality, hygiene, use of veterinary medicine and tracing and tracking of products. In addition this system through audits and sanctions by independent body controls the level of compliance (Wever and Wognum 2008).

On the other hand, countries without sector wide quality control systems quality standards are enforced by governmental institutions. For example in Kenya, the department of veterinary service through established laws such as meat control Act, Cap 356 of the laws of Kenya provides food safety and quality legislation (GoK, 2009). Moreover, sectors such as dairy and tea in Kenya have modern quality systems through cooperative governance forms and retail food industry programs ((Ruben et al. 2007). However, Vellema and Boselie (2003) argues that due to increased certification costs incurred by producers and high cost of monitoring by buyers small scale producers and firms, their participating in value chains demanding high quality certified products has been limited.

Wever and Wognum (2008) points out that in the Dutch pork sub sector grading of pork by slaughter houses is used in providing a transparent basis for payments of pig farmers. They use SEUROP, a classification system based on degree of carcass conformation (meat proportion)

According to Trienekens and Zuurbier (2008), establishing a systematic approach to indentifying evaluating and controlling steps (HACCP) in a food chain ensures that the pork produced is within acceptable safety margin that address physical, chemical and biological Hazards. HACCP principles are the basis of most food quality and assurance systems and they aim at preventing hazards rather than depend on intensive testing of end products. In a pork chain it is designed to be applied in the entire chain starting from input supplying to consumption as illustrated in *Table 2.1*.

Table 2.1 Critical control points in a pork chain

Activity	CCP
1. Inputs supply Purchasing and storage	Maintain quality and storage conditions
2. Production	Cleaning procedure to maintain strict hygiene (personal , shed, equipments, & containers) Input storage conditions ( feeds, drugs)
3. Transport (farm to slaughter ) Maintaining stress free (space and comfort)	Check transport space requirement Cleaning and disinfection procedure of facility
4.Slaughtering	Cleaning and disinfection procedure of the slaughter slab and transport trucks and meat carriage boxes. Maintaining visitors records
5. Transport (slaughter house to pork centre)	Non-corossive meat carriers, & cleaning and disinfection procedures Temperature
6. Processing/portioning	Strict hygiene
7.Wholesaling/retailing:	Proper temperature for storage, packaging conditions
8. Cooking/ roasting/grilling	Temperature

## 2.6 Marketing practice involving small holder pig farmers

Many small scale pig producers are mostly found in developing countries and engage in informal sector. According to a report by World Bank (2001) this informal economy contributes to about 42% of the gross domestic product of these countries making it an important sector. KIT and IIRR (2008) describes marketing practices involving small scale farmers, livestock farmers included as very vibrant with participation of a vast number of small scale entrepreneurs. Control of exchange of resources is largely in the hands of invisible forces emanating from transactions undertaken by the numerous small scale entrepreneurs enabling consumers in urban area and cities to buy fresh products. Further, the authors point out that large corporations and government agencies have limited control over the practices.

The consequence has been marketing practices with common features whose characteristics include among others irregular supply, high variability in quality attributes, scattered and fragmented production by a large number of small scale producers, local oligopoly, high transaction costs and deficient public regulation (Lambert and Cooper, 2000). The study also argues that there is limited collective action by all actors and inadequate market information.

According to FAO (2003) there has been a considerable rise in the food processing and retail sectors leading to power concentration in actors in these sectors. In Kenya for example, the report indicates that these sectors have risen and account for about 30% of food trade and their presence has not favoured small holder farmers since they are not able to fully comply with the standards and rules enforced especially by supermarkets. The growth of a strong retail sector has given rise to development certification and auditing systems that enables the retailers to get the products of the quality they want so as to meet the consumer/customer demand.

## 2.7 Value chain sustainability

Chain sustainability is seen from the basis of people, planet and profit referred to as 3Ps. A value chain is judged by the way it operates and to what extent it meets the needs of the 3Ps. (Kleindorfer *et al*, 2005). Further, the authors expound this concept of value chain sustainability based on Brundtland (1987) sustainability definition “development that meets the needs of the present without compromising the ability of future generations.” The concept asserts that the needs of the vulnerable and worlds poor small scale farmers included should be given priority while at the same time limiting the impacts of modern technology and social organization on the environment.

There is considerable bias between men and women in the food marketing chains involving small holder sector. Women poses less skills and capital thus they tend to confine themselves in retailing functions especially of small quantities while men mostly engage in wholesaling that is more capital intensive. The women are therefore more vulnerable and less remunerated performing labour intensive marketing activities (KIT and IIRR, 2008).

Low farm gates prices offered to small scale farmers by traders either local or multinationals, poor labour situations and poor environmental circumstances constitute a chain that is seen not to be sustainable and therefore not contributing to the people, planet and profit. On the contrary, a sustainable chain according to Tedo (2005) endeavours to create equitable shareholding within the value chain, meets societal values and attempts to reduce environmental footprint. By fully integrating sustainability into the core of the entire value chains operations is one way of preserving and ensuring future profitability of the chain actors.

Table 2.2 Description of 3Ps sustainability criteria

Criteria	Sustainability criteria
People	<ul style="list-style-type: none"><li>• Social Justice / Cultural Respected</li><li>• Gender Equity / No child labour</li><li>• Farmers’ co-operation for bargaining power</li><li>• Long term relationship</li></ul>
Planet	<ul style="list-style-type: none"><li>• Environmental safety</li><li>• Low (energy) input / No pollution</li><li>• Conservation Soil, Water, Nature &amp; Wildlife</li></ul>
Profit	<ul style="list-style-type: none"><li>• Economical viable ( profitable)</li><li>• Fair Small Farmers’ share / fair wages</li><li>• Fair Trade / no trade barriers</li></ul>

Source: Adapted from (Kleindorfer *et al*, 2005).

## 2.8 Profit margins of chain actors

In participating in chain activities, actors incur costs. Some incur more costs than others do depending on the investments and risks they have to bear (KIT and IIRR, 2008). In products where no or very little value addition done, the value share of the farmer is usually more than in situations where final products have undergone processing and adding value to them. The more perishable a product is and extent of value addition done on the product, the higher the risks and transaction costs along the value chain (Ruben *et al.*, 2007). Zhang and Hu (2010) argues that although contracts can be one way of reducing transaction costs and improving management of flow of goods and services along the value chain, it does not recognize the aspects of informal relationships between the chain actors sharing norms and values. Wierenga (1997) had earlier pointed out that a set of independent actors/companies working closely together to manage value chain logistics can realise superior customer value at the lowest costs while at the same time taking into account social responsible behaviour of chain stakeholders.

The pig farmers purchase feeds forming about 70 % of total costs (Serres,1992), pays for health costs of the pigs, cleans the pig unit and carry out feeding and other husbandry activities. In addition, they invest in capital items like housing, and equipments. The farmers also invest in time as they manage their pig enterprises even though many small-scale farmers do not normally account for the time they spent in farming.

The trader has his costs too, which include hiring / own transport, labour, capital to purchase the pigs, expenditures in acquiring permits and time. When the trader is also performing retailing functions, costs such as rent, electricity bills trading fees, labour costs and storage costs are included.

According to KIT and IIRR (2008), calculating profit shares of the actors in a value chain is not straightforward since it requires different types of information that small scale farmers find difficult to record. It gives a better outlook of the benefits that each actor in the chain receives and it more preferred. Operating profit which is also referred to as gross income is simpler to calculate, however the above authors point out that it does not include fixed costs and therefore not very reliable. It is defined as the difference between revenue and variable costs and can be used to indicate the operating profit of the chain actors. On the other hand, the value share which is the percentage of final retail price earned by the actor can be used to show how the various actors share the value added to the product.

## **2.9 Improving profit margins of small scale farmers**

Small scale producers are often involved in supply chains that are more local in scope. KIT et al. (2006) describes the Kenyan small scale producers both livestock and crops as having much shorter supply chains that are characterised by less stringent quality measures which unfortunately trade on products that fetch low prices. According to Vellema and Boselie (2003) these small scale producers are edged out of high quality markets since they are constrained by high certification costs and dependency on downstream chain actors such as transporters and traders for input supplies, credit and market access which the large producers are able to meet thereby remaining in the chain.

In order to remain and actively participate in the value chains, Lazzarini et al. (2001) suggest that small scale producers should exploit existing networks of social relationships which provides social capital to enable them to vertically integrate their activities in the value chain. According to KIT, et al.(2006), this vertical integration enables small scale producers to be involved in many activities such as marketing as a group and processing and not only production. Input supply and marketing become more efficient. In addition to vertical integration, small scale producers can engage in horizontal integration where they get involved in chain management that include product development and price negotiation in a business cooperative venture.

Peppelenbos (2005) pointed out that vertical integration of small producer in the chain does not necessarily result into added value and extra income. Vertical integration strategies need to consider the added costs in technology acquisition, securing capital for investment in value adding activities, building a specialized human resource and building organizational management capacity. Likewise horizontal integration will demand skill development in information and quality management plus innovation and chain cooperation for there to be profitable and effective involvement of small scale producers in chain management.

Increased involvement of private sector in agricultural development has steadily unleashed competitiveness among chain actors and supporters in developing countries (World Bank, 2001). According to Vermeulen et al, (2008), private entrepreneurs who are described as traders, processors, retailers and financial bodies, have stepped in to offer market outlets and infrastructure to small scale farmers, additionally they are providing extension advice thereby supplementing the limited public extension service and also offer financial services and inputs to

these farmers. They have promoted a buyer driven production approach that ensures reliability and continuity of demand and supply alongside helping to improve product quality and safety.

KIT and IIRR (2008) argue that private entrepreneurs are agents for development having the potential to develop markets that are efficient resulting to farming that is gainful and with value added products that the small scale farmers would otherwise not be able to efficiently market.



## Chapter Three: Research Methodology

This chapter presents the study area, study design and data collection strategy and the way the gathered data was analysed.

The approach of this research was both quantitative and qualitative based on empirical data collected from survey and case study and secondary data obtained from study of literature, documents and from internet sites.

### 3.1 Study area

The study was carried out in Thika district which is one of the seven districts in central province of Kenya occupying 15.4% (2024sqkm) of the total area of the province (13176 sq km) with a population of 645,714 (MoP&ND,2006). Specifically the study was conducted in 5 sites i.e. Thika town where 6 interviews were held, Kabati township (1 interview with slaughter house owner) and three locations/villages where survey data was gathered (*map on survey sites figure 3.2*)

Thika town is a modern municipality with a modest growth and a population of 107,000; it is externally served by a dual carriage way to Nairobi city and a well maintained internal road network. The district is important for horticulture and coffee which are export commodities besides other industries such as textile, food processing, tannery, motor vehicle assemblies, cigarette and bakeries. These industries employ a large workforce ranging from casual labourers to highly skilled personnel that rely on food products being retailed in Thika town. It is for this reason that demand of pork has been sustained over the years.

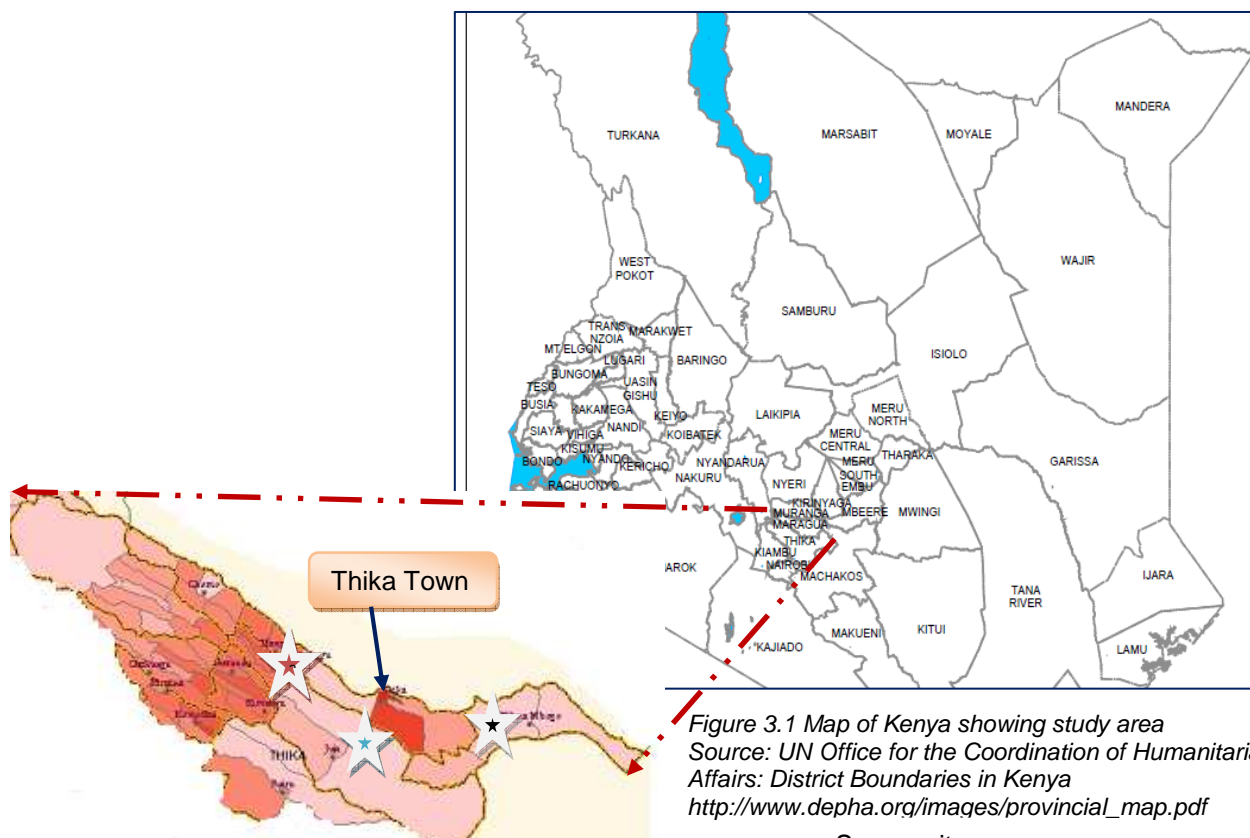





Figure 3.2 Map of Thika District

Source: Thika district strategic plan 2005-2010...pg4

#### Survey sites

-  Juja location
-  Gatanga
-  Muguga/Maguguni location



### 3.2 Study design and Strategy

In order to have a direction in carrying out this study, a research design was developed (*figure 3.2*) to guide the research process through the different steps necessary for the successful completion of the research (Verschuren and Doorewaard 2005). Three methods were used in data collection, which included; Desk study, survey and Case study.

#### Research design

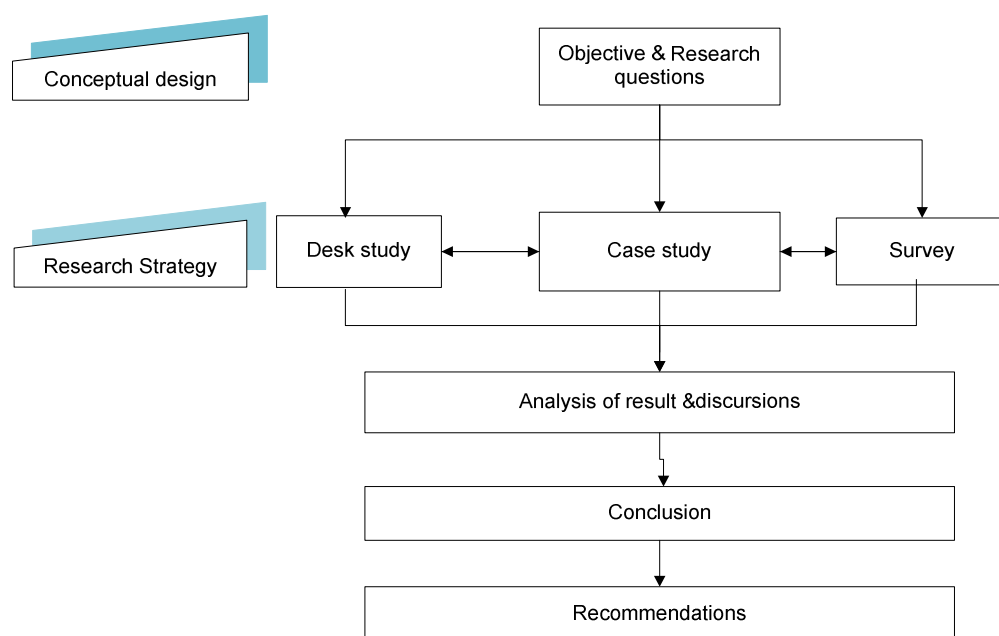


Figure 3.3 Research design, adopted from Verschuren and Doorewaard (2005) ...pg 17

#### 3.2.1 Desk study

This method was used to generate data from existing literature necessary to lay down the foundation information of this research before setting off for field study. Source of information from desk study was from text books, PhD thesis, scientific Journals and publications. Documents from National and District livestock offices and internet were also be used.

#### 3.2.2 Survey

This method was used in data collection through a structured questionnaire designed for pig farmers so as to generate a wider scope of information. One subject matter specialist (SMS), the district animal production officer (DAPO) from the district livestock office assisted in the data collection. This particular officer was selected because he was the one in charge of pig production section at the district level. The officer was briefed on the study scope by the researcher and the details of the survey questionnaire.

In order to locate pig farmers to interview the DAPO linked the researcher with the owner Thika pork centre (TPC) who knew the locations of many pig farmers in the district. Together they identified survey sites as Juja, Muguga/ Maguguni and Gatanga locations based on the concentration of pig farmers who supplied pigs to TPC. From the list of pig farmers provided by TPC 7 farmers from each location were selected using fishbowl simple random sampling technique and interviewed. Out of the 21 selected farmers from the 3 locations 18 were interviewed with 3 being pre testing questionnaires and the remaining 3 farmers were not available to be interviewed.

Also in each of the locations 10 names of pig farmers who did not supply pigs to TPC were provided by the already interviewed pig farmers supplying to TPC. Similarly using fishbowl simple random sampling technique 5 farmers were selected and interviewed. randomly visited and

interviewed. Two clusters were formed each comprising of 15 from the TPC chain and the other cluster for farmers practising spot selling. The sites were within 30 Km from Thika town.

The questionnaire was administered on one on one to each of the respondents from the two clusters. The questionnaire focused on the systems of pig production practised; present market outlets and constraints, farmers' perception on the current marketing system and what support they get from other chain actors including chain supporters. Other variables included no of sows, pigs sold/ year, variable cost and selling price (*Survey questionnaire annex A*).

The administration of the questionnaire was done by the researcher and the DAPO from the district livestock office. Prior undertaking questionnaire administration the researcher held two meetings with SMS to explain how the questionnaires would be administered and carried out pretesting on 3 questionnaires. The survey questions were written in English however they were administered in Swahili which is widely spoken in the district.

### **3.2.3 Case study**

The third method used in this study was case study involving seven interviews with 7 stakeholders actively participating in the Thika pork centre value chain conducted with the help of a semi-structured questionnaire. The interviews were conducted on the strategic sample as described below in face to face process using a check list (*check lists annex B*). These stakeholders played key roles in the various functions in TPC chain (*figure 4.1*) and by interviewing them, a clear picture of the organization of the TPC chain was achieved.

A combination of individual interview, observations and content analysis was done to achieve in depth information from several sources, a research technique described by Verschuren and Doorewaard (2005) as triangulation of sources.

#### **Interview with pork traders/ processors**

Thika pork centre was selected by purposive sampling technique. Being a key pork trader in the district and pioneer of pork roasting, he was in possession of in-depth information on situation of pork business in the district such as consumption patterns, transaction costs and main constraints in the sub sector. The interview also provided in depth insights on success and limiting factors of TPC. The interview involved the researcher and the manager of TPC.

The other trader interviewed was a broker who was buying pigs from farmers and selling to mostly the local butchers dealing with 1-2 pigs per day. This trader ran a small pork butcher in Juja town. This interview provided information on pork trading in the informal chain in the study area which was important so as to draw a comparison between the more organized TPC channel and the spot selling channel that he was involved in..

#### **Interview with transporters**

Two key transporters were interviewed to give insights on pig transportation critical control points as well as constraints. The interview centred on transportation of live pigs from the farms to the slaughter house and of the carcasses from the slaughter house to the butcheries. The first transporter who owned a 1 ton pickup truck was strategically selected with guidance of Thika pork centre. The other transporter interviewed was transporting meat on motorcycle targeting butcher who were close to the slaughter facilities slaughtering 1-2 pigs per day.

#### **Interview with pig slaughter house**

This interview involved the manager of Kenol- kabati slaughter house who was asked questions related to hygiene and quality control as well as volumes of pigs slaughtered at a given time.

Equally important were issues on environmental sustainability relating to disposal of effluents from the slaughter unit.

### Interview with experts providing production services

Two key production experts were interviewed, the district livestock officer and the veterinary officer. The Livestock production officer was interviewed to give expert insight on production systems, market constraints, potential for chain development involving small-scale farmers and improvement of producer's value shares in the chain. The Veterinary officer on the other hand was interviewed on the quality control systems in place, food safety and meat quality.

Table 3.1 List of stakeholders interviewed

Chain player	Persons Interviewed	Number of interviews
Pork traders	Mrs Stella Wanjiru Wamuchiru -Manager Thika pork centre (purchasing pigs, transporting, portioning and retailing/wholesaling)  Mr. Peter Kamau. -Trader / broker (purchasing pigs and selling meat to butchers/processors)	2
Transporters	Mr Stephen Njugna ( Using 1 ton pick-up transporting live pigs and meat)  Mr Patrick Murigi ( Using a motor cycle, transporting meat from slaughter house to butcherries in Thika town)	2
Slaughter house	Mr Harrison Wakinga Kamau (Owner -Kabati pig slaughter house)	1
Livestock Extension service provider	Mr Julius Mwaniki ( Deputy DLPO Thika district)	1
Livestock disease control service provider	Dr Kaguchia Wainaina (Deputy DVO Thika district)	1

### 3.3 Data processing and Analysis

Data gathered through survey and clustered according to the two groups of pig farmers was coded and analysed using statistical package for social sciences (SPSS 17.0 for windows). To compare their different responses such as age, herd size, land size, level of education and distance to Thika town the data was analysed by using descriptive statistics. Cross tabulation and chi square were used to compare the perception the role value chain play in promoting small-scale pig farmers in the district by the two clusters. It was also used to compare between the source of information and level of education and constraints by the two clusters.

The significance in the samples to a normally distributed set was tested at 95% confidence using chi square to tell whether the sample is or is not significantly different from a normal distribution. Presentation of survey findings was by using pie charts and bar graphs.

Findings from case study were analysed using chain maps, stakeholder analysis matrix; other tools used included marketing mix (5 Ps) and porter's five forces. Data of costs incurred and

revenues received was supplied by the respondents and additional secondary data from the District livestock office was used to compute simplified gross margin % and profit shares and profitability among the various chain actors and across the chains.

Table 3.2 Summary of Data gathered and Sources

Research Sub – question	Data/ Parameters	Source
1.1	Pig production systems	Thika district Livestock production office, Literature
1.2	Marketing practices and outlets	Thika district Livestock production office Interview with the two processor/trader Literature
1.3	Current pork value chain and actors relationships	Interview with DLPO and Traders Survey questionnaire Literature
1.4	Pork quality control measures being applied by actors in the chain	Interview with DVO , interview with transporter, slaughter house manager Literature
1.5	Constraints faced by small holder pig farmers and pork traders	Interview with processor/trader, DLPO and DVO Survey questionnaires
2.1	Thika pork centre success facilitating and limiting factors	interview with Pork centre
2.2	Simplified gross margin% and profit margins of chain actors	Literature, survey, interview with trader and DLPO
2.3	Improving profit share of small holder pig farmers	Interview with processor/trader/ DLPO Literature

## Chapter four: Thika Pork Sub Sector

This chapter is presented in two sections; the first section presents results of case study involving interview of key stakeholders in the sub sector and actors in Thika pork centre value chain. The second section present field survey results from respondents in the 3 survey locations. The results are presented based on the two formed clusters i.e. TPC chain and informal chain pig farmers, specifically highlighting differences from their response.

The findings related to the research sub questions in 1.7.1 and 1.7.2 and results are based on data collected and observations made. Findings from case study are presented with chains maps, stakeholders' analysis and various tables while findings from the survey are presented using pie charts and bar graphs. SGM% and Profit calculations are presented in tables pie charts.

### 4.1 Case study: Thika pork centre value chain

Findings on status of the pork sub sector in which TPC operates in, brief history of the centre, success and limiting factors that have had impact on effectiveness and sustainability of the TPC value chain are concisely presented. In addition, profit shares of the producers, transporters, broker, slaughter house and pork butchers have been calculated and presented. Finally findings on how private sector entrepreneurs can engage in development of value chains involving small scale pig farmers are presented through analysing the role played by TPC in developing the Thika pork centre value chain.

#### 4.1.1 Pork sub sector situation in Thika district.

##### Production

A review of the annual reports of the Ministry of Livestock development in particular, MoLD (2008) reveals that there are about 2080 pig farmers in Thika district raising an estimated 25,000 pigs. An in depth interview with the deputy District livestock production officer showed that most of the farmers fall in the category of small scale producers raising an estimated 85% of the total 25,000 pigs in the district. The production systems are summarized in the *table 4.1*

Table 4.1 Summary of pig production systems in Thika district

System	Characteristics	Estimated Prevalence
Free range	<ul style="list-style-type: none"><li>1-2 free ranging sows with small litters of less than 8 piglets often weaning 3-5 piglets.</li><li>Found in the informal settlement of Kiandutu, Kiganjo and Witeithie on the out skirts of Thika town.</li></ul>	2 % of the total pigs ( 750 pigs)
Semi intensive	System ranging from improved backyard to small scale semi intensive Raising 1-5 sows with confinement of the pigs Feeding of concentrates complemented with kitchen wastes and farm by products to cut down the cost of feeding.	Form the bulk of the pigs and farms in the district. Estimated at about 85% (21,000 pigs)
Intensive	<ul style="list-style-type: none"><li>Small scale 1-5 sows to Medium scale producers on a &lt;5- 20 sow level farms</li><li>Complete confinement of pigs with high management. Each category kept in separate pens and feed according to pig category requirements.</li><li>Predominant use of commercial concentrates, kitchen and hotel waste feeding not practised</li><li>Some degree of production specialization either as weaner or fatterer production</li></ul>	Few farms estimated to be raising about 12% of the total pigs ( 3000 pigs)

The case study also revealed that the main pig slaughter facility, the Kenol-kabati abattoir was slaughtering an average of 20 pigs a day which translate to between 1000 to 1250 kgs of pork that was being consumed within the district. It is located 10 Km west of Thika town.

### Quality control system

The case study revealed through interview with the DVO that there is a quality control system in place under the oversight of the veterinary office in the district. Further *table 4.2* below summarises the levels and activities that monitored and regulated.

Table 4.2 Quality control measures

Level	Control measure	Observation
Farm	Licensing of all pig farms Provision of animal health service by qualified personnel Both public and private	Hardly done Coordination is by DVO
Transport	Live pigs- a no objection letter is issued by veterinary officer in destination district to allow issuing of a movement permit from district of origin. Meat – anti mortem and post-mortem (roller marks) inspection is done by public veterinary officer at the slaughter facility. Issuing of certificate of transport (C.o.T) to ensure that all pork consumed is from a licensed slaughter facility. Meat carriage boxes/ trucks inspected every year	Movement permit charged KSh 50  Kenol- Kabati slaughter house has a resident government meat inspector.
Slaughter house	Running water and efficient waste disposal Workers must possess valid health certificate from the public health department. Pig holding pens for anti mortem inspection Slaughtering process- removal of skin and fat from the carcass to increase lean meat % ( increase quality of pork)	Removal of skin and underneath fat is an innovation of TPC and the slaughter house
Butchery	Workers must possess valid health certificate from the public health department A certified meat safe house where meat is hang to allow free flow of air, Cold storage ( a deep freezer) Standard and correct type of kitchen equipment. Routine inspection on cleanliness by Public health officers.	Done in collaboration with Public health office.

Home slaughter for purpose of selling to consumers has decreased to near zero as revealed by an interview with the deputy DVO.

#### 4.1.2 History of Thika Pork Centre

TPC has been in operation since 1997. Prior to this the owner was only involved in production keeping pigs on medium scale semi intensive system delivering 60-100 fatteners per month to Farmers choice ltd, a leading pork processor in the country. The election violence that preceded the 1997 election led to a near collapse of the tourist sector which is a major consumer of pork products from Farmers choice ltd. This processor drastically reduced their intake, a move that

frustrated most pig farmers forcing some to abandon production. The farmer come trader remembers having to continue feeding a herd of 84 pigs for close to 10 months after the processor failed to collect the fatteners in late 1997 making huge losses.

The interview further revealed that frustration of this farmer and indeed majority of other small scale and medium scale pig farmers turned out to be an opportunity that led to the birth of TPC in early 1998. According to deputy district livestock officer, pork consumption by local people was not popular and that there were only 2 small pork butcheries in Thika town selling 1-2 pigs in a day. The entry of TPC as the third pork butchery in Thika town marked the beginning of increased pork preference, initially the supply was from own farm and slaughtering was on farm. Starting with selling 2-3 pigs (120 kg – 150kg) in the year 2000 the centre grew to its highest volume of 8 pigs (550 Kg) per day in 2005 and currently selling an average of 6 pigs (400kg) per day.

The interview revealed also that the centre specialized in pork trade because the owner being a pig farmer was assured of market and also the increase in consumption of pork by local people contributed to sustainability of profits. The trader pointed out that although supply from small scale pig farmers was irregular in terms of volumes and quality, their payment demands are flexible, moreover being a small scale pig farmer there is a feeling of belonging that makes him feel obliged to continue buying pigs from them. 150 pig farmers are currently supplying pigs to the centre.

#### **4.1.3 Actors in the pork value chain in Thika district**

The actors in the pork chain in Thika district were identified as input suppliers, pig farmers majorly small scale practising semi intensive system of production, traders in pigs and pork and consumers. Using the definition of chain actors by KIT and IIRR (2008) as those actors who are directly commercially involved in the chain and own the products, the actors are described here below.

##### **Input suppliers**

Pig feed availability is high in Thika district, indeed MoLD (2008) indicate that there are 15 feed millers in Thika town producing livestock feeds. Ten millers out of the fifteen were producing pig feeds alongside other livestock feeds. Sow and weaner meal and pig finisher meal were most prevalent and available from the millers and feed vendors in Thika town and others distribution centres in small urban centres throughout the district.

Apart from the above concentrates, feed ingredients such as palm kernel cake, wheat middlings, maize bran and germ, rice bran, sunflower meals, soya bean meal, breweries dried grain, bread crumbs were readily available. In addition, some animal by-products available are fish meal, bone meal and unsellable fermented milk from Brookside dairy a leading milk processing plant in the district.

Kitchen remains from hotels in Thika town and from institutions such Mt Kenya University and Jomo Kenyatta University both located in the district offer an alternative source of cheap pig feed but its quality is very low. Similarly, open air retail food markets provide pig feed resource from the unsellable products. These types of feed resource are popular with free range and semi intensive pig systems keepers who use it to cut down feed cost.

Although there was no pig breeding company in the district, farmers accessed breeding boars and in pig gilts from farmers choice ltd farm which is only 30 km from Thika town. Farmers raised their own foundation stock through selection and also sold to other farmers.

Veterinary drugs are available from the various agrovet shops throughout the district but vaccines especially foot and Mouth disease (FMD) vaccine is only available in Nairobi being produced locally by the Kenya veterinary vaccine Production institute (KEVEVAPI).



Cleaning equipment like shovels, brooms, wheelbarrows are fabricated locally by artisans. Intensive and semi intensive system have feeding and watering troughs constructed alongside the pig unit using cut stones. In backyard and free range system feeders and watering equipments are improvised from drums cut into halves.

## Producers

There are estimated 2080 pig farmers in Thika district as indicated in section 4.1 above. The interview with the deputy District livestock production officer Mr. Julius Mwaniki showed these farmers have remained almost constant over the last decade raising an estimated 25,000 pigs. The pig population had increased only slightly from 23,400 in 2005 to estimated 25,000 in 2008 (MoLD, 2008).

The current high demand of pigs for slaughter within the district has outstripped the local supply. This was evident from the many pig traders traversing the district in search of pigs for slaughter. In fact the situation witnessed was such that the traders were enticing pig farmers to sell even their breeding sows and boars by offering increased prices and prompt cash payment thereby undermining efforts to increase herd sizes.

Three production systems were identified namely improved backyard and small scale intensive system forming 85%, medium and large scale intensive system (12%) and a mere 3 % constituted by free range system. Raising pigs in free range system is not permitted according to animal disease act cap 345 of the Laws of Kenya and they are regarded as stray or roaming pigs as pointed out by the deputy DVO during interview. Occasionally, the DVO organizes raids on these free ranging pigs and baits them then destroy them.

Pig producers in the district are not specialized in either weaner production or fatterer farms. They are largely mixed system starting from reproduction to produce weaners and later fatten them on the same farm. Pig farmers interviewed in the survey in both clusters showed that all reared piglets and did fattening.

- i. **Free range system-** Estimated 1250 pigs reared in this system although it is prohibited due to food healthy issues and damaging of crops by the roaming pigs. They are kept mainly in informal settlements and roam the villages feeding from garbage dump sites. No proper housing apart from night enclosures made up of wooden plunks and sticks. Main feeds include kitchen waste collected from hotels at zero cost. Since there is no use of concentrate feeds, the survey found out that the cost of feed in this system was as low as 30% of the cost in production systems relying entirely on concentrate feeds. However, growth rate is low with pigs reaching 100-120kg live weight in 10-12 months leading to pork with lots of fat and therefore many pork butchers in Thika town reject these pigs. The market for these pigs remains the village small pork butchers and home slaughter.



Figure 4.1 pigs in an enclosure

- ii. **Small scale intensive and improved backyard system-** Pigs from these systems were being fed on concentrates but also the farmers made on farm rations from ingredients purchased from livestock feed vendors. They also supplemented these with kitchen remains from hotels and from institutions within the district to reduce feed costs by almost 30%. Close 21,000 pigs were being raised under these systems. Within 8-10 months the fatteners reach 80-100 kg live weight which is the preferred slaughter weight.



Photo 4.2 Improved housing in backyard system



These pigs were mainly sold to main pork butcheries in Thika town with Thika pork centre having a market share of 40% (200-250 pigs per month) of pigs purchased. These farmers also sold culled sows and boars; some even sold productive sows to meet urgent need of ask particularly school fees and medical expenses.

- iii. **Medium and large intensive scale system**-In this system the pigs are confined in well constructed pig units and the size of the farm having more than 10 sows and at least 1 boar. Farrowing is planned and weaning done in less than 2 months. Feeds are purchased from feed vendors or delivered to the farm by feed company distributors' agents and is hygiene observed. Fatteners are sold at the age of 6-7 months weighing 80-115 kg live weight. These farmers preferred to sell their finished pigs to established processors like farmers choice ltd in Nairobi but also to large pork butcheries like Thika pork centre.



*Photo 4.3 Housing in medium scale intensive system*

Disease incidences were low as revealed by interviewed farmers in the survey exercise noting that they did not experience disease challenges. Out the survey sample only 16% cited diseases as a challenge. The Deputy DVO also indicated that incidences of diseases of pigs were low and that there had been only 1 case of FMD reported in Feb. 2010 and a quarantine that lasted for 3 months was put in place. However, both farmers and the Deputy DVO reported that cases of worm infestation and mites were common but farmers had the means and ways of controlling them.

### Live pig traders

Two buyers of pigs were identified from the survey and case study. First were brokers who as the interview with one broker pointed out that they either purchased pigs slaughter them and sell meat to pork butcheries or just acted as middlemen linking traders with the farmers and paid a commission. When buying to slaughter and sell the meat, brokers paid farmers on live weight basis greatly underpaying them. For example TPC was paying a commission of KSh 10 per kg of CDW for every pig purchased through a broker. Pig farmers selling 1-3 pigs preferred selling to brokers.

Three main pork butcheries in Thika town are the other identified traders. These traders purchased the bulk of pigs from farmers in the district as shown by the abattoir reports. Using own and hired transport they transported the pigs to Kenol- kabati abattoir to sleep overnight in readiness for slaughter the following day. These traders preferred to pay farmers based on slaughter weight which was fixed price for all categories of pigs. The price ranged between KSh.140 -170 per kg CDW and KSh. 50 for skin and fat.



*Photo 4.4 Weighing carcass*

### Pork butchers- wholesaling, retailing

The informal supply chain had only retailers who sold meat from brokers or slaughtered pigs they purchased from farmers directly. From the case study it emerged out that there are 21 pork butcheries in Thika town and its small suburbs but as mentioned earlier there are 3 main ones with TPC retailing close to 40% (400kg of pork per day) of the pork consumed in Thika. These small butcheries dealt with 1-2 pigs (100kg) per day and were retailing from KSh. 220- 2420 per kg pork. Thika pork centre was retailing as well as wholesaling at same price of KSh.240 per kg meat.



Photo 4.5 Pork cut being weighed

Pork processing in this chain is minimal as revealed by the case study; there was only portioning to produce special parts such as spare ribs, pork chops that were demanded by Roasters and homeland hotel in Nairobi and coconut grill in Thika at a premium price of KSh.260 per kg.

Offal which included head, feet, stomachs and skins were sold to women petty meat traders at KSh 400-600. These women cooked these parts at open air village markets throughout the district.



Photo 4.6 Customers being served at TPC

## Consumers

The consumer is the final chain actor in the pork chain is the consumer. TPC served 4 consumer segments as in table 4.3 The bulk of consumed pork is by middle class income earners that buy pork to carry home and the numerous town workers and travellers who come to the butchery for lunch of barbeque pork and “Ugali” a popular maize meal delicacy.

Table 4.3 Thika Pork centre Consumer segmentation

	Segmentation			
Product	Institutional consumers (Hotels (Homeland hotel, coconut grill hotel)	Home consumption Middle income earners	City workers and travellers	Open air /village market meat vendors (mostly women)
Fresh pork (KSh240)				
Roasted pork(KSH240)				
Pork chops, spare ribs(KSh260)				
heads and legs, stomachs (KSh 400-600)				
Skin, fat ( KSh 5 per kg				

The consumption pattern and purchasing power of these consumers have a strong influence on pork quality. In fact it as a result of the consumers rejecting fatty meat that Thika pork centre innovated the practice of removing the skin and underlying fat right at the slaughter house so as to only sell pork that the consumers want.

### 4.1.4 Chain Supporters and Influencers

These are chain stakeholders who are involved indirectly with pork business but offer essential services required by the chain actors. Roduner (2007) describes these services as adding value to the product through transformation, under favourable regulatory framework and a facilitating infrastructure. Using this definition, the following supporters were identified and discussed here below.

## Transporters

Transport service was identified between the various stages within the chain. All the interviewed farmers said they transport feeds by hired trucks for those buying in bulk while those buying in smaller quantities such as 1-5 bags of 70kg feed ferried them by public vehicles. There were farm deliveries from feed millers or their distributing agents.

From the case study, the interviewed transporter revealed that it was traders who contracted him to transport pigs for them from the farm to Kenol-Kabati abattoir and there

after transporting meat in specific meat carriage boxes to the butcheries in Thika town. Using his 1 ton pickup truck this transporter was doing 3-4 trips per week ferrying 12-14 pigs per trip. He was charging per trip regardless of the number of pigs being ferried.

Another interviewed transporter was using a motorcycle to carry meat to the butcheries from the abattoir. He was also carrying the meat in the specified meat carriage boxes. Although he also charged per trip, he could only ferry a maximum of 200kg per trip. The case study also revealed that some traders used own transport which they claimed was more convenient than contracting truck owners to ferry pigs for them. Thika pork centre was one such trader.



*Photo 4.7 Transporter collecting pigs*



*Photo 4.8 Motorcycle meat transporter*

## Slaughter house

According to veterinary meat hygiene regulation, all pigs should be slaughtered in a licensed slaughter facility unless they for home consumption and not for trade. The case study clearly show that all pork consumed in Thika town is from pigs slaughtered at Kenol- kabati abattoir which is a private business ventures established 13 years ago. Slaughters 20-25 pigs (50-60 kgs CDW) per day and has 4 monthly paid employees which include a slaughter house manager.

A resident meat inspector from the department of veterinary service is stationed at the facility to offer meat inspection service at a fee and general hygiene of the slaughter house and it operators. These operators are paid a fee of KSh 100 by the trader who also pays another KSh 100 to the slaughter house.



*Photo 4.9 Carcasses awaiting inspection*

This slaughter house practices a slaughtering procedure that involves removing the skin and underlying fat from the carcass to reduce the amount of fat and give the carcass an appearance of leanness which has become a consumer demand. This fat, skin, head, feet and offal are sold to meat rosters and deep fryers in open air village market and slums dominated by women.

The researcher observed that the slaughter house has an efficient effluent disposal system that drains into lagoons and finally into marshy low land owned by the proprietor. Identified CCP by the slaughter house operator were slaughter house hygiene, procedure of cleaning the trucks and meat carriage boxes, certificate of transport of meat and roller marks on the meat.



## Service providers in advisory, financial and regulation

Identified stakeholders providing advisory, financial and regulatory services are as described in table 4.4

Table 4.4 Key supporters and influencers in the pork sub sector

Supporter/influencer	Key function
Ministry of Livestock Development Livestock production services	Responsible for the creation of production and trading favorable environment through increasing the opportunities like market information, credit facilities to farmers. Provide advisory services to farmers that include appropriate husbandry practices, market information and creating linkages between actors.
Veterinary service	Provide farmers with animal health service that include disease surveillance, disease control through provision of vaccines, treating sick animals. Control spread of disease through quarantine practices and controlling movement of livestock. Regulate meat quality and safety through inspection of carcasses and meat transport carriers. Coordinate and monitor private veterinary service provision
Agricultural Finance Cooperation Bank (AFC) Thika Branch.	Providing financial and non financial services to farmers, the input suppliers and Livestock traders.
National Animal Husbandry Research institute- Niavasha	Carry out research and development of livestock production in the country.
Department of Animal Production and Technology -Jomo Kenyatta University of Agriculture and Technology (Juja Thika district)	Offer training in different specialization of animal production such as nutrition, genetic and breeding, and livestock management to students who will become future actors or supporters in livestock supply chain. Develop and disseminate pig production technical hand books to farmers and livestock service providers. Collaborate with farmers in conducting on farm research especially on appropriate small scale technologies.
Municipal public health department – Thika	Issue trade licences Inspect trading premises Issue health certificates to persons working in food and drugs sectors. Provide garbage collection service and enforce environments conservation regulations.
Kenya Police	Enforcing livestock movement regulations to check on theft of animals and also help to reduce disease spread

### 4.1.5 Chain Maps

The actors and supporters in the TPC value chain are presented in the chain map (*figure 4.1*) based on findings from the case study. Similarly, the findings revealed that pig farmers practicing spot selling belonged to an informal chain that had no formal chain relationships (*figure 4.2*)

## Thika pork centre value chain (Formal chain)

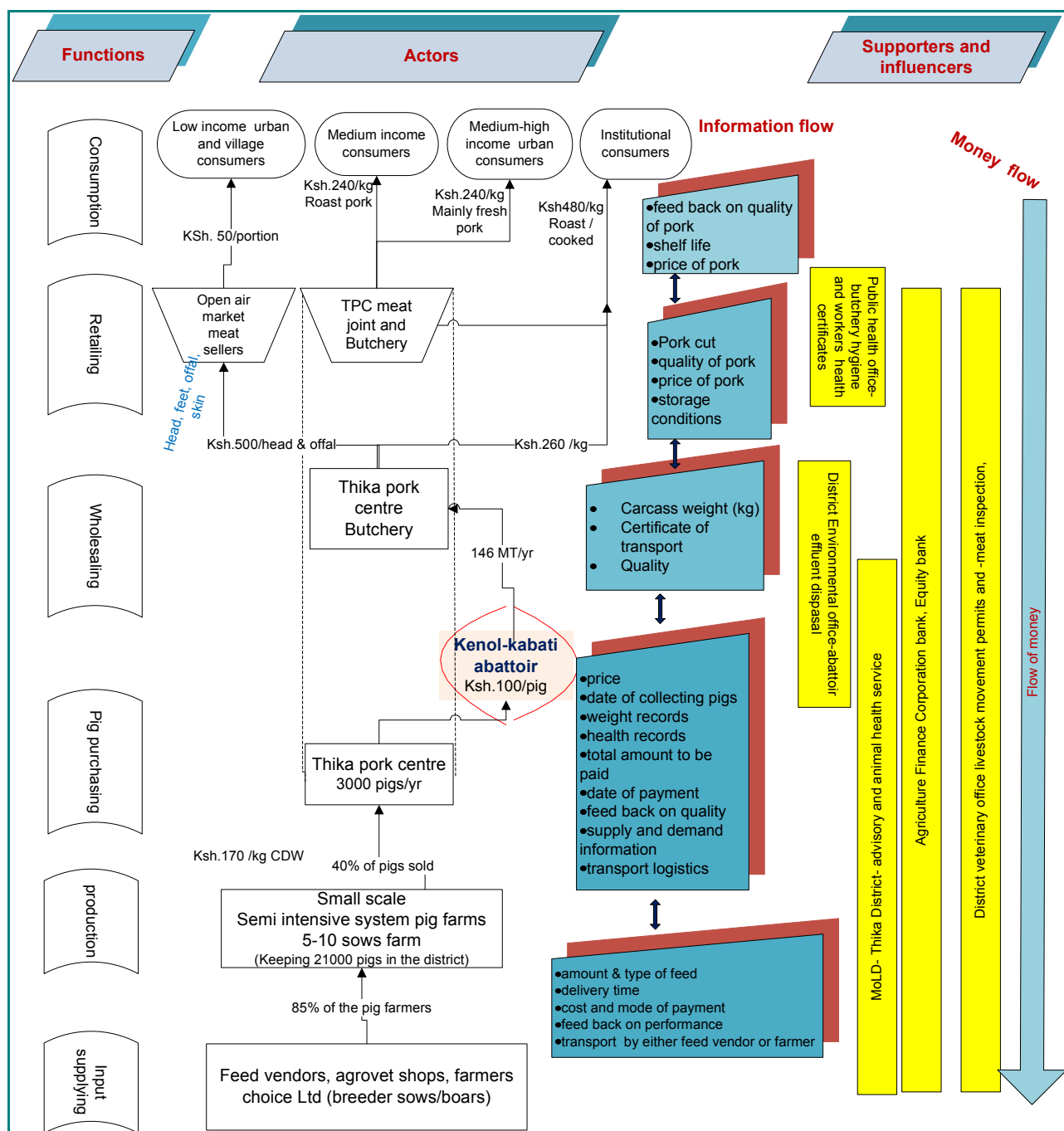


Figure 4.1 Thika pork centre chain

## Informal pork chain

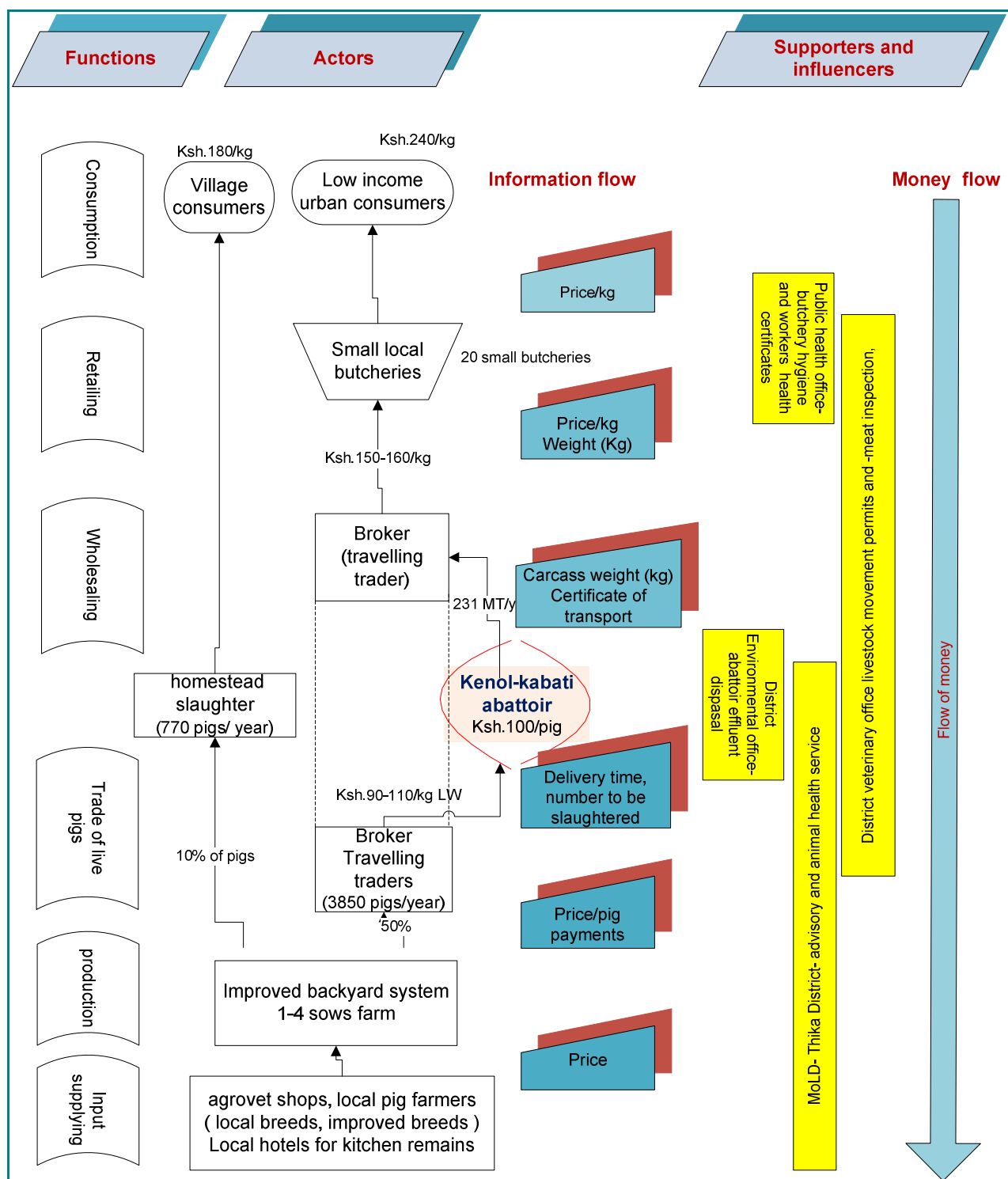


Figure 4.2 Informal chain

More information is shared in the TPC chain compared to the informal chain and there are more supporters in the TPC chain. TPC handles much bigger volume of pork (146 Mts/year) compared to 231 Mts /year for the 20 other pork traders operating in the district. This bigger economy of scale permits TPC to pay its farmers slightly higher price of KSh.170/kg compared to KSh.140-150/kg carcass weight since the transaction cost per kg purchased is lower with increased volumes.

#### 4.1.6 Success factors of Thika Pork Centre

Entrepreneurs skills- Holds a certificate in sales and marketing attained through correspondence learning and has long term experience in various trading ventures such as general retail and wholesale shop. This puts the proprietor a head of the other pork centre in the district.

Innovation- Pioneered the practice of roasting pork in Thika town in 1998 using a special locally fabricated oven that roasts the meat without using direct fire on the meat. This traditional innovation entails an oven as seen in figure photo 4.10 with a clay brick lining that absorbs the heat from fire source from wood at the bottom of the oven. According the manager, meat from this oven has better eating qualities compared to meat roasted on direct charcoal fire which is commonly used by other pork butcheries.



Photo 4.10 Pork roasting oven

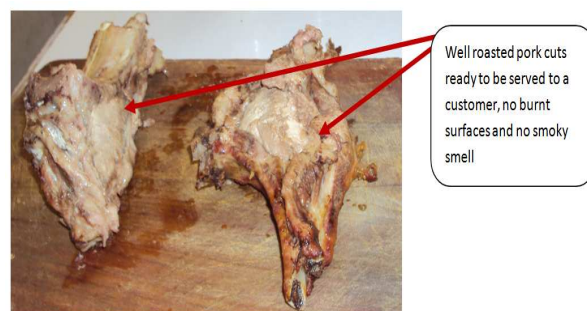


Photo 4.11 Roasted meat

The front part has door which when closed, allow the heat from the brick lining to radiate into the roasting chamber. Fresh pork was placed at the lower part of the oven and moved upward in the less warm part of the oven progressively as it got roasted to required state.

The ready meat was then transferred to a warming oven a waiting to be served to the consumers. The warmer operated using heated water on fitted pipes with a charcoal stove as the source of heat (photo 4.12 meat warming oven).



Photo 4.12 Meat warming oven

The researcher observed that the meat was devoid of soot and had no hard burnt surface. The manager claimed that consumers preferred meat roasted in this manner was because there was reduced risk of arthritis compared to eating meat roasted on direct fire, this claims however could not be substantiated in this study.

Quality pork- While other pork butcheries sell meat with skin on, TPC removes the skin and the underneath fat (*photo 4.13*). This is in response to his customers demand for meat with less fat. The fat and skin are sold separately. Since TPC collects all pigs from the farms, he rejects pigs that are not fit for slaughter so as to maintain a supply of pork of desired quality to his customers. By using his own transport, he ensures that pigs are transported as comfortable as possible to minimise chances of PSE pork that consumers highly reject.



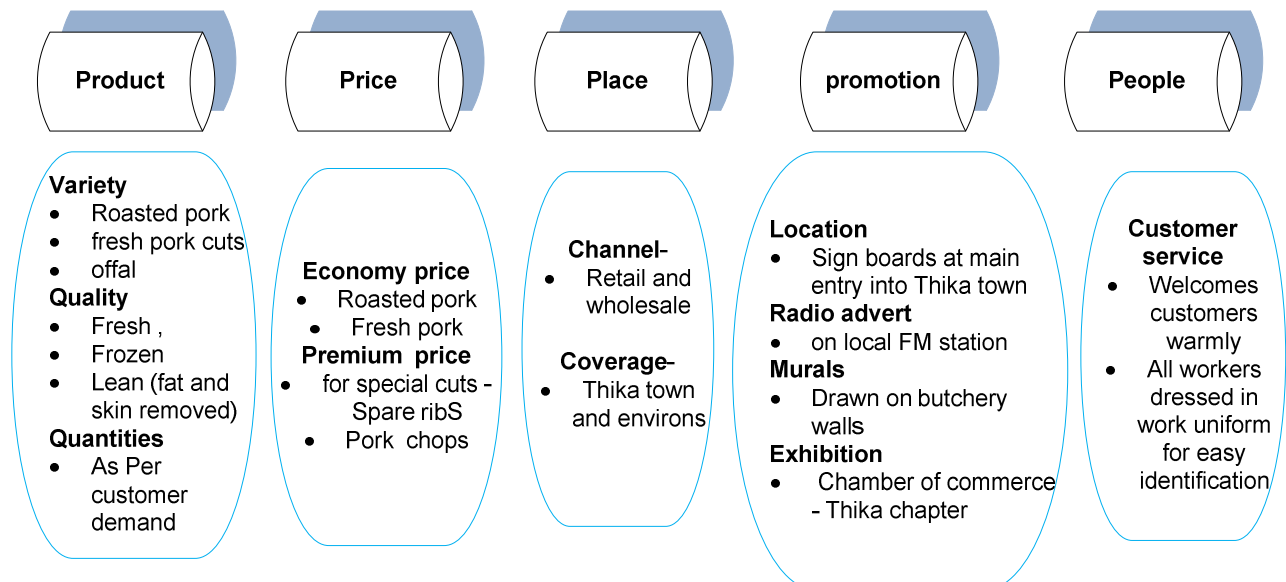
*Photo 4.13 Removing skin and fat*



*Photo 4.14 Carcass with less fat at TPC butchery*

Mode of payment- Pays cash after slaughter and weighing is done in the presence of suppliers. This has enhanced trust and transparency which has resulted into a supportive chain relationship.

Marketing strategy – This is to position its product in desirable place relative to competing products in the minds of target consumers. The mix variables as applied by TPC in the marketing strategy are the “5Ps: *product, price, place, promotion and people* seen in figure 4.3



*Figure 4.3 Market mix (5Ps) analysis*

This strategy has worked well for Thika pork centre as it is currently handling about 40% of the total pork slaughtered at Kenol- kabati slaughter as revealed by the slaughter house manger.



Business competitiveness- five forces analysis results showed that pork business in the district is attractiveness and profitable in the long run. The results as seen in figure 4.4 indicate that marketing of pork by Thika pork centre is an attractive venture and profitable in the long run. He holds a higher bargaining position compared to any of his suppliers and buyers. There is also no serious threats from substitutes of pork since the current pork demand is higher than supply as a result of consumer preference. There is however stiff rivalry among pork traders but TPC has an edge over them since he has long experience in pork trading in the district and has stable relationship with his buyers and customers.

### Porter's five forces

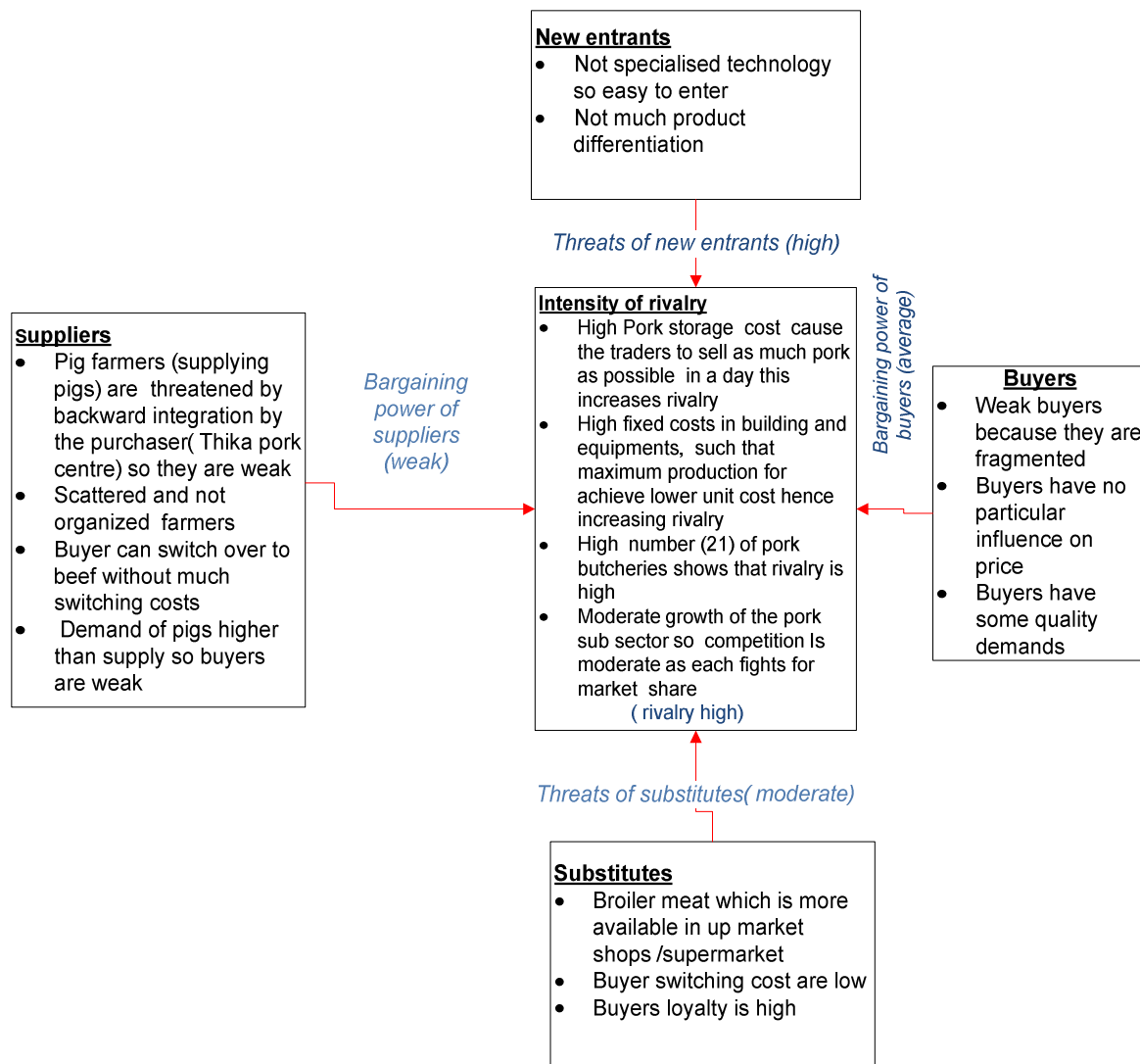


Figure 4.4 Porters five forces analysis for TPC

### Sustainability

Employ youths who have no experience in pork meat roasting and offer them training. Also provides advance payment to farmers in form of soft loans to meet cash needs such as school fees, food and medical expenses. The centre contributes to enhancing gender equality by offering employment to both men and women currently having 8 women and 8 men.

Economically, the centre has raised the income of small scale farmers by offering the best price of Ksh.170 per kg carcass weight compared to other buyers who offering as low as Ksh.145. Over the last 12 months TPC had paid KSh. 28.9 million to the 150 small scale pig farmers it buys pigs

from. In addition he offers training on proper manure disposal and use in crop fields thereby improving soil fertility and conserving environment.

Judged from Tedo (2005) perspective of chain sustainability, the two analysed chains are far from being sustainable. According this author, a sustainable chain entails equitable shareholding of the profit. Although the profit margins of the actors in the TPC are relatively equitable compared to the shares in the informal chain (*figures 4.19 and 4.21*), farmers had the least margins in both chains compared to the other actors.

#### 4.1.8 Limiting factors

Competition- There is stiff rivalry among pork traders for pigs and for pork market share. The case study identified 21 running pork butcherries in Thika town and environs.

Fluctuation of supply- Supply of pigs from small scale pig farmers is not constant as a result TPC is forced to slaughter fewer number of pigs than his demand. TPC has had to source pigs from far districts which increases transport costs. Additionally, slaughter of younger pigs like weaners to feel the short fall is on the increase.

Transport costs- The main suppliers of TPC are small scale pig farmers. These farmers are scattered all over the district and selling 1-5 pigs at a given time. This had an effect of increasing transportation cost since it involved moving to several locations / farms on poor rural roads to get required numbers of pigs.

High cost of credit – Although there are many banks and micro credit institutions in Thika, the loans they provide attract high interest rates (14%- 21%). The owner of TPC had obtained loans from two local banks but he claimed that it has been difficult to repay due to the high cost of interest. Therefore expansion programmes that require huge capital have been either delayed or abandoned altogether.

#### 4.1.9 Future Plans

The centre has plans to start small scale processing of sausage and minced pork meat and also start a feed mill so as to provide quality feeds to farmers in the chain.

### 4.2 Survey results: Difference between TPC chain and the informal chain

Survey results relate to demographic nature of the pig the farmers farm labour provision and division, marketing outlets, information shared and source and prices they received for their pigs. Other parameters are major constraints, perception on pork quality and safety support they got from other chain actors and strategy to develop effective chains and profit shares of actors. The sample of the respondents was 15 farmers from each cluster.

#### 4.2.1 Background information of interviewed pig farmers

##### Age

Farmers in the Thika pork centre chain had an average age of 49 years while the pig farmers in the informal chain involving many buyers had a mean age of 52 years.

Table 4.5 Average age of interviewed farmers

Chain	Mean	Std deviation	Mode	Std Error mean
Thika pork centre	49	2.98	50	11.55
Informal chain	52	2.40	52	9.30

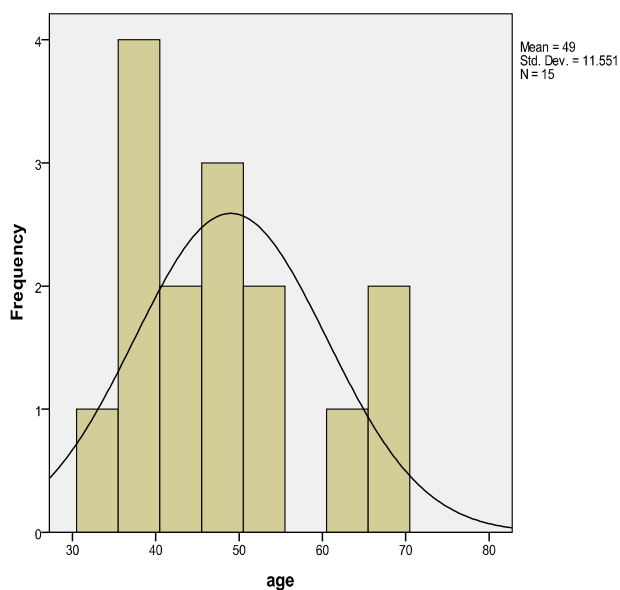


Figure 4.5 Average age of pig farmers in Thika pork centre chain

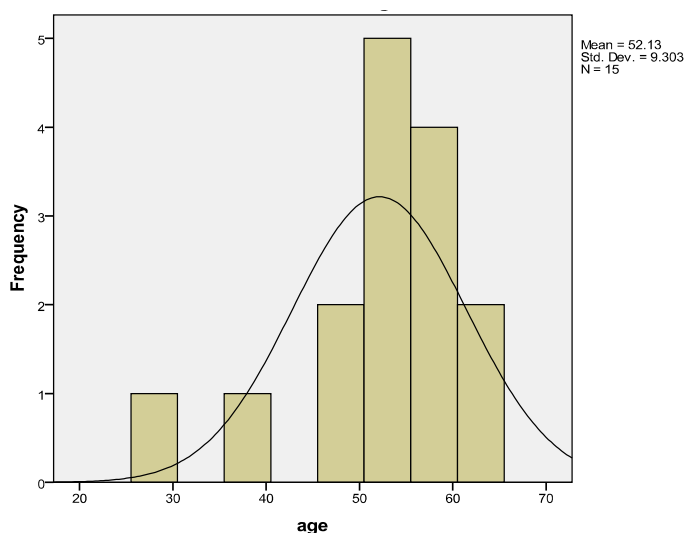


Figure 4.6 Average age of pig farmers in informal chain

### Proportion of Men and women pig farmers

In each chain (cluster), there were 9 men and 6 women interviewed

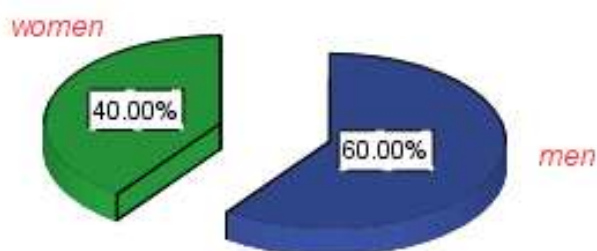


Figure 4.7 Proportion of men and women- informal and TPC chain

The results revealed that both men and women from TPC chain and the informal chain were engaged in pig rearing in an equal proportion.

### Educational background

The findings show that farmers with no formal education did not supply pigs to TPC chain (formal chain) and this chain had the highest number of farmers with education level of diploma and above (26.7%) compared to 6.7 % in the informal chain. The informal chain had farmers at all the education levels with the farmers having reached secondary level being the majority at 53.3 %.

(Table annex C)

The results show that there is no significant difference between level of education of the farmers in the two chains  $P < 0.05$  (0.339) presented in annex D(i)

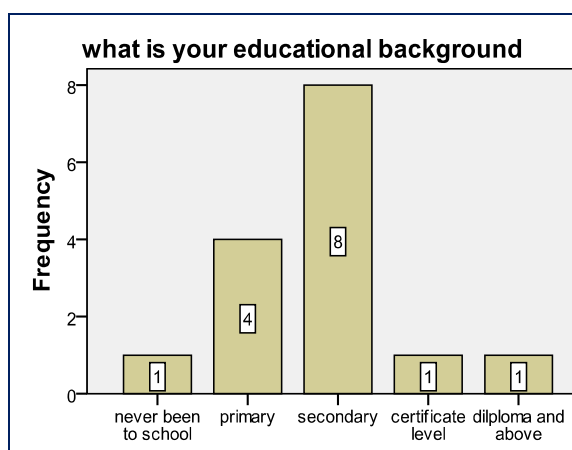


Figure 4.8 education background–informal chain farmers

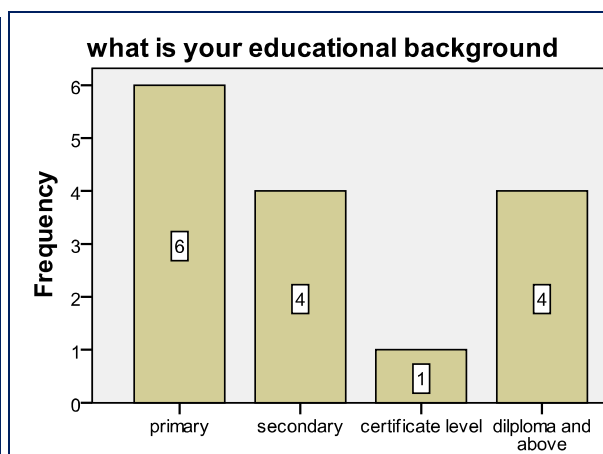


Figure 4.9 education background–TPC chain farmers

### Herd size.

The average herd size by farmers from the two chains is presented in table 4.6 here below.

Table 4.6 Average pig herd size

Cluster	Mean	Mode	Std deviation	Std error mean
Thika pork centre	22.9	12	14.2	3.7
Informal chain	14.3	4	9.3	2.4

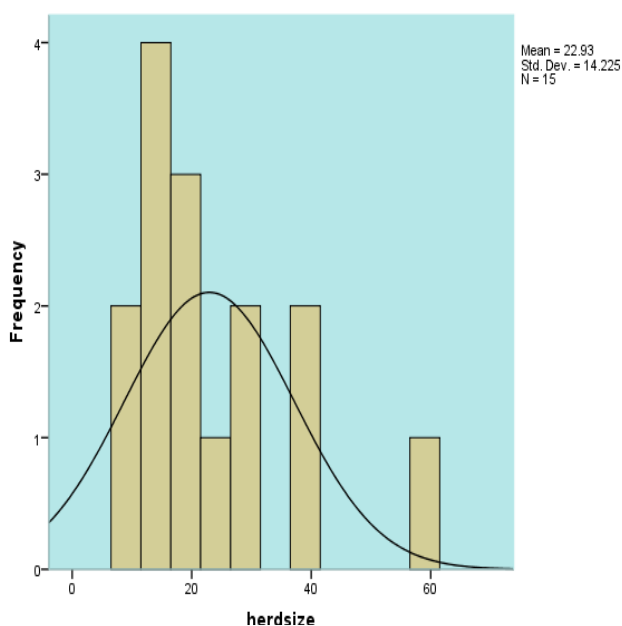


Figure 4.10 Average herd size TPC chain farmers

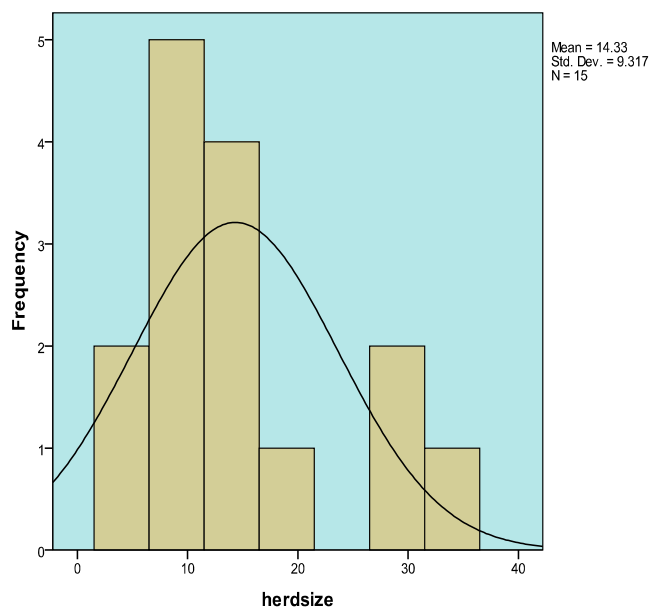


Figure 4.11 Average herd size informal chain farmers

Farmers supplying pigs to TPC raised more pigs (mean 22.9) than those delivering to the informal market (mean 14.3) moreover TPC pig farmers registered a mode of 12 compared to 4 by informal chain farmers.

## Pig keeping as main business

Interviewed farmers were asked whether they practised pig keeping as the main farm enterprise or they engaged in other farm / off farm businesses. 93.3% of the total interviewed farmers from both chains gave response that showed that pig business was not their main activity and 6.7 % said they did not engage in other businesses. The result is presented in the figure 4.12

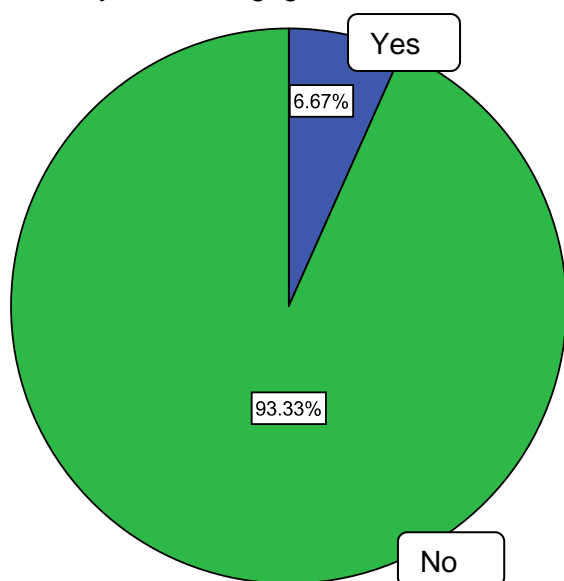


Figure 4.12 Proportion of farmers engaged in other businesses

## Farm labour

To get the insight on farm labour division and control of revenue, survey questions on use of family labour, who did purchasing of inputs, feeding/ cleaning, selling of pigs and who was involved in control of income from the sale of pigs were asked. The results are presented in table 4.7.

Table 4.7 Comparison of labour division and control of revenue

Activity	Source	Thika pork Centre Chain (%)	Informal chain (%)
Provision of farm labour	family	46	60
	hired	54	40
Purchasing inputs	Men	43	67
	Women	43	0
	Children	14	33
Cleaning and feeding	Men	14	22
	Women	28	34
	Children	58	44
Selling of pigs	Men	50	73
	Women	38	7
	Women + men	12	20
Control of revenue from sale of pigs	Men	13	33
	Women	27	7
	Women + men	60	60

The results revealed that in both chains use of family labour and hired labour was applied almost on an equal proportion (54% for TPC chain and 40% for the informal chain)

On farm labour division, the results showed that men are mostly involved activities like purchase of inputs (43% for farmers in TPC chain and 67% for informal chain) and marketing of pigs (50% for

TPC chain farmers and 73% for informal chain farmers). In both chains, children did more cleaning and feeding (58% TPC chain and 44% informal chain).

The results also revealed that in 60% of the interviewed farmers decision on how the revenue from their pig business was to be used was made by both men and women. Further the results show that there were more women (27%) making unlitary decision on how the money from sale of pigs was utilized in the TPC chain compared to 7% in the informal chain.

#### 4.2.2 Pork quality and food safety.

##### Pig farmers perception on pork quality and food safety.

To find out the awareness of farmers on pork quality and issues of food safety, they were asked what their perception was on pork quality and food safety in terms of importance. The results revealed that 66.7 % of interviewed farmers in both chains agreed that both quality and food safety were important aspects to be considered in the entire chain.

Perception on pork quality and food safety

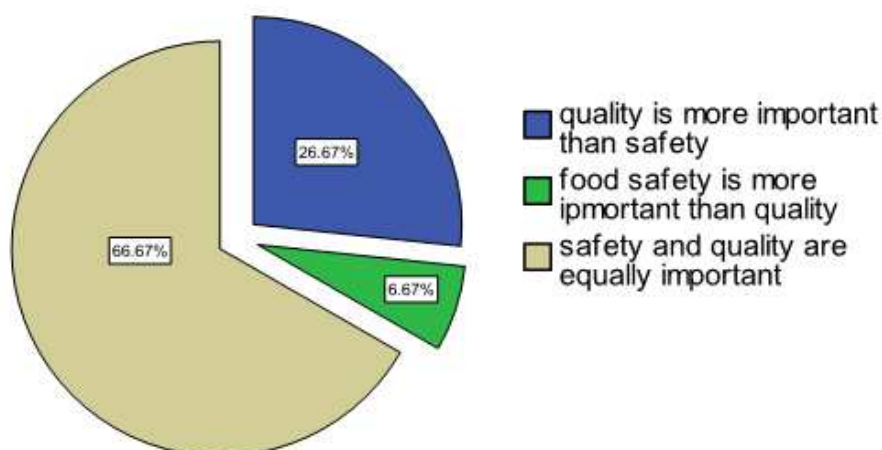


Figure 4.13 Farmers perception on quality & food safety

The survey results showed that there was no significant difference between the perception on pork quality and food safety by farmers involved in Thika pork centre value chain and those in the informal chain.  $P > .05$  (0.075), the result is presented in figure 4.13 and Annex D(ii).

##### Farm practice to enhance quality and food safety.

Asked what farm practices they carried out to enhance pork quality and food safety, the result was as in the *table 4.8*

The findings revealed three mostly practised ;proper cleaning of the pig units ( 53% TPC chain and 33% informal chain), proper storage of inputs especially feed and drugs ( 47% TPC and 33% informal chain and keeping proper records ( 33% TPC chain and 40% informal chain). Further these three practices were indentified by the farmers as the critical control points that they considered in their farms, however the researcher observed that the farmers did not practise them appropriately.

Table 4.8 Farm practices by farmers to enhance quality and food safety

Farm practice	No. of farmers practicing	
	Informal chain	TPC chain
keeping proper records of inputs , outputs and visitors into the farm	6 (40 %)	5 (33 %)
proper storage condition of inputs ( feeds, drugs)	5 (33 %)	7 (47 %)
proper cleaning procedures of pig units	6 (40 %)	8 (53 %)
proper feeding regimes	2 (13 %)	2 (13 %)
selling age ( slaughter age)	1 (7 %)	4 (27 %)
Observing withdrawal periods after using vet drugs	3 (20 %)	6 (40 %)
manure disposal	5 (33 %)	3 (20 %)
castration practice	0 (0 %)	1 (7 %)

#### 4.2.3 Access of information

The farmers were asked who provided them with information about pig business and what type of information they obtained. The results show that 80% of farmers delivering pigs to TPC access to information ranging from price, quality, demand and supply and husbandry practices compared to 26.7 % farmers in the informal chain. 53% of the farmers in informal chain obtained information on husbandry practices compared to 13.3% from TPC chain.

Table 4.9 Information obtained by farmers

Cluster	Type of information shared			
	price	Market outlets	Husbandry practices	Price, quality, demand and supply, market outlets
Thika Pork Centre	0%	6.7%	13.3%	80%
Informal chain	2%	6.7%	53.3%	26,7%

Chi- test results presented in annex D(iii) on source of information between the two chains showed significant difference;  $P < 0.05$  (0.018) with 67% farmers in the TPC chain obtaining pig business information from more than one actor in the sub sector while only 13% of farmers in the informal chain sourced information from more than one source.

#### View of farmers on existence of strong information sharing among actors

It revealed that 46% of farmers in TPC agree that there is strong information sharing among actors while 0% in the informal chain agrees. On the other hand 40% in the informal chain do not agree while only 6% in TPC chain disagree as seen in *figures 4.14 and 4.15*

Moreover results showed significant difference between the two chains on the view of farmers on existence of strong information sharing among actors;  $P < 0.05$  (0.00) presented in chi- square test annex D(iv).



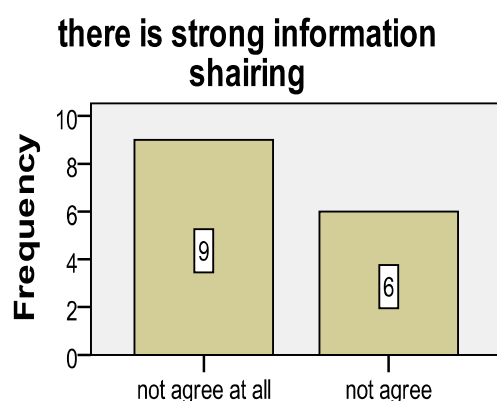


Figure 4.14 View on information sharing Informal chain

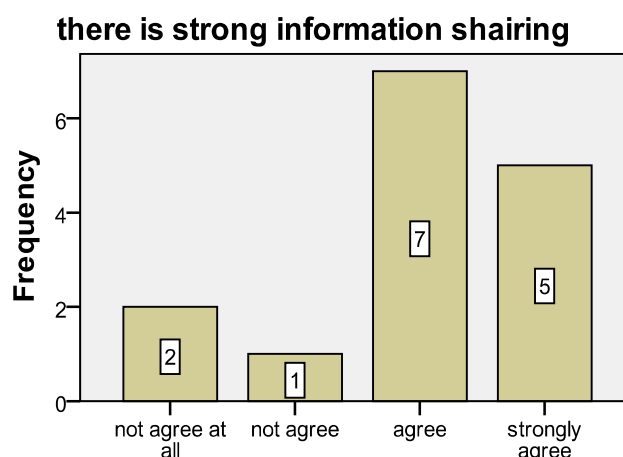


Figure 4.15 View on information sharing TPC chain

#### 4.2.4 Constraints in the Pork sub sector in Thika district

##### Major challenges as identified by pig farmers

Results from the survey question on one major constraint that they faced showed that 18 farmers (60%) out of the sample size of 30 farmers identified high prices of concentrate feeds in relation to prices of pork. Another 3 farmers identified pig diseases and insufficient pig husbandry skills while poor breeds were identified as a major constraint by 1 farmer.

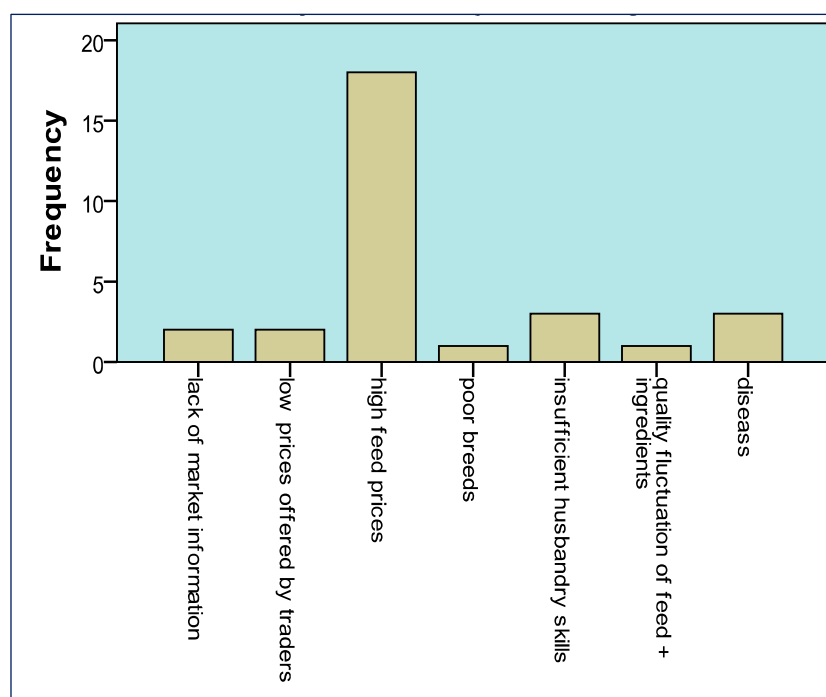
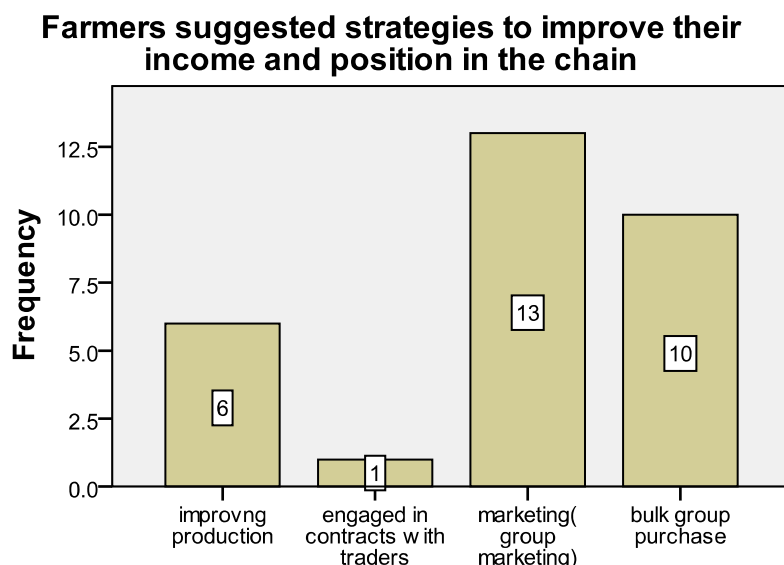


Figure 4.16 Major constraints encountered by farmers

The results above show that pig feed is a constraint to majority of the pig farmers. There was no significant difference between constraints faced by TPC farmers and those involved in the informal chain;  $P > 0.05$  (0.273) annex D(v)

#### 4.2.5 Farmer suggestion on strategies to improve their position in the chain

The farmers were asked what strategies when enhanced would improve their position in the chain and therefore income and the results presented in *figure 4.17*



*Figure 4.17 Suggested chain development strategies*

Findings show that 20% respondents see specializing in production as the best option to improve their income while 76% suggested engaging in additional chain activities such as marketing their products and buying inputs in bulk in organised groups. Engaging in contract negotiation with traders was preferred by 3% of the

The results showed no significant difference in suggested chain development strategies between producers from both chains ( $P > 0.05$ ) as in annex D(vi).

#### 4.2.6 Support that farmers received from private entrepreneurs

In order to find out what support private entrepreneurs provided to the pig farmers in the study area, farmers were asked what kind of support they received from stakeholders in the sub sector.

The survey further revealed that 33.3% of the interviewed farmers agreed that pork traders who in this study played a role of private entrepreneurs played a major role of providing market outlet. Another 10% said they benefited through soft loans from these traders. 23.3% farmers indicated that they received training on husbandry skills from government extension workers as well as private extension service providers.

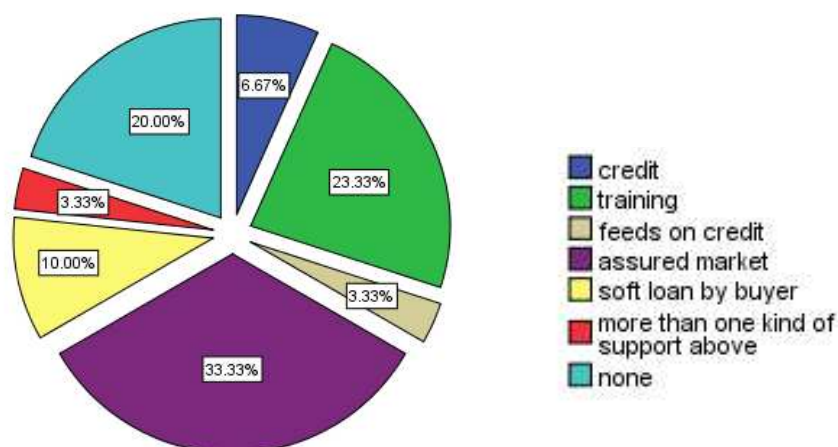


Figure 4.18 Support provided to farmers

There is no significant difference in support provided to farmers in TPC chain and those in the informal chain,  $P > 0.05$  (0.103) as seen in results of chi-square test in annex D(vii)) and presented in figure 4.18 although there is tendency to be different.

#### 4.2.7 Actor profit shares

In order to get an indication about the profits of the actors in TPC chain and the informal chain, gathered data from survey, case study and secondary data from MoLD (2008) were used to calculate simplified gross margins% (SGM) according to HPC (2007) and profitability and profit shares based on Kahan (2004). The parameters used are as described below:

- Gross output –value of what is produced by the enterprise
- Variable cost ( direct costs)-cost that directly related to the amount product
- Fixed costs (indirect costs)- cost incurred on durable asserts ( depreciation , interest, maintenance)
- Gross margin ( gross profit)- gross output minus variable costs
- Simplified gross margin (SGM) - Selling price minus variable costs
- Simplified gross margin % - SGM divided by selling price (expressed as %)
- Profit /loss- gross output – total cost (total variable costs+ total fixed costs), this can be expressed per unit of product or per whole enterprise.
- Profitability- Return to investment given by profit /cost price expressed as a percentage.

Data on direct costs and revenues was easily supplied by the respondents willingly. Fixed costs which included calculated costs were to some degree based on assumptions such as interest rates charged by Agriculture finance corporation bank and values and useful life span of the buildings, equipment and machinery. Economic principles based on Kahan (2004) were used as guideline. Summary of results is presented in table 4. 10 and 4.11 and detailed computation in annexes E and F

Table 4.10 Summary - Thika pork centre chain profit calculations

( Figures are in KSh)	Producer ( pig farmer)	Trader (Thika pork centre)	Slaughter house (Kenol- kabati)
Gross out put	670,600	38,288,500	912,500
Total variable costs	439,556	27,992,645	146,376
Gross margin	231,044	10,295,856	766,124
Total fixed costs	95,938	2,181,465	512,270
Total costs	535,494	30,174,110	658,646
Cost price	134	184	1.2
Selling price	170	240	1.6
Profit per kg pork	36	56	0.43
Total profit	135,106	8,114,391	241,354
Profitability (profit/cost price * %)	27	30	37
Simplified Gross Margin % (SGM/selling price *%)	34	27	84

Source: own field study and MoLD (2008)

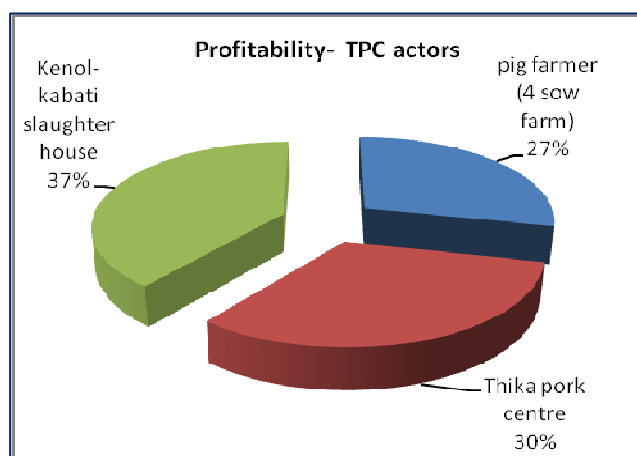


Figure 4.19 Profitability TPC chain

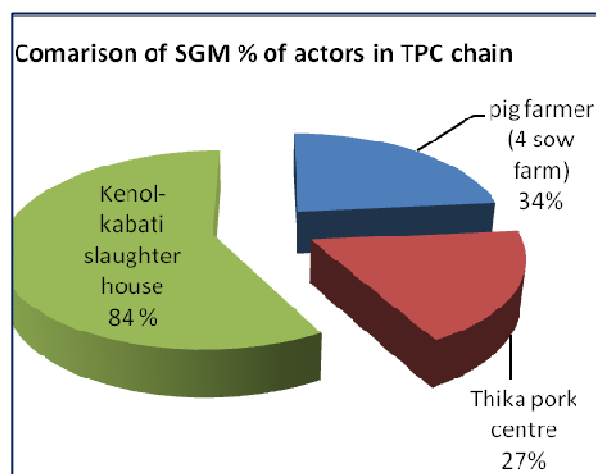


Figure 4.20 SGM% of actors in TPC chain

The result show that SGM % is highest with the slaughter house operator (84%), but low with the farmer and TPC at 34 % and 27% respectively. This is because the slaughter house operator has less variable costs ( salaries of a manager and one operator, occasional casuals and payment of monthly bills) but his fixed cost which are not included in SGM% calculations are very high. This makes him have a higher SGM% compared to the farmer and TPC who have huge variable costs in purchase of feeds ( farmer) and purchase of pigs and transport cost ( TPC).

The results of the profit calculation in this chain show that the slaughter house operator has the lowest profit share per KSh 0.43 kg of pork, then followed by the farmer with share of KSh. 36 and highest share was with TPC with KSh.56 /kg pork. This shows that actors who own the product as is the case with the farmer and TPC have high profit shares compared to supporters with chain functions like slaughter house operator who only provides a service. Profit shares for the actors in the two chains are presented in figure 4. 23. On the other hand the trader has a higher profit share than the farmer because of dealing with higher volumes of pork.

Comparing the profitability, the results show the farmer with lowest share of 27% followed by TPC with 30 % and highest with slaughter house operator at 37%. This indicates that actors in TPC chain have a moderately evenly distributed profit margin, however the most efficient actor is the slaughter house operator while the least efficient is the farmer.

Table 4.11 Summary -Informal chain actors profit calculations

	Producer (pig farmer)	Broker	informal chain pork trader	Slaughter house Kenol- kabati
Gross out put	296,500	11,424,000	10,822,250	912500
Total variable costs	183,666	9,029,195	8,768,998	146376
Gross margin	112,835	2,394,805	2,053,252	766124
Total fixed costs	72,474	86,400	476,805	512270
Total costs	256,140	9,115,595	9,245,803	658646
Cost price	116	150	204	1.2
Selling price	135	190	240	1.6
Profit per kg pork	19	40	36	0.43
Total profit	29,970	2,308,405	1,576,447	241354
Profitability (profit/cost price*%)	16	27	18	37
Simplified GM % (SGM/selling price*%)	38	21	19	84

Source: own field study and MoLD (2008)

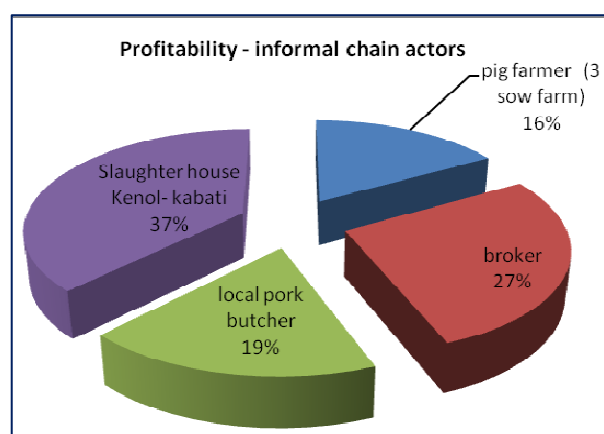


Figure 4.21 Comparison profitability informal chain

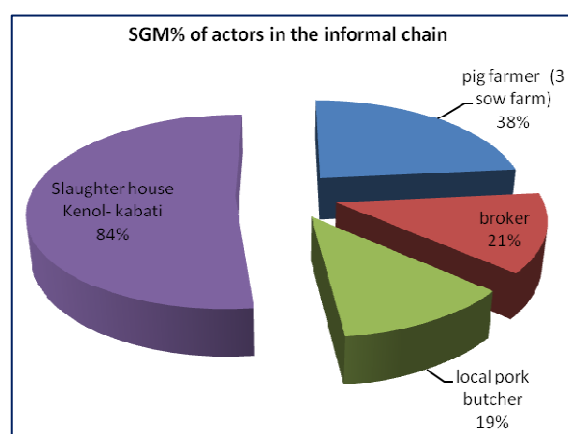


Figure 4.22 Comparison SGM% informal chain

In the informal chain, results show that SGM % is highest with the slaughter house operator (84%), and the farmer with 38 % while the broker and pork butcher hasd 21% and 19% respectively. The low variable costs of the slaughter house operator makes him have a high SGM%. The farmer has a higher SGM than the broker and local butcher, this can be because the farmer in this chain feed uses low cost feeds ( mostly kitchen remains from hotels) thus the variable cost are low compared to broker with high transport costs, As for the butcher , the fact that he buys from the brocker and not directly from farmers increases his purchase cost.

Profit share results in this informal chain show that that the slaughter house operator has the lowest profit share per KSh 0.43 kg of pork, then followed by the farmer with share of KSh. 19 and the local small scale pork butcher with a share of KSh 36. The actor with the highest profit share in this chain was the brocker of KSh.40. This can be because the brocker is the link actor in this chain between producer and the market, so by using this to his advantage his profit share it increases his profit share.

Results of profitability put the slaughter house with the highest profit margin of 37% and the pig farmer with the lowest margin of 16%. As analysed in the TPC chain, the slaughter house operator has the highest profits since he is offering a monopolised service in the district so he sets charging prices to his advantage. The broker on the other hand the high profitability of the broker can be attributed to the fact that he buys pigs from poorly informed informal chain actors and sells pork to local butcher who does not have capacity to source pigs for himself.

Analysis of the above results by comparing SGM%, profit shares and profitability of actors across the two chains revealed that actors under similar chain functions in the TPC had higher levels of these parameters than in the informal chain (Table 4.12).

Table 4.12 SGM% and Profitability and profit shares comparison across the chains.

		Actors			
Parameter	chain	Pig farmer	Broker	Pork trader	Slaughter house
SGM%	TPC	34	-	27	84
	Informal	38	21	19	84
Profitability (%)	TPC	21		23	27
	Informal	14	21	15	27
Profit shares (%)	TPC	38.5	-	61	0.50
	Informal	20	42	37.55	0.45

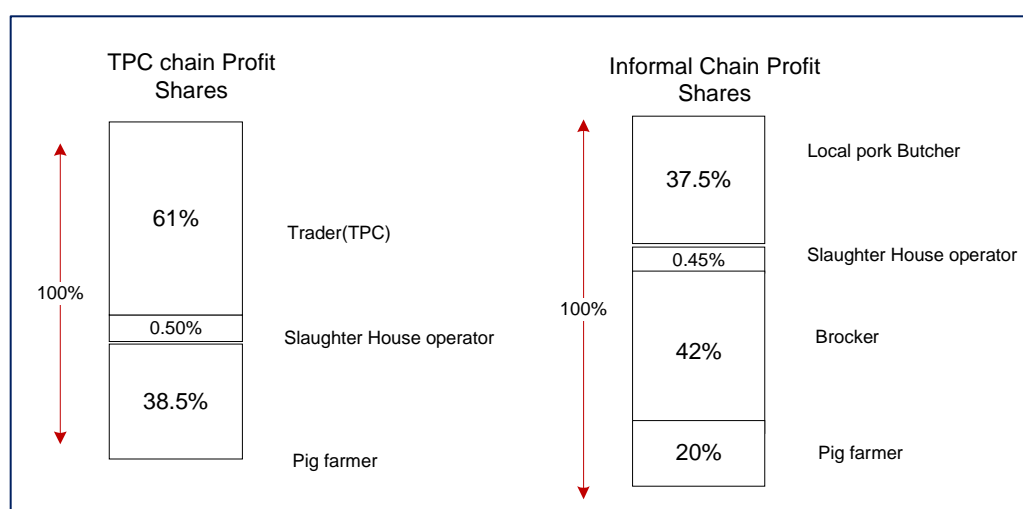


Figure 4.23 Profit shares

The total sum of profit shares of actors in the informal chain is higher than that in TPC chain, but due to the many actors involved thereby increasing transaction cost, the profit shares are lower. For example the farmer in TPC has profit share of 38.5 % while in the informal chain it is 20%.

The researcher observed that an actor with a high SGM% was not necessarily the one with a higher profit margin. For example, the pig farmer in the TPC (formal) chain had a lower SGM% compared to the farmer in the informal chain but a higher profit margin. This can be explained by the fact that not all actors have variable costs and fixed costs in the same proportions. Therefore an actor with low variable costs like the slaughter house operator has a very high SGM% (84) but moderate profit margin since fixed costs are enormous.

## Chapter Five: Thika Pork Centre and informal chain

This chapter discusses the results from the findings on the status of Thika pork sub sector and specifically highlights the differences between the two chains as revealed by the findings. The discussions are based on results and findings as reviewed in chapter on literature review.

### 5.1 Production systems

Pig farmers in Thika district are small scale keeping 1-5 sows in semi intensive production systems. These concurs with the estimate figures provided from the interview with the DLPO, in addition, Muys and Westenbrink (2004) in their book perfectly described small scale pig keepers in the tropics as having similar number of sows and smaller herd size. These farmers had low economies of scale characterised by low productivity and therefore to improve their productivity increasing herd size alongside other management practices is important.

### 5.2 Quality control system

Although all pig farms are supposed to be licensed, none according to the interview with the DVO had applied for the licence thus making it difficult for effective monitoring of farm hygiene. Movement of pigs to slaughter facilities and meat to retailing points is fully regulated by the DVO as provided for in the meat control act cap 356 of the laws of the Kenya. However due to institutional inefficiencies monitoring of this control system is weak as acknowledged by the DVO.

Kalathas (2007) while referring to the Dutch IKB integrated quality management system points out that it is a sector led and not government centred quality control and management system that can sustainably supply high quality pork that has high safety standards. The applicability of such a system in chains involving small scale farmers is doubtful, Vellema and Boselie (2003) states that increase in certification costs incurred by producers and high cost of monitoring by buyers leads to high non compliance thus it is difficult to implement.

### 5.3 Marketing practices

Marketing of pork in the district was being done by the 21 pork centre some which were really small scale selling one pig per day. TPC was the largest current pork turnover of selling 400kg per day as revealed by the owner and from the researcher observation on the amount of pork coming to the pork centre from the slaughter. These small scale butcherries were posing stiff competition for supply of pigs to extend that TPC was now sourcing pigs from far districts effectively increasing transport costs.

Pig marketing practices in the district are largely informal with limited buyer supplier relationships except when transacting financial agreement during delivery of pigs for slaughter or weaners for fattening to other farmers. Indeed as stated by World Bank (2001) report, these farmers engage in the informal sector but as revealed from the case study, TPC chain actors are steadily increasing their formal marketing engagement away from the traditional informal dealings in the chain. Furthermore a report by FAO report on Kenya's growing retail sector (FAO, 2003) states that the retailers are opening doors for small scale farmers to enter the formal marketing channels.

### 5.4 Structure of pork value chain

Activities of actors in TPC chain are strongly linked and coordinated through the trader which makes flow of physical products, information and money more efficient. This creates a transparent and successive value chain as explained by Vorst (2000). TPC was indeed the chain coordinator linking his suppliers other service providers such as input suppliers, animal health care and the market. The sharing of information between the producers and TPC was particularly contributed the TPC chain efficiency.

Kotabe et al. (2003) found out that communication and information sharing accelerates improvement in chain coordination and efficiency through reduction of transaction costs and fast relaying of necessary information leading to achieving greater operational efficiencies. Similarly, a



study by Coronado et al. (2010) concluded that information exchange between chain actors is positively related efficiency. Moreover, sustainable trading relationships are founded on well established information exchange along and within the value chain.

## **5.5 Background Information of Respondents**

### **5.5.1 Age, sex and education and herd size**

The results show that older farmers were the ones engaged in pig farming and not younger persons. It was not clear why this was so but the interviewed farmers indicated that young people preferred to off farm jobs in the urban centres compared to farming.

The results reveal that both men and women are engaged in pig rearing although the proportion of men is slightly higher (60%) than that of women (40%). Although the number of pigs kept were low (1-5 sows), the pigs were raised for commercial purpose and not subsistence. This finding contradicts KIT and IIRR (2008) argument that women in developing countries are only engaged in subsistence form of agriculture.

Comparison of the level of education of the farmers in the two chains shows that there is no significance difference ( $P>0.05$ ) therefore the two categories of farmers have the same capacity building needs.

The average number of pigs kept farmers in the two clusters shows that farmers supplying TPC have higher number pigs per farmers (22) compared with farmers in the informal chain (14). Since farmers in the TPC chain have an assured market of their pigs, the risk of rearing more pigs is less than that of the farmers supplying to the informal chain. However there is no significant difference in their herd sizes in the two clusters. Therefore strategy to increase their economies of scale is similar.

### **5.5.2 Pig farming as main business**

Most of these farmers (93%) from both chains did not rely on pig business but it was observed that they were engaged in other farm activities like dairy, crop farming and others poultry farming. The very nature of the small herds they raised called for them to practise other income generating activities since the incomes from the pig business was low so as to be able to meet their food and financial needs. Furthermore , KIT and IIRR ( 2008) states that small scale farmers in developing countries are engaged in production of small amounts of various farm produce such as fruits, milk, vegetables, cereals and tubers.

### **5.5.3 Farm labour**

The researcher observed that pig farmers applying hired labour were farmers who did not reside on their farms but lived in Thika town and other urban centres where they engaged in other businesses or in employment. There was no difference in no of farmers applying hired labour between the two chains.

On farm labour division, the results showed that men are mostly involved in less strenuous activities like purchase of inputs and marketing of pigs in both chains compared to activities carried out by women and children. However this tendency was more in the informal chain than in the TPC chain where more women and children did feeding and cleaning. This considerable bias between men and women is explained by KIT and IIRR (2008) from the point of view that women poses less skills and capital than men, indeed this factor has further increased the vulnerability of women who have continued performing labour intensive farm and marketing activities

More women in the TPC (27%) had control of revenue from pig business compared to the women in the informal chain (7%). More women were also involved in purchase of inputs and sale of pigs in TPC chain compared to the women in the informal chain therefore they had more say on the use of the revenue.

## **5.6 Quality and food safety**

### **5.6.1 Perception of pig farmers on quality and food safety**

The farmers in chains acknowledged that they are aware of food safety and quality issues; however it was not evident that they practised measures aimed at achieving required standards at farm level. The high level awareness can be attributed to the fact that close to 70% of interviewed farmers had attained primary or secondary level education which implies that they can read and understand food safety and quality requirements.

Thika district being an urban district has more consumers with great awareness of the risks of poor quality foods and the need to eat and stay healthy especially by high income and educated consumers. Furthermore it was revealed in case study that consumers readily rejected pork that was too fatty and if it showed abnormal colouration. This has therefore made the pork chain actors in the district to be conscious of food safety and quality demands. This is what is explained by Luning and Marcelis (2009) as consumers' demands on the assurance of quality and safety of food products and their production process.

### **5.6.2 Farm practice to enhance quality and food safety.**

Interwoven farmers from both chains practised a number of farm practices geared to achieving pork that is of desired quality and that meets food safety demand. Although the results show that farmers from the two chains practised cleaning of the pig units, stored their inputs especially feed and drugs in appropriate conditions and keeping proper records, there was no evidence that they practised the claimed measures.

Further investigation by the researcher revealed that there was no motivation to produce quality pork as the traders paid the farmers based on weight and there was no grading of the carcass and branding. This is in complete contrast to for example what Wever and Wognum (2008) explains on benefit of a grading system in providing a transparent basis for payments of pig farmers using the Dutch SEUROP meat sector grading system.

## **5.7 Information access**

Farmers supplying pigs to TPC obtained more kinds of information (price, quality demand, supply and demand of pigs, market outlets) compared to those in the informal chain.

Informal chain farmers had a greater access to information on 53.3% provided by livestock extension workers while the TPC chain farmers received information from traders, slaughter house manager and extension agents. This increased information exchange contributed to improvement in chain coordination and efficiency through reduction of transaction costs and fast relaying of necessary information leading to achieving greater operational efficiencies. It was no wonder that farmers in TPC were being paid a higher price for their pigs KSh 170 per kg CDW compared to farmers in the informal chain received KSh.140- 150 /kg CDW. As found out by Kotabe et al. (2003) reliable and fast information sharing among chain actors has an effect on increasing operational efficiencies. Similarly, a study by Kibue (2007) on livestock marketing in Kenya, found out that inadequate market information by producers was being exploited by the buyers to their advantage, this can be the reason behind low price offered to pig farmers in the informal chain since there is limited information sharing.

## **5.8 Major constraints faced by pig farmers**

The farmers in the two chains acknowledged that they faced many constraints in their pig business. The results positively indicate that feeds which according to Serres (1992) accounts for over 70% of the variable costs was the most constraining factor. Although concentrate pig feed and other feed ingredients were readily available in the district the producers claimed that the cost was high in comparison to the price they received for pork and the quality low. It is for this

reason that all interviewed farmers as indicated by the survey opted to supplement feeding with low cost feed ingredients and kitchen remains from hotels. This practice had undesirable effect on lowering the quality of pork but until there is a proper strategy on addressing the feed problems in the livestock sector in the country producers will continue to be faced by this challenge.

### 5.9 Strategy to improve bargaining position and income of small scale pig farmers

From the results on what farmer thought were the most rewarding chain development strategies, it shows that majority (76%) would engage in other chain activities such as participating more in marketing and purchasing inputs as a group. Contract with traders was the least suggested strategy, indeed contracts among small scale producers is not widely practiced due to the small quantities of produce from these farmers and as Vellema and Boselie (2003) explains increased quality and certification costs limits small scale producers from actively participating in formal contracts.

From the perspective of Peppelenbos (2005) and KIT et al. (2006), three aspects of chain participation by small scale farmers can be applied as illustrated in the figure 5.1

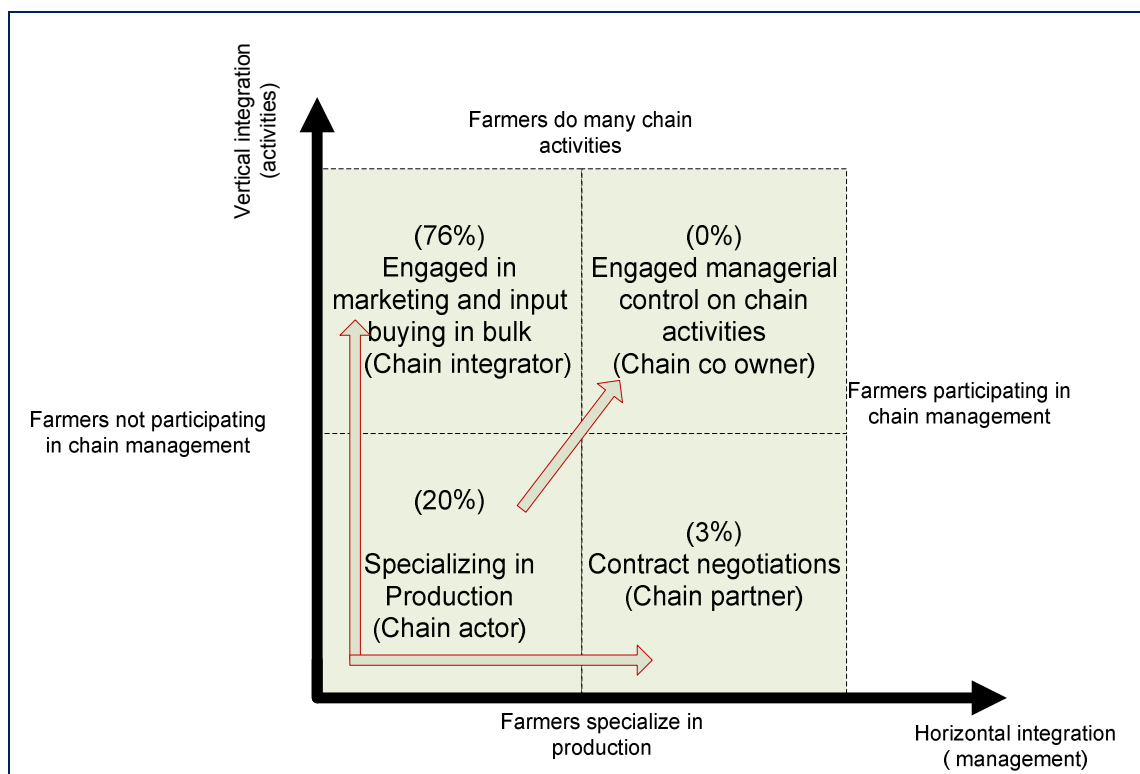


Figure 5.1 Participation by small scale farmers in chain development

It can be concluded that vertical integration is the preferred strategy by the interviewed farmers to improve incomes from their pig business as illustrated in the figure 31 above. Indeed Vellema and Boselie (2003) states that to avoid these small scale farmers being edged out of business by perpetually depending on other actors on input supply and market access they can vertically integrate their activities rather than only being involved in production. These farmers have networks of social relationships that serve as social capital which can be used to vertically integrate their activities.

Although only 3% of the interviewed farmers were in favour of chain management that include product development and price negation in a business cooperative venture as choice strategy, it an important strategy since it increase actors bargaining power and influence the way the chain is managed.

The effectiveness and success of the activity integration and engagement in chain management is highly dependent on such factors as cost of technology and availability, capital investment in value addition activities and costs in capacity building. In chain management skill development is necessary. These factors are what Peppelenbos (2005) explains as being important considerations in designing chain development strategies involving small scale farmers without which, the strategies will not be effective and profitable.

Thika pork centre as an entrepreneur has played a major role in enhancing information sharing and chain development with these interviewed small scale farmers. It was in fact easier to access information about the pork sub sector in the district from actors in the value chain compared to the limited information supplied by the livestock office. In addition TPC has popularised pork roasting in the district, all the other 21 pork butcheries are now selling roasted pork.

Findings from the case study indicated that Thika pork centre a small business entrepreneur stepped in to provide a market outlet for small scale pig farmers after farmers' choice ltd the then sole buyer of pigs in the region drastically reduced their uptake.

### **5.10 Actors profit shares**

It was easier to get data from respondents that kept good records of their enterprises but for a majority of farmers close approximation of costs and revenues were used since they lacked proper records.

In both chains the farmers are the actors with the lowest profit margins. The results revealed that these farmers kept 3-4 sows and selling between 35- 60 finished pigs in a year. These small herds from the widely scattered farmers within the study area had low economies of scale which in effect increased production cost per unit product. Furthermore, a study by Lambert and Cooper (2000) on characteristics of marketing practices among small scale farmers asserts that the scattered and fragmented production by small scale farmers has contributed to low profitability due to increased production cost per unit product.

Profitability of pig farms in the more formal TPC chain was 26% compared to 16% farmers in the informal chain. This difference is attributed to the fact that in the TPC chain there is a more direct contact between the producers and the trader (TPC) while in the informal chain inclusion of the broker served to increase the number of intermediaries in the chain thereby increasing transaction costs. On the other hand, analysis chain map information flow and the survey results on information sharing showed that actors in the TPC value chain shared more information along the entire chain compared to those in the informal chain who had one actor, the broker controlling information flow back to the producers and up steam to the local pork butchers to his advantage. The efficient communication and information sharing in TPC chain greatly contributed to reduction of transaction costs and fast relaying of necessary information leading to achieving greater operational efficiencies. This argument is also echoed by Coronado et al (2010) whose study said that there is close relationship between efficient information exchange and chain efficiency.

Although Lambert and Cooper (2000) had earlier stated that there is limited collective action by all actors and inadequate market information in chains involving small scale farmers, this study found out that the farmers in TPC value chain though being small scale farmers in every sense, had adequate information to enable them make appropriate decisions on when to sell and where to sell their pigs.

The results also revealed that actors dealing with high volumes of traded pork attained highest profits. TPC traded 146 Mts of pork in the last 12 months making a profit of KSh. 8.1 million compared to the local pork butcher who traded a mere 43.8 Mts and making a profit of KSh. 1.57 million. The high profit registered by the traders in both chains compared to their respective suppliers is also attributed to the fact the traders bore more risks than the farmers since they were dealing with a perishable product (meat) while farmers were dealing with live pigs. This is in line with what Ruben et al. (2007) found out on risks and transaction costs along the value chain in

relation to perishability of a product. Actors bearing high risks raised prices of the products and if they managed the risks well, they received higher profits.

Although the sum of profits obtained by actors in the informal chain was higher (KSh 95) than in KSh 92 in TPC chain, the many actors in the informal chain sharing this profit can be said to contribute to reduced profit shares of actors in the chain. Actually this is explained in the study by Bhang and Hu (2010) that reducing transaction costs improves management of the chain which can raise profits.

It was also evident that players who did not own the product but only offered service such as slaughtering and transport registered highest profitability. This is because the service they offered was specialized and monopolised.

## Chapter Six: Conclusions and recommendations

Conclusion and recommendations of this study are drawn from survey, case study results and discussions. Besides this, the researchers observations made during the study have also been used.

### 6.1 Conclusions

The pork sub sector in Thika district comprises producers who are majorly small scale farmers who rear small herds with 3 to 4 sows and selling few finished pigs per year. Productivity in the small scale semi intensive system practiced by these farmers is low with long fattening periods that extend up to ten months resulting to low profits.

Pig keeping in the district is practised by averagely older farmers of fifty years and over. It is not the main business of the farmers but it practised alongside other farm enterprises and off farm businesses. It was not clear why persons with youthful age did not engage in pig farming. Both men and women practice pig farming contrary to some studies and reports that indicate pig keeping as a man's domain, indeed interviewed farmers revealed an almost equal participation of men and women in the business of rearing pigs.

The exact status of the pork sub sector in the district in terms of pig populations, pork output pork demand and supply and economic contribution is not well documented. The secondary data available is based on poorly formulated estimates which can give underestimated or overestimated picture of the sub sector.

Competition for supply of pigs coupled with the steady increase in demand for pork by consumers in the district has worked well for the producers because the traders have raised prices. It is however not certain for how long this situation will remain as it is or it will revert to the cyclic fluctuation demand and supply which has been a characteristic of the pork sub sector in country for many years.

The sub sector in the district is not well organised, there is no formal organization dealing with pig issues and most actors operate in isolation. This is however different for actors involved in Thika pork centre value chain who have some chain relationship in regards to information sharing, transparent mode of financial transactions and guaranteeing market of supplies.

The main constraint in the sub sector seen from the producer's perspective and advisory service providers is high cost of concentrate feed compared to the price of pork offered by traders. The poor quality of feed further complicate the problem albeit its availability. Farmers have devised cost cutting strategies by feeding homemade rations and kitchen remains alongside feeding the concentrate feeds resulted to production of poor quality pork.

Quality control measures are weak and enforcement and compliance low. Actors in the sub sector are not involved in the management of the control measures and therefore they do not own them. The regulation and monitoring of movement of pigs and pork and hygiene is solely by the public led veterinary department which due to institutional deficiencies such as inadequate staffing, some regulations are sometimes not fully implemented. The pork traders in collaboration with the veterinary office can initiate an integrated quality management system starting with aspects that enhance traceability and start simple quality assurance practices such as grading and labelling.

The success of Thika pork centre to be the leading pork trader in the district and dealing with close to 40% of the total retail pork in Thika town are as result of long experience in entrepreneurship and innovation skills. He is indeed the pioneer of oven pork roasting using indirect fire and through collaboration with Kenol- kabati abattoir started practice of removing the skin and underneath fat from the carcass to meet the customers demand for meat that has less fat.



Despite the reported success, expansion and diversification plan of processing and producing feeds with desired quality standards to supply his pig supplies is limited by unavailability of suitable credit facility that is affordable so as to meet his expansion plans.

Profitability of pig enterprises of small scale farmers has remained low due to dealing with low volumes which increases production costs per unit product, scattered and not well organized to muscle collective bargaining power while at the same time they lack adequate market information. Farmers engaged in Thika pork centre have higher profits (KSh. 36/kg pork) from their pig business compared to KSh.19 for those selling to whoever buyer that is available (informal chain).

Formal chains enhance information sharing both in terms of flow and volume. Information sharing and number of sources of obtaining information is more in formal chains than in informal chains as seen from the scenario of TPC case study. More farmers in TPC chain obtained information about production, market outlets, price, quality demands and trends in demand and supply from diverse sources compared to farmers in informal chain.

Participating in chain activity only as a producer does not earn the farmer much income, some level of chain integration either vertical or horizontal with the support of government, private sector and other development agencies will yield more income.

## **6.2 Recommendations**

From the results of this study, it has been found out that pork sub sector in Thika district has a number of challenges that limit its growth and opportunities that if addressed can lead to improved incomes of small scale farmers. Addressing these challenges and exploiting the available opportunities will contribute to improved incomes these farmers as they form the bulk of the producers in the area and indeed elsewhere in the country. To do this the following recommendations are made;

- In order to correctly quantify the contribution of the pork sub sector in the district and to get a proper outlook of the sector, an estimation of the number of pigs, number slaughtered per day /month and number and volume pork traders dealt with to be worked out using estimation from the main pork traders. The outcome will provide more reliable data than the one currently being quoted from the livestock office. Further, a comprehensive national wide livestock census can be undertaken by MoLD.
- For there to be increased productivity of pork the issue of high cost in relation to pork prices and quality of feed must be addressed. The short term remedy to this challenge is to avail to pig farmers on farm feed mixing formula so that they can make appropriate rations with ingredients having right nutritive values and safety standards. In the long term, the chain actors through formation of a cooperative / organization can process quality feeds for themselves.
- In order to improve farm practices that can lead to improved pork quality that is safe, housing structures for pigs that meets the basic hygiene requirements to be designed by livestock production specialist in collaboration with the farmers so as to consider the local conditions.
- The actors in the pork chain are not involved in the regulation of quality management of pork in the district, it is left solely to the district veterinary officer to enforce and monitor. By establishing a sector based quality management system involving all the players will enhance compliance and collective implementation.
- For small scale farmers to take advantage of benefit of being part of value chain like the ones in the Thika pork centre chain, they need to be supported through capacity building in



such areas as price negotiation skills and value addition technologies. This can be done through public-private partnership initiatives. This is a role the department of livestock production can take a lead role and collaborate with NGOs , Government and donor funded sector projects and programmes.

- The sub sector stakeholders in the district are not well organised, by forming an organization or a cooperative can improve coordination and cooperation among themselves. This will make them to benefit from the advantages of group marketing and bulk input sourcing.
- Although local banks offer credit to farmers, the conditions for accessing these loans are not friendly to farmers and the cost of the loans is high. In order for these available loans to be accessed by the farmers tailor made loan packages that meet the need of the farming community and agro industry be availed by the credit providers.
- Thika pork centre to explore the possibility of producing such conveniently package products like sausages and hams and other products like minced meat to improve the range of products all based on consumer demands in relation to quality nutrition and convenience. Currently it is only roasted pork that is being offered.

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## Annexes

### Annex A: Survey questionnaire for small holder pig farmers

Questionnaire no.....

1. Age of the farmer..... 2.sex .....

. Location: ..... Village.....

3. Division.....District.....

#### 4. Educational background

- a) Never been to school
- b) Primary level
- c) Secondary level
- d) Certificate level
- e) Diploma & above

#### 5. What is the total size of the land in acres?

- a) Less than one acre
- b) 1- 2 acres
- c) 3- 4 acres
- d) 5 acres & above

#### 6. What is current pig herd size?.....

#### 7 What is the number of sows?.....

##### Herd size per category

Age category	Males	Females	Total
a)Piglets (Less 8 weeks)			
b)Weaners (8 weeks-14 weeks)			
c)Fatteners			
d)Sows /gilts			
e)Boars			

8. Is pig business your main business? Yes  No

9. Do you use family labour to run your pig business? Yes  No

#### Labour division in your pig business?

Activity	By whom			
	male	Female	Children	Hired labour
10)Purchasing inputs				
11)Feeding pigs				
12)Cleaning pig unit				
13)Selling of pigs				
14)Controlling revenue from sale of pigs				

15. Which market/place do you sell your pigs?

a) At farm gate

b) Local livestock market

c) Kenol- kabati abattoir

d) Thika Municipality Abattoir

e) Others (specify) .....

16. Give the reason(s) for the choice in question 9.

.....

17. Who is your main buys your pigs?

a) Pig traders (brokers)

b) Other pig farmers

c) Thika pork centre

18. What is your reason for your choice of buyer above?

a) Provides transport b) transparent payment mode c) offers better price d) buys all categories of pigs

e) Pigs collected when you want (assured market) f) I sell to any buyer that is available

19. What is the source of pig feed?

a) swill/kitchen waste only

b) swill/kitchen waste + purchased feed

c) own home made ration

d) purchase from local feed vendors

e) Purchased and delivered from feed miller

f) Others (specify).....

20. What costs do you incur costs per year? Ksh.....

Particulars	Amount/No	Unit cost	Total cost
Feed			
Purchase of pigs			
Vet drugs			
Disinfectants			
Hired labour (hours)			
Water expenses			
Equipments (cost of equipment and life span)			
Housing ( cost of pig unit and life span)			
Own labour (hours)			
Others (specify).....			

21. What revenue do you get from your pig business on yearly basis? Ksh.....

Particular	Amount/no	Unit price	Total revenue
Fatteners			
Piglets			
Sows/gilts			
Boars			
Manure			
Others (specify).....			

22. What is the difference in KSh between cost incurred and selling price?

KSh.

23. Who provides you with information about pig business?

- |   |                      |                      |                      |
|---|----------------------|----------------------|----------------------|
| a) Livestock Extension staff(public and private | <input type="text"/> | b) Pig traders       | <input type="text"/> |
| c) Media  | <input type="text"/> | d) farmer to farmers | <input type="text"/> |
| e) a combination of the above                   | <input type="text"/> | f) none              | <input type="text"/> |

24 What kind of information do you get from the answer you have given in question 17?

- |                               |                      |
|-------------------------------|----------------------|
| a) Quality of pork            | <input type="text"/> |
| b) Price                      | <input type="text"/> |
| c) Quantity/Number            | <input type="text"/> |
| d) Husbandry practices        | <input type="text"/> |
| e) Market outlets             | <input type="text"/> |
| f) A combination of the above | <input type="text"/> |
| g) none                       | <input type="text"/> |

25. Pork sub sector in the district have strong Information sharing and flow among pork chain players!

- |                     |                      |                   |                      |
|---------------------|----------------------|-------------------|----------------------|
| a) Not agree at all | <input type="text"/> | b) not agree      | <input type="text"/> |
| c) Agree            | <input type="text"/> | d) strongly agree | <input type="text"/> |

26 It is difficult to organise Pig farmers in Thika district into a farmer's organization!

- |                     |                      |
|---------------------|----------------------|
| a) Strongly agree   | <input type="text"/> |
| b) Agree            | <input type="text"/> |
| c) Not agree        | <input type="text"/> |
| d) Not agree at all | <input type="text"/> |

27 What chain development strategy is the most important to develop in order to contribute to increase income from your pig enterprises?

- |                                  |                      |                                      |                      |
|----------------------------------|----------------------|--------------------------------------|----------------------|
| a) Improving quality of products | <input type="text"/> | b) engaging in contract with traders | <input type="text"/> |
| c) Marketing as a group          | <input type="text"/> | d) Bulk input supply acquisition     | <input type="text"/> |

28 What constraints do you face in raising your pigs? (Rank according to strength, decreasing from 1)

Constraints	rank
a) lack of market information	
b) Low prices offered by traders	
c) High price of feeds	
d) Poor breeds	
e) Insufficient husbandry skills	
f) fluctuation of feed + raw material quality	
g) pig farmers not able to form a producer organization	
h) inadequate provision of training by extension workers	
i) Others	



29. What support do you receive from stakeholders in the sub sector?

- a) Credit( loan )
- b) training
- c) feeds on credit
- d) assured market
- e) soft loan by buyer
- f) a combination of above
- g) none

30 What is your perception on pork quality and food safety?

- a) Quality is more important than food safety
- b) Food safety is more important than quality
- c) Safety and quality are equally important
- d) Others perception ( specify)

31 What farm practices do you carry out that enhance pork quality and food safety?

- a) Keeping records of inputs, outputs and farm visitors
- b) Proper storage conditions of inputs (feeds, drugs)
- c) Transport conditions of ( feeds, pigs)
- d) Clean pig units (cleaning procedures)
- e) Observing withdrawal periods of vet drugs
- f) Disposal of dead pigs
- g) Disposal of manure
- h) Slaughter age
- i) Fasting before slaughter
- j) Stress shortly before slaughter
- k) Castration
- l) Others.....

32 Which of the above measures do you consider as critical control points concerning quality?

33 What do buyers pay you per kg carcass weight?.....

## Anne B: Checklist for interviews

### a) Check /questionnaire: pork traders

1 How long have you been in meat business?

2 What motivated you to start this business?

3. How many persons do have you employed?

		male	Female
Hired labour	Kitchen		
	Service		
	Supervisory		
	Security		
	Driver		
Own labour	MD/ Finance administration		
	Chairman/ field operations		

3 What type of meat do you sale in your butchery?

4 What type of pork do you sell and who are you main customers (market segmentation)?

	Segmentation				
Product	Diplomats/ expatriates	Retailing Hotels (Homeland hotel, coconut grill hotel)	Home consumpt ion	City workers and travellers	Open air /village market meat vendors

5 How many pigs have you been buying and selling per week in the following years?

Year	2000	2005	2010
Buying (no.)			
Selling (Kg)			

5 What are your reasons for specialising in selling pork?

6 From which areas do you source **most** of your supply of pigs?

District	Location ( village)	No per week	No of pig Farmers and Traders(F and T)	Average distance from Thika

7 In order of importance, who are your sources of supply? (1 most important and 4 least important)

8 What are the main constraints you encounter in your business?

9 How do you determine the price for kg pork? What are the quality criteria you consider?

10 What are the Critical control points that you monitor?

- 11 How do you control pork quality and food safety and who are you answerable to?
- 12 What are the main barriers to pork consumption in Thika district
- 13 How is pork trading organized in the district, formal or non formal arrangement?
- 14 What pork quality constraints issues do you encounter?
- 15 Who are the competitors and supporters of your pork business?
- 16 Have you obtained any financial /non financial service and from whom? Comment on access and affordability.
- 18 What contribution has your business had towards improving small scale pig farming of the areas you have been buying pigs from?
19. How does your business contribute to social sustainability? (Gender equity, other social responsibilities)

20 Costs (Monthly cost KSh.)

Particular	Amount/No	Cost/unit	Total cost
Purchase of fatteners( kg)			
Transport			
Slaughter expenses			
Inspection and movement permits			
Hired labour( weekly)			
Water expenses			
Electricity			
Business licences			
Building /premise(value)			
Equipments			
Own labour			
Security			
Others Specify rent			
.....			

17 What is your daily revenue (KSh)

Particular	Amount/No	price/unit	Total revenue
Fresh pork (kg)			
Offal (kg)			
Roast pork (kg)			
Boiled pork (kg)			
Soup			
Ugali			
Others.....			

**b) Checklist for District Livestock production Officer (DLPO)**

Describe the predominant pig production systems in the district?  
Constraints faced by small scale pig farmers and traders in the district include and the possible solution are.....?  
What is the potential for developing value chain with SH pig farmers in the district?  
Who are the major pork business actors in the district?  
What do you think is the reason for many pig farmers participating in informal marketing arrangements?  
What support do SH pig farmers need to improve their bargaining position in the chain?  
What can small holder pig farmers do to improve their bargaining position in the chain?  
Do you think formal chains can improve small scale farmers' position /profits? Yes /no Explain  
In what ways has the government tried to improve the pork sub sector in the district?

**c) Check list for District Veterinary Officer (DVO)**

What disease constraints do pig farmers face?  
What is the status of pig disease prevalence and outbreaks?  
Who are the actors in disease control and treatment?  
What role does DVO play in?  
a) Disease control/ treatment?  
b) Transportation of pigs/meat/ slaughter slabs/ houses?  
c) Food safety and quality control  
What food safety and quality control systems for pork are in place in the district?  
What challenges do you encounter in implementing this system?  
How can the system be improved?

**d) Checklist for Transporter**

How long have you been in the business of livestock transport?  
Do you transport other livestock apart from pigs?  
Is the transport facility specifically adapted /registered for the business?  
Hygiene practices being done in including licensing?  
Is the transporter aware of Critical control points? What the CCP in place?  
Constraints faced.  
Cost involved and revenues received?

**e) Check list for kabati pig slaughter house**

Ownership of the slaughter house/land  
How long has it been in operation?  
Numbers slaughtered per day  
Gendered Task/ activities in the slaughtering process  
What benefit do the local people get from the abattoir (direct and indirect benefits?)  
Costs involved and revenues per month  
Disposal of effluent from the slaughter unit  
CCP in the slaughtering process

### Annex C: Education background of respondents

Cluster(chain)		educational background				
		Never been to school	Primary level	secondary	Certificate	Diploma & above
Thika Pork centre	Number	0	6	4	1	4
	frequency	0	40	26.7	6.2	26.7
Informal chain	Number	1	4	8	1	1
	frequency	6.7	26.7	53.3	6.7	6.7

## Annex D: Chi- Square Tests

### i) Education background

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.556 <sup>a</sup>	6	.273
Likelihood Ratio	9.894	6	.129
Linear-by-Linear Association	.000	1	1.000
N of Valid Cases	30		

a. 12 cells (85.7%) have expected count less than 5. The minimum expected count is .50.

### ii) Perception on quality and food safety

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.182 <sup>a</sup>	2	.075
Likelihood Ratio	6.774	2	.034
Linear-by-Linear Association	2.289	1	.130
N of Valid Cases	30		

a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is 2.00.

### iii) Source of information

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.905 <sup>a</sup>	4	.018
Likelihood Ratio	13.576	4	.009
Linear-by-Linear Association	6.443	1	.011
N of Valid Cases	30		

a. 8 cells (80.0%) have expected count less than 5. The minimum expected count is 1.00.

### iv) Strong information sharing

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.026 <sup>a</sup>	3	.000
Likelihood Ratio	25.416	3	.000
Linear-by-Linear Association	15.130	1	.000
N of Valid Cases	30		

a. 6 cells (75.0%) have expected count less than 5. The minimum expected count is 2.50.

### vi) Strategy to develop chain to improve profits

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.836 <sup>a</sup>	3	.050
Likelihood Ratio	8.677	3	.034
Linear-by-Linear Association	1.365	1	.243
N of Valid Cases	30		

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is .50.

vi) Support by stakeholders to pig farmers

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.552 <sup>a</sup>	6	.103
Likelihood Ratio	12.816	6	.046
Linear-by-Linear Association	.000	1	1.000
N of Valid Cases	30		

a. 12 cells (85.7%) have expected count less than 5. The minimum expected count is .50.



## Annex E: Thika pork centre chain actors profits (formal chain)

### Pig farmer

<b>Technical information</b>					
No osf sows	4	Post weaning mortality	4%		
Litter index	2	Weaning days	49		
Born alive piglets	12	Start of fattening	20-23 weeks at		
Pre weaning mortality	14%	Mortality during fattening	4%		
Feeds	total livability 82%				
	feeds all his categorieis of pigs with one type				
	Fatteners sold at 80-100 kg LWT dressed % of	63			
Culling rate	35%				
<b>Financial points( in Ksh, 102 =1 Euro)</b>	Interest	14%			
Number of pigs sold/per	60	Total weight = 60 * 63 kg	3780		
Feed costs, kg feed one feed type for all pigs	Ksh 16 per kg	Total kg of feed per year	25200		
Other costs/sow present per year- vet drugs, Ksh 1000 per sow					
disinfectants	present				
	water bill/ month	Ksh 300 per month			
Price of 1 kg Cold Dressed Weight (CDW)	Ksh 170/ kg				
revenue from 1 culled sow	Ksh 8000/sow				
	Manure produced on the farm- 5 tons	at Ksh 1000/ton			
Labour provided by family- 4 hours per day	at Ksh 30 per hour				
<b>Gross output</b>	Outputs	Kg	Unit price	Total	
	Sale of fatteners per year- (kg)	3780	170	642600	
	sale of culled sow (No)	1	8000	8000	
	sale of manure (Mts)	5	1000	5000	
	sale of fat and skins (Kg)	300	50	15000	
<b>Total Gross output</b>				670600	
<b>Variable costs</b>		Kg/ No	unit price	Total	
Feeds- all categories of pigs are fed on one type of feed (kg)		25200	16	403200	
Water costs per month	no of bills	12	300	3600	
other costs per sow present		4	1000	4000	
Total				410800	
interest on variable cost at 14% - total VC/2* Interest				28756	
<b>Total variable cost (paid costs)</b>				<b>439,556</b>	
Gross margin (gross profit)				<b>231,044</b>	
Gross margin per kg sold - gross margin /	total no of kg pork			<b>61</b>	
<b>Simplified GM % (SGM)</b>	<b>GM/ GO*100</b>			<b>34.5</b>	
<b>Fixed costs</b>					
	value	rate of maintenance		Total	
pig unit maintenance	Pig unit	120,000	3%	3,600	
	equipment	15,000	8%	1,200	
depreciation	years life span	value	scrap value		
pig unit	10	120,000	0	12,000	
equipment	7	15,000	5%	2,036	
land ( 1 acre)	value	Interest		Total	
	110000	14%		15,400	
own labour	Rate ksh/ hour	total no of hours			
	30	1460		43,800	
Interest on capital	value	scrap value	Average capital	interest	Total
pig unit	120000	0	60000	14%	8,400
equipments	15000	750	7875	14%	1,103
Pigs- closing-opening	50000	50000	50000	14%	7,000
stock value		4 sows and 1 boar @10000			
emergency cash	10000	10000	10000	14%	1,400
<b>Total fixed costs</b>				<b>95,938</b>	
<b>Total costs</b>	VC +FC)			<b>535,494</b>	
cost price per kg pork	Total cost - side revenues)/total kg of pork sold			<b>134</b>	
<b>profit per kg pork</b>				<b>36</b>	
Total profit	Gross out put- Total costs			<b>135,106</b>	

### Trader ( Thika pork centre in thika town)

Buys on average 6 fatteners /day with an average carcass weight of 63kg					
Uses his pick up and collection of the animals is prearranged with close to 150 farmers					
He pays on Kg /CDW the following day after delivery.					
Slaughtering is done following day of collection at the kenol- kabati slaughter house at a fee.					
interest rate	14%				
Total no of pigs per year 6* 365	2190				
Gross output					
Daily sales	Item	Ammount	price /kg/no	Total per day	Total per year
	pork Kg/ CDW	400	240	96000	35040000
	offal's/pig	6	500	3000	1095000
	kg/pig skin and fat	30	50	1500	547500
	"Ugali" per day		3800	3800	1387000
	soda crates	4	600	2400	219000
<b>Total gross output /day</b>				<b>106700</b>	
<b>Total gross out put per year</b>					<b>38288500</b>
<b>Variable costs</b>	No	Total kg/day	unit cost	Total per day	Total per year
purchase of pigs	6	378	170	64260	23454900
fuel for transport	per day			1000	365000
slaughter expenses	pigs	6	200	1200	438000
inspection and movement	6	130	130	780	284700
purchase of sodas- crates	crates	4	450	1800	657000
purchase of "unga" ( Kg)		50	31	1550	565750
			total per month		
water bill		12	5000		60000
electricity bill		12	8000		96000
other costs -uniforms, detergents, cleaning materials		12	20000		240000
total per year					26161350
interest	Total VC* 14%				1831295
<b>total variable costs</b>					<b>27992645</b>
<b>gross margin- total revenue minus total variable cost</b>					<b>10295856</b>
<b>gross margin per kg pork sold</b>					<b>70.5</b>
<b>Simplified GM %</b>	<b>GM/ GO*100</b>				<b>26.9</b>
<b>Fixed costs</b>					
	No of bills	monthly wage bill			<b>Total per year</b>
permanent employees 16 workers	12	72000			864000
owner wage	12	35000			420000
trade licenses per year					15000
rent	12	35000			420000
vehicle insurance cost per year	2 vehicles				37500
vehicle maintenance per month (2 vehecles)		10000			120000
maintenance of equipment	value	Rate			Total
oven- capital investment	80000	13%			10400
meat warmer	20000	6%			1200
freezer	100000	5%			5000
weighing scale	33000	4%			1155
<b>depreciation</b>	Value	scrap value	useful life (yrs)		
2 vehicles , life span 10 yrs	1500000	250000	10		125000
oven- life span5 yrs	80000	0	5		16000
meat warmer life span 20 yrs	20000	0	20		1000
freezer- life span 20 yrs	100000	15000	20		4250
weighing scale- life span 30 yrs	33000	0	30		1100
<b>interest on capital=ave. capital invetment* Interest</b>					
	value	scrap value	ave. capital invet	interest	
2 vehicles	1500000	250000	875000	14%	122500
oven- roaster	80000	0	40000	14%	5600
meat warmer	20000	0	10000	14%	1400
freezer	100000	15000	57500	14%	8050
weighing scale	33000	0	16500	14%	2310
<b>Total fixed costs</b>					<b>2181465</b>
<b>Total costs ( VC + FC)</b>					<b>30174110</b>
side revenue					3248500
cost price per kg pork					184
profit per kg pork					56
<b>total profit</b>					<b>8114391</b>

## Kenol -kabati slaughter house

slaughters avrerage pigs / month		750			
charge	Ksh/pig	100			
average kg carcass		63			
Interest rate		14%			
Gross out put				Total per day	Total per yr)
Charge from slaughtered pigs		No	charge/pig		
		25	100	2500	912500
<b>variable costs</b>					
		no	days /month	rate /day	
hired labour causal		2	8	150	14400
cleaning and dinfection costs per month		800			9600
purchase of drums for boiling water (in a year)		4		1200	4800
electricity cost- bills		12		6500	78000
fire wood for boiling/ scalding water/ month		12		2500	30000
Variable cost					136800
Interest (VC /2 * interest)					9576
Total variable cost					146376
<b>Gross margin ( gross profit)</b>					<b>766124</b>
Simplified GM %	GM/ GO*100				84
<b>fixed costs</b>			No of wage bill	Ammount/month	Total per year
permanent workers- 1 manager, 1 attendant 1 security/ month			12	20000	240000
<b>maintenance</b>					
	No	Value	rate of maintenace		
bore hole 20 yrs useful life	1	550000	5%		27500
bore hole pump	1	38000	10%		3800
slaughter house buidings	1	750000	3%		22500
weighing scale-15 yrs	2	66000	5%		3300
ripping saws -3 yrs	4	3000	15%		450
meat hangers- 5 yrs	50	7500	2%		150
Roller chain-5 yrs	1	25000	5%		1250
<b>depreciation</b>	Useful years	Value	scrap value		
bore hole 20 yrs useful life	20	550000	0		27500
bore hole pump	10	38000	0		3800
slaughter house buidings	20	750000	3%		37500
weighing scale	15	66000	0		4400
ripping saws	3	3000	0		1000
meat hangers	5	7500	20%		1200
Roller chain	5	25000	10%		4500
<b>interest on capital</b>	Value	scrap value	Avarege Invet	Interest	
land	220000			14%	30800
bore hole 20 yrs useful life	550000	0	275000	14%	38500
bore hole pump	38000	0	19000	14%	2660
slaughter house buidings	750000	3%	386250	14%	54075
weighing scale	66000	0	33000	14%	4620
ripping saws	3000	0	1500	14%	210
meat hangers	7500	20%	4500	14%	630
Roller chain	25000	10%	13750	14%	1925
<b>Total fixed costs</b>					<b>512270</b>
Total costs					658646
Total kg of pork slaughtered	750 pigs * 63 kg per pig)				567000
cost per kg					1.2
price per kg pork					1.6
profit per kg					0.4
<b>total profit</b>					<b>241354</b>

## Annex F: Informal chain actors' profits (spot marketing)

### Pig farmer

<b>Technical information</b>					
	No of sows	3		Post weaning mortality	4%
	Litter index	2		Weaning days	49
Born alive piglets		12		Start of fattening	16 weeks
Pre weaning mortality		14%		Mortality during fattening	4%
	total livability	82%			
Feeds	feeds all his categories of pigs with one type of feed				
	Pigs are sold at on LWT basis average 90 kg				
Culling rate		35%			
<b>Financial points( in Ksh, 102 =1 Euro)</b>		Interest		14%	
<b>Number of pigs sold/per yr</b>	<b>35</b>			Total weight = 35 * 90 kg	3150
Feed costs, kg feed one feed type for all pigs		Ksh 16 per kg		Total kg of feed per year	17500
Other costs/sow present per year- vet drugs, disinfectants		Ksh 1000 per sow present			
	water bill/ month	Ksh 200 per month			
Price of 1 kg live Weight	Ksh 90				
revenue from 1 culled sow		Ksh 8000/sow			
	Manure produced on the farm- 5 tons at Ksh 1000/ton				
Labour provided by family- 4 hours per day		at Ksh 30 per hour			
<b>Gross out put</b>	Outputs		Kg	Unit price	Total
	Sale of fatteners / pigs per year- 35 pigs equivalent to 60 kg CDW		2100	135	283500
	sale of culled sow	(No)	1	8000	8000
	sale of manure	(Mts)	5	1000	5000
<b>Total Gross output</b>					296500
<b>Variable costs</b>			Kg/ No	unit price	Total
Feeds- all categories of pigs are fed on one type of feed (kg)			17500	9.5	166250
Water costs per month	no of bills		12	200	2400
other costs per sow present			3	1000	3000
Total					171650
Interest on variable cost at 14% - total VC/2* Interest					12015.5
<b>Total variable cost</b>	<b>(paid costs)</b>				<b>183,666</b>
Gross margin (gross profit)					<b>112,835</b>
Gross margin per kg sold - gross margin /		total no of kg pork			<b>36</b>
<b>Simplified GM (SGM)</b>	<b>GM/ VC*100</b>				<b>38.1</b>
<b>Fixed costs</b>					
		value	rate of maintenance		Total
pig unit maintenance	Pig unit	45,000	4%		1,800
	equipment	5,500	5%		275
depreciation	years life span	value	scrap value		
pig unit	10	45,000	0		4,500
equipment	5	5,500	5%		1,045
land ( 0.5 acre)		value	Interest		Total
		85000	14%		11,900
own labour	Rate ksh/ hour	total no of hours			
	30	1460			43,800
Interest on capital	value	scrap value	Average capital	interest	Total
pig unit	45000	0	22500	14%	3,150
equipments	5500	275	2888	14%	404
Pigs- closing-opening	40000	40000	40000	14%	5,600
stock value		3 sows and 1 boar @10000			
<b>Total fixed costs</b>					<b>72,474</b>
<b>Total costs</b>	VC +FC)				256,140
cost price per kg pork	Total cost - side revenues)/total kg of pork sold				
					116
<b>profit per kg pork</b>					<b>19</b>
<b>Total profit</b>	<b>Gross out put- Total costs</b>				<b>59,336</b>

### Pork trader - Local pork butcher

Buys on average 2 fatteners /day with an average carcass weight of 60kg buys from broker who delivers to the trader at the butchery Pays broker on Kg of CDW basis after delivery.					
Interest rate		14%			
Gross output					
Daily sales	item	amount in Kg	price /kg	Total per day	Total per year
No of pigs	two pigs	120	240	28800	10512000
	"Ugali"			850	310250
Total revenue/day				29650	
<b>Total revenue/ year</b>					<b>10822250</b>
<b>Variable costs</b>		Total /day	unit cost	total per day	Total per year
purchase of pigs	Kg of pork	120	180	21600	7884000
purchase of "unga" ( Kg)		15	31	465	169725
water bill monthly paid		12	2800		33600
electricity bill		12	3500		42000
other costs -uniforms, detrgents, cleaning materials, firewood		12	5500		66000
Total gross output per day				22453	
Total Gross output per year					8195325
interest					573673
<b>Total variable costs</b>					<b>8768998</b>
<b>gross margin- total revenue minus total variable cost</b>					<b>2053252</b>
<b>gross margin per kg pork sold ( 120 kg * 365= total kg pork )</b>					<b>47</b>
<b>Simplified GM% ( SGM/Selling price*100</b>					<b>19</b>
<b>Fixed costs per year</b>					
	no of wage bills	amount /month			Total per year
permanent employees 2 wokers	12	12000			144000
trade licenses per year					15000
Rent monthly	12	10000			120000
maintenance of equipment	Value	Maintanance rate			
roasting jiko- capital investment	12000	13%			1500
weighing scale	33000	4%			1155
<b>depreciation</b>	Value	scrap value	useful years		
roasting jiko- life span 5 yrs	12000	0	0	2400	
weighing scale- life span 30 yrs	33000	0	0	1100	
<b>Own labour</b>		monthly rate			
<b>interest on capital</b>		16000			192000
	value	scrap value	average inv	Interest	
jiko- roaster	12000	0	6000	14%	840
weighing scale	33000	0	16500	14%	2310
<b>Total fixed costs</b>					<b>476805</b>
<b>Total costs</b>					<b>9245803</b>
side revenue					310250
cost price per kg pork Total costs- side revnue/ total kg of pork purchased					204
profit per kg pork selling price - cost price = 240-190					36
<b>Total profit GO- Total costs</b>					<b>1576447</b>

### Broker -Pig buyer

buys pigs from farmers transports to local slaughter slab on motorcycle in a wooden box					
purchase an average of pigs per month	80 pigs			20	
purchase price on live weight Ksh. 90-100			average KSh	90	
Total no of pigs purchased in a year				1040	
selling price to the butcheries				190	
average live weight pig	90		total kg lwt	93600	
average kg of pork/pig	60		total kg pork	62400	
Interest rate	14%				
Gross output					
		Kg sold/ No sold/month	unit price	Total per month	Total per year
Revenue from sale of pork		4800	190	912000	10944000
Revenue from sale of of heads, feet and offal		80	500	40000	480000
<b>Total gross output per month</b>				<b>952000</b>	
<b>Total gross output per year</b>					<b>11424000</b>
<b>variable cost</b>		Kg bought/month	unit price		
purchase of pigs 80 pigs /	month @ 90kh LWT	7200	90	648000	7776000
transport pigs per trip	uses motorcycle	No of pigs/month	charge per pig		
		80	200	16000	192000
meat	hired motorcycle	No of meat boxes /month	charged/meat box		
		24	200	4800	57600
slaughter expenses		No of pigs/month	charge per pig		
		80	100	8000	96000
inspection and movement		80	130	10400	124800
meat carrier license		charged per year			100
other costs - mobile phone credit, fares per week		4000 per week		16000	192000
Sub Total variable costs					8438500
interest	Total VC * 14%				590695
<b>Total variable costs</b>					<b>9029195</b>
Gross margin					2394805
Simplified GM % ( SGM/Selling price *100					21
<b>fixed costs</b>					
own labour	hours per/ day	Total hour /month	rate ksh	total per mont	
	8	240	30	7200	86400
<b>total fixed costs</b>					<b>86400</b>
<b>Total costs ( VC + FC)</b>					<b>9115595</b>
side revenues (from sale of offal, heads, fat and skins)					480000
cost per 1 kg					150
price per 1 kg- price paid by butcher					190
profit	Selling price - cost price ( 190-150)				40
<b>Total profit</b>					<b>2308405</b>