Developing market linkages for smallholder farmers

The Tanzanian dairy industry



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Abstract

Agriculture in developing countries has a large potential to contribute to poverty reduction and economic development. Three out of four people in developing countries live in rural areas and depend on agriculture for their livelihoods. However, for agriculture to become a tool for economic development, a revolution in smallholder productivity is necessary. With improved resources, farmers can link up with new markets and engage in value-adding activities. Experience taught us that smallholders have difficulties facilitating their own development. Therefore, this thesis aims to investigate how smallholders can be supported in their efforts to create new market opportunities and develop their resources.

The Tanzanian dairy industry will serve as a case study for this investigation because it can be characterized by its large number of smallholder farmers. Inspired by global value chain literature, there is evidence that there are several actors ,'chain integrators', in the dairy industry who are currently trying to organize the farmers, develop their resources and create new market opportunities. Because these chain integrators represent different types of value chain actors, they each take a different approach to their development intervention.

Consequently, this research aims to answer the following research question: *How do chain integrators develop market linkages for smallholder farmers in the Tanzanian dairy industry?* In order to answer this question, there are two variables that need to be defined, i.e. the different types of chain integrators and the instruments that chain integrators use to construct their development intervention. These two variables will make up the analytical framework along which the findings of the field research will be analyzed.

This thesis concludes that each approach to develop market linkages for smallholders has its own strengths and weaknesses. Three different types of chain integrators were identified, i.e. buyer-driven, intermediary-driven and producer-driven. In addition, the instruments of chain integrators aim to contribute to three generic purposes that enhance the development of market linkages for smallholders, i.e. reducing transaction costs, creating production networks and developing the resources of the firm. The way that the chain integrators consequently configure the instruments that contribute to these purposes determines the success of the intervention and the sustainability of the market linkage for the smallholders.

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Abbreviations

FAO	Food and Agriculture Organization
GCC	Global Commodity Chain
GVC	Global Value Chain
MCC	Milk Collection Centre
MDG	Millennium Development Goals
MLF	Ministry of Livestock Development & Fisheries
MMA	Matchmakers Associates
MSM	Maastricht School of Management
NGO	Non-Governmental Organization
RTA	Round Table Africa
RLDC	Rural Livelihood Development Company
SNV	Stichting Nederlandse Vrijwilligers
	(Netherlands Development Organization)
TAMPA	Tanzania Milk Processor Association
TZS	Tanzania Shilling
	1 dollar equals approximately 1350 TSZ ¹
	(per 01-07-2009)
UN	United Nations

¹ http://www.oanda.com/currency/historical-rates

1 Introduction

1.1 Agriculture for development

'In the 21st century, agriculture continues to be a fundamental instrument for sustainable development and poverty reduction.' (World Bank, 2007, p.1)

Development thinking has known many paradigms over the past decades, 'ranging from an emphasis on technical solutions to "basic needs", and from integrated development programs to structural adjustment' (Schulpen & Gibbon, 2002). Currently, in the light of the UN Millennium Development Goals (MDGs), there is a strong focus in development assistance on economic development and poverty reduction. Following MDG I, the aim is to 'halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day' (www.un.org). The private sector needs to play an important role in achieving this goal.

75% of poor people in developing countries live in rural areas, depending mostly on agriculture as their source of income and way of survival (World Bank, 2007). In order to reduce poverty, agriculture should therefore be one of the focal sectors of development interventions. Not only would a stronger agricultural sector contribute to poverty reduction, at the same time it would help reduce food insecurity in many developing countries. It would thereby also contribute to achieving the 3rd target of MDG I, i.e.: 'halve, between 1990 and 2015, the proportion of people who suffer from hunger' (www.un.org).

'Using agriculture as the basis for economic growth in the agriculture-based countries requires a productivity revolution in smallholder farming' (World Bank, 2007, p.1). Smallholder farmers in developing countries need to raise production efficiency and quality standards to become competitive players in agricultural markets. As a result of trends such as urbanization, rising incomes and globalization there are new opportunities to diversify; particularly into processed foods markets. A major challenge is that a large part of the agricultural activities in developing countries currently occur in the informal economy (Henson & Cranfield, 2009). To increase efficiency in agriculture and to develop agribusinesses that are able to explore new markets by diversification, formalization in

agriculture is necessary. By linking up to domestic and international markets, farmers have the opportunity to develop and modernize production processes that will increase their competitiveness in these markets. In order to become active players in the global agricultural industry, farmers from developing countries will need to embrace a stronger business perspective and reassess their current set of farming activities.

1.2 Problem outline

Due to their limited capacity and capabilities, smallholders often have difficulties to explore new market opportunities. Therefore, they need support that aims to organize and coordinate smallholder production and establishes new market linkages. There are numerous institutions and companies that are actively engaging in such activities. Particularly donors and NGOs have traditionally set up development projects that aimed to improve the position of smallholders (Shepherd, 2007). However, these NGOs have now come to realize that development interventions need to be motivated by market demand, because development interventions are more sustainable if they are commercially viable. That is why production activities need to be assessed in relation to the entire value chain. This supports the notion that there is a need for better market linkages between small producers and the market in developing countries (Shepherd, 2007).

This thesis aspires to contribute to the discussion regarding the development of market linkages for smallholders. More specifically, these market linkages need to focus on establishing a long-term relationship 'between small farmers on one hand and downstream agribusiness (processors, exporters and retailers) on the other' (Vorley, Lundy & Macgregor, 2008, p.188). Also the provision of extension services such as finance, training, inputs, etc. enhance the development of smallholders' capabilities which can stimulate the development of sustainable market linkages. However, there are high costs and risks associated with linking smallholder farmers to formal markets. Problems with regard to production costs and volumes, poor access to information, etc., raise the transaction costs of working with a large number of small farmers. In addition, the low production capacity of smallholders is an obstacle to achieve economies of scale. Close coordination of production is therefore a necessity to lower the transaction costs, raise efficiency and marke the linkage sustainable. For this reason private companies usually prefer to work with organized farmers over individual farmers (Vorley et al., 2008). That the production of smallholders needs to be coordinated is

recognized in many commodity chains. There are many 'drivers' that can support the coordination and integration of smallholder production. Typical examples of such 'drivers' are NGOs, lead firms or farmer cooperatives. As there exists no universal term for the 'drivers' in linkage literature, they will be referred to as '*chain integrators*' for the rest of this thesis. This term has been chosen because the chain integrators attempt to facilitate the *integration* of smallholders into formalized production *chains*. Alternatively, terms such as 'chain facilitator', 'driver for market linkages' or 'market linkage developer', could also have been chosen. All the different chain integrators have their own motivations and therefore different approaches to develop market linkages. As it is unsure whether one of these approaches is typically better than another, it is interesting to investigate the characteristics of the interventions by different chain integrators. This will lead to valuable insights of the functioning of several chain integrators and can possibly lead to more effective and balanced interventions by chain integrators in the future.

The dairy industry in Tanzania will serve as a case to investigate the role of the chain integrator in creating market linkages for smallholders. More specifically, the focus is on the formalized market, referring to the trade between producers and (small scale) dairy processors. This case was investigated during an internship in Tanzania for Round Table Africa. In cooperation with SNV Netherlands Development Organization, the author performed a 3-month field research for Tanzania Milk Processors Association (TAMPA) focused on the different approaches to source raw milk. As part of the research, the author had the opportunity to talk to many different stakeholders in the dairy industry and make field visits to farms, collection centers and processing facilities. The internship was concluded with a report that summarized the findings of the research for all the stakeholders that were involved.

One of the characteristics of the Tanzanian dairy industry is its large number of smallholder dairy farmers. Due to a lack of large-scale milk producers in Tanzania, dairy processors are forced to turn to smallholder farmers for the procurement of raw milk. However, there is a large informal dairy market in which most of the raw milk is traded (95% of raw milk is traded on the informal market; RLDC, undated). This informal market offers fierce competition to the dairy processors in both the procurement and sales of milk and dairy products. In general, the linkages between smallholders and the formal market are weak.

Farmers are easily tempted to abandon purchasing agreements if they can gain higher profits on spot markets. This is undesirable for the dairy processors as it raises uncertainty about the milk supply. To make this system more stable and reliable, it is thus necessary to develop market linkages in such a way that they benefit both the farmers as well as the dairy processors. An important link in this system is the milk collection center (MCC), which is sometimes nothing more than a small shed or house with some cooling and measurement equipment. It is the place where the farmers and dairy processor meet and engage in market transactions, thus it is a logical place to start building market linkages. The MCC is therefore a central point in this case study.

The interventions of chain integrators in the Tanzanian dairy industry are focused on establishing and developing new market opportunities for smallholder farmers and at the same time securing a stable milk supply to the professional dairy processors. Several different types of chain integrators offer a good case for comparison of approaches to create market linkages. The case will illustrate how chain integrators approach the creation of market linkages in a developmental context.

1.3 Research question

Based on the above, the following research question was formulated:

How do chain integrators develop market linkages for smallholder farmers in the Tanzanian dairy industry?

This research question implicitly refers to two variables that help smallholder connect with formal markets. Firstly, there are the chain integrators. As previously mentioned, there are several actors that can take up the role of chain integrator. Therefore, it is necessary to develop the concept of chain integrator based on theory of market linkages. This results in the first variable, namely the *different types of chain integrators*. Secondly, the way that chain integrators develop market linkages for smallholders needs to be defined. Typically, chain integrators have a set of instruments at their disposal that support smallholders to connect with new markets. However, theory cannot define these instruments in detail, because they are context-specific. Alternatively, theory proposes a set of purposes that chain integrators aim to achieve with their interventions, which support the development of market linkages for

smallholders. The instruments are the practical tools that chain integrators implement to serve these purposes. Therefore, the second variable that needs to be defined is the *purposes of the instruments of chain integrators*. The value chain approach will be used to define these variables and construct the analytical framework along which the findings of the field research will be analyzed.

1.4 Delimitations

This research assumes that there is a need for chain integrators to support the development of new market linkages for smallholder farmers. As individual farmers are often unable to enter new markets due to limited size and capacity, they need to be stimulated and coordinated. The chain integrator is able to take up this function. Therefore, the research focuses on the role of the chain integrator and not on whether the chain integrator is necessary or not.

In addition, the research does not investigate the marketing opportunities for dairy products in Tanzania. The assumption is that there is a demand for raw milk from the dairy processors and that the supply is currently unstable and insufficient. Thus, there is a need for better market linkages for smallholder producers and it will be investigated how these can be developed in a sustainable manner.

1.5 Outline of the thesis

This thesis is divided into seven chapters. In chapter one (*Introduction*), the rationale for the research was presented, motivated and concluded in a research question. Chapter two (*Methodology*) explains the method along which the theoretical- and field research was organized. Saunders, Lewis & Thornhill's (2003) research onion will prove the basis for this chapter, in which each of the different layers of the onion will be discussed. In chapter three (*Theory*), global value chain literature will be introduced as a tool for investigation and as an inspiration for the variables that are analyzed in this thesis. The literature review will result in a comprehensive analytical framework that will be applied to the dairy industry in Tanzania. Thereafter, chapter four (*Case*) will introduce the dairy sector of Tanzania with the aim to get a better understanding of the local situation that influences the findings of this research. Trough an overview of the industry, the regions that were investigated and the major challenges, the reader will gain a deeper understanding of the local context. Chapter five (*Analysis*), starts off with the contextualization of the variables that were used to analyze the

chain integrators in the Tanzanian dairy industry. Consequently, these variables are investigated and assessed based on the findings of the field research in Tanzania. Chapter six (*Discussion*) discusses the findings of chapter five and explains how the variables relate to each other. Furthermore, this chapter discusses the lessons that can be learnt from this investigation. Finally, chapter seven (*Conclusion*) strives to answer the research question that was posed at the outset of this research, and provides some additional concluding remarks.

2 Methodology

The purpose of this chapter is to explain the research method that is applied in this thesis. The focus will be on the research philosophy, research approach and data collection method.

2.1 Research process

The foundation for this chapter is the research process onion (figure 1) by Saunders, Lewis and Thornhill (2003). The research onion offers comprehensive and structured approach to explain the considerations that underlie the choice of data collection methods. However, before arriving at the central point, there are several layers of the onion that need to be peeled away to define in detail the methodology used in this research.





Source: Saunders, Lewis & Thornhill, 2003

2.2 Research philosophy

The *research philosophy* or theory of science is the first layer in the research process onion. It constitutes the way one thinks about the development of knowledge (Saunders et al., 2003). The research philosophy influences the way one goes about doing research, and is divided into three schools of thought, i.e. positivism, realism and interpretivism.

The perception of knowledge development in this thesis is in line with the interpretivism tradition. Thus, in contrast with the positivist view, reality is assumed to be 'too complex to lend itself to theorizing by definite 'laws' in the same way as the physical sciences' (Saunders et al., 2003, p.84). Particularly in the Tanzanian context, it is very difficult to collect sufficient, high-quality data that corresponds to the positivist view. One should therefore be careful to generalize the findings of this research to other industries or countries. In addition, the reasoning in this research is in line with the social constructionism perspective. There is a strong focus on the details of the situation in order to construct a complete picture that represents reality. As reality is socially constructed, 'it is necessary to explore the subjective meanings motivating people's actions in order to be able to understand these' (Saunders et al., 2003, p.84). In order to gain a better understanding it was necessary to go to Tanzania and speak with the people involved to interpret their subjective meanings. The interpretation of the researcher is also subjective, thus had other researchers investigated the same subject, they might have come up with different conclusions. To enhance the objectivity of this research, the researcher has been in constant dialogue with other researchers regarding its design. In addition, the data was collected with the aim to represent a large part of the industry to increase its reliability.

2.3 Research approach

The research approach is the second layer in the research onion, which explains the way theory serves as an inspiration for the design of the research project. This research is structured along the lines of the *abductive* research approach (Dubois & Gadde, 2002). Even though this approach is not mentioned in the research onion by Saunders et al. (2003), it best describes the research approach assumed in this thesis.

Dubois & Gadde (2003) refer to abduction as *systematic combining* (figure 2), which 'is a process in where theoretical framework, empirical fieldwork and case analysis evolve simultaneously' (p.554). It means that theory and case study are investigated constantly, and thereby also have the possibility to influence each other. Two important processes in systematic combining are *matching* theory and reality, and the *direction and redirection* of the study.





Source: Dubois & Gadde, 2003

The abductive research approach is particularly relevant to this study, because it allows for a continuous movement between literature and practice. During the field research this was done to create a better understanding of both the theory and reality. Due to a lack of specific knowledge of the dairy industry it was necessary to learn from theory, while theory in turn provoked new practical questions. The development context also added a new dimension, which was addressed by comparing reality to theory and vice versa. As such, the preliminary research was adapted to fit the actual situation.

In this research, the process of matching was experienced when data collection and data analysis occurred simultaneously. Similarly, data was matched to existing literature regarding smallholder production. As such, the models of chain integrators were matched to the literature, which resulted in the usage of the model for 'typical organization of smallholder production' by Vorley et al. (2008). The instruments that are used to compare these models are inspired both by literature as well as through empirical findings. The direction and redirection of the study was enabled by interviewing several different stakeholders from the industry and by analyzing previous reports and data sources. Using several different data sources is also referred to as triangulation, and is used to gain new insights into existing situations.

2.4 Research Strategy

The research strategy explains the overall approach that is adopted to answer the research questions. There are several ways to do this, such as surveys or experiments, but the approach chosen in this research is a case study (Saunders et al., 2003). More specifically, the case is that of the formal dairy industry in Tanzania. As a large part of the dairy industry in Tanzania is unofficial, it is difficult to measure this market. Therefore, the focus lies on the official market that involves dairy companies or registered farmer groups, hence the terminology 'formalized'.

In case studies it is common to use a number of different data collection methods, which has also been done in this research. Despite the fact that a case study might feel somehow 'unscientific', the expectation is that there are many lessons to be learnt from this case and that it serves as an appropriate vehicle to test existing theory regarding the topic (Saunders et al., 2003). Yin (2003) distinguishes two ways for generalizing result of a case study, i.e. 'analytic generalization' and 'statistical generalization'. The former type of generalization aims to make inferences at two different levels, i.e. the level of the case study and the level of theory. The latter type of generalization only makes inferences at the level of the case study. Therefore, the primary aim in case study research should be to make analytic generalizations, because they further develop the theory regarding a certain topic. The way that this case study contributes to both types of generalizations will be discussed in detail in the discussion chapter (chapter 6).

2.5 Time horizon

An important consideration while planning research is the time horizon that is used for measurement. This case study takes a cross-sectional approach, meaning that it takes a snapshot at one point in time (Saunders et al., 2003). The main reason for this is the time restriction when the field research was being done. The field research was conducted over a 3-month period in which it was possible to visit the relevant companies and other actors only once or twice. In addition, the changes in the industry do not happen on such a fast pace that it would yield significantly different data within this three month period. Therefore, the interviews that were conducted in this period are used to construct a snapshot of the situation at that point in time, which will be analyzed in this thesis.

2.6 Data collection methods

The data that was used in this research is a combination of primary and secondary data sources, with an emphasis on primary data. Using several methods of data collection allows for triangulation, which increases the reliability of the study. The usage of the sources of data will be explained in more detail below.

2.6.1 Primary data

Primary data is the most important source of data for this research. The data were collected during an internship in Tanzania, by means of in-depth interviews, field visits and observations. The field work was conducted over a period of 3 months, between July and September 2009. For an overview of the interviews and field visits see appendix 1.

The in-depth interviews were conducted with important stakeholder in the Tanzanian dairy industry, such as milk processors, NGOs and the Ministry of Livestock Development & Fisheries. Each interview lasted between 30 minutes and 2 hours. The interviewees were selected based on their membership of TAMPA (Tanzania Milk Processers Association) and their activities in the dairy industry. The dairy industry in Tanzania only counts roughly 30 professional processors (in 2007, appendix 2 & 3) and it was possible to visit some large and some small companies and their facilities. These companies were selected on their willingness to cooperate and based on practical considerations (transport, availability, etc.). A wide range of topics were discussed during the interviews to construct a complete picture of the dairy value chain. Initially, several interviews were held to develop a better understanding of the industry. Later, some of the actors were revisited to collect more detailed information about their activities that are directly related to the research topic. Already in the early stages of the primary data collection, the different types of chain integrators that drive the development of market linkages for smallholder farmers were identified. Through the interaction with theory this led to a typology that was very similar to that introduced by Vorley et al. (2008), which is adapted in this research and explained in section 3.4.1. The instruments that chain integrators utilize to create market linkages for smallholder are used to compare the different types of chain integrators. The instruments are inspired by literature and were concretely formulated in the initial stages of the field research.

The field visits and observations were a combined effort and sometimes took place after the interviews with the stakeholders. They included visits to processing facilities and milk collection centers (MCCs). Also smallholder's farms were visited sometimes, to get an impression of how the animals were kept and their attitude towards working with chain integrators. During the field visits we spoke with employees of the dairy companies, employees at the MCCs and farmers that delivered to the MCCs. The opinion of the employees and farmers was important, as it provided a way to verify data collected during other interviews. Thus, the field visits offered a clearer picture of the concrete activities in the chain. They also gave a 'feel' of the sentiments among the smallholders in the industry. Despite the occasional communication problems (not all farmers spoke English, but there was always a translator present) the farmers' input was highly valued.

2.6.2 Secondary data

As for secondary data a couple of reports were used that provided an overview of the Tanzanian dairy industry. Particularly the report by MatchMakers Associates (MMA, 2008) was very useful at the early stage, but also presented relevant quantitative data about the industry that was useful later on. In addition, other research reports about the industry were used to determine its structure and a few annuals reports of the dairy firms provided more quantitative data.

At some of the MCCs it was possible to take a look at the administration to get an idea of their actual sales and prices. It was striking to see that there was some difference in the way the administration was maintained, sometimes providing very accurate data and sometimes not. Therefore, this data was used with caution when coming to conclusions.

2.6.3 Quality of research design

Relevant for the quality of the research design is the *purpose* of the research. In this study the purpose is twofold: exploratory and explanatory (Yin, 2003; Saunders et al., 2003). Its exploratory purpose is expressed by the desire to 'find out what is happening' in the dairy industry. Also the extensive literature research contributes to this purpose. Yet, the main focus of the study is on its explanatory purpose. It tries to explain the interaction between certain variables, and the outcomes of this interaction. According to Yin (2003), case studies are often used to investigate explanatory research purposes.

The *construct validity* of a research refers to 'establishing correct operational measures for the concepts being studied' (Yin, 2003, p.34). Particularly in case studies it is difficult to develop the construct validity because the measures tend to be subjective and might be not sufficiently operational. To overcome this problem of subjectivity, several different sources of evidence have been used. Yin (2003) proposes 'six sources of evidence' that can be used in case study research. In this study, four of those six sources of evidence were used: documentation (in the form of sector studies); archival records (administrative documents); interviews (with key industry informants); and direct observations (through field visits). In addition, the construct validity was strengthened by a review process of the draft case study report. Several experts from different organizations (MSM, RTA, SNV, TAMPA) have read and commented on preliminary versions of the report. This increased the objectivity of the analysis and the findings in this case.

Internal validity is only used in explanatory or causal studies, and explains the establishment of a causal relationship between two variables (Yin, 2003). It concerns the investigation of the direct relation between variables 'x' and 'y', without having a third variable 'z' that explains 'y'. If the research has failed to eliminate 'z', it has failed to deal with the threat to internal validity (Yin, 2003). The threat to internal validity has been addressed in this research by means of the analytical technique 'Pattern matching' (Yin, 2003). More precisely, it looks at rival explanations as patterns, because the aim is to compare the independent variables in the research. Yet, the independent variables in this research are not mutually exclusive, which is desired according to Yin (2003). The instruments that are used to compare the independent variables are the same, allowing for a detailed comparison. Thus, the question is not whether there is a relationship between the independent variables and the instruments, but how the instruments are used in different situations. In order to increase the internal validity, the instruments were inspired and verified by several actors from the dairy industry and research experts.

The *external validity* concerns 'the domain to which a study's findings can be generalized' (Yin, 2003). A general complaint of case studies is that they offer a poor basis for generalization. However, case studies should not be generalized to other case studies, but to some broader theory (Yin, 2003). Therefore, this case study is aimed to develop the literature that discusses the development of market linkages for smallholders, by giving a practical

example of how different drivers use similar instruments and their motivations to do this. Nonetheless, the findings of this research could serve as an inspiration for research in other countries and/or industries, as it offers a practical tool to analyze market linkage development for smallholder farmers. The typology that is used in this thesis is generic and the instruments that are used to compare them can apply to other industries or countries as well. In addition, the overall motivation of the chain integrators to engage in certain activities can be driven by the same motivations across countries or industries. Therefore this can provide a basis for a better understanding of linkage activities from different actors.

The *reliability* of the study demonstrates that the operations of a study – such as the data collection procedures – can be repeated, with the same results (Yin, 2003). The reliability of the data is increased by the usage of an interview question list that was used as a guideline during the many discussions and interviews with the stakeholders. In addition, the name of the interviewee and the date of the interview are notes, and some of the interviews were recorded and transcribed. During the field visits it was not possible to record the interviews but notes were taken to be able to structure the data. Finally, the analysis of the data was done in cooperation with a colleague (Victor van der Linden), who was mainly involved in the last stage of the research. This enabled him to look at the data with an unbiased and fresh perspective that helped to reach more objective conclusions. Also experts from SNV and MSM assisted in this process, which enhanced the reliability of the case study.

3 Theory

This chapter will present the theories that shaped the analytical framework to this research. After an introduction that focuses on global trends in agro-industries and linkage theory, the value chain analysis approach will be presented. This approach and its literature will provide the basis for the subsequent section about chain integrators. To sum up, the findings in the literature will be used to develop an analytical framework that will be applied in this thesis.

3.1 Global trends & agro-industries

Agricultural and economic trends both within developing countries as well as outside have a large impact on smallholder farmers in developing countries. 'International trade and communications are accelerating changes in demand, leading to convergence of dietary patterns as well as growing interest in ethnic foods from specific geographic locations' (Da Silva & Baker, 2009, p.1). Particularly the nature of agro-food demand offers a wide range of diversification and value addition possibilities for agriculture in developing countries (Da Silva & Baker, 2009). The largest part of the global processed food sales (\$ 3 trillion annually) are in high-income countries, but the share of value addition generated by developing countries has nearly doubled over the past 25 years (Rabobank, 2008 & FAO, 2007, in Da Silva & Baker, 2009).

There are many new market opportunities for third world farmers, because there are large international markets that they can serve. In reality, farmers from developing countries have a very hard time competing internationally, due to a lack of skills and resources. At the same time they are confronted with increased foreign competition that is entering their domestic markets, outperforming smallholder farmers on price and quality (Henson & Cranfield, 2009). The only local beneficiaries of this development are farmers and/or retailers with strong capabilities that are able to reach economies of scale. These farmers are able to compete with foreign entrants in the local market and sometimes even benefit from the opportunities that globalization offers by competing in foreign markets.

In domestic markets in developing countries new opportunities are arising as well. Population and income growth are important drivers for increased demand for agricultural products, while at the same time pushing for a shift in the type of products that are demanded (Henson & Cranfield, 2009). This last assumption is also referred to as Bennett's Law² (figure 3). In addition, with more urbanization, more women participating in the paid labor force and greater ownership of household appliances (like refrigerators, etc.), more processed foods will be demanded (Henson & Cranfield, 2009). This can reverse the effect of Engel's Law³, thereby creating new opportunities to sell new types of products. For smallholder farmers it is hard to tap into these new markets, as they often do not have the capacity to invest in new technologies and follow the continuously changing consumer demands. The changes in both the national and international markets pose both a challenge and an opportunity to smallholder farmers. Unfortunately, there is little evidence that these farmers have been capable of effectively exploit these new opportunities.





Source: Reardon & Barrett, 2000

² XX Bennett's Law posits that, as income rises, per capita consumption of starchy food staples falls.

³ XX Engel's Law states that, as incomes increase, the proportion of income spent on food falls.

Already in 1958, Albert O. Hirschman raised the issue of a lack of business linkages and interdependence in developing countries (Hirschman, 1958). Particularly agriculture 'is characterized by a scarcity of linkage effects' (Hirschman, 1958, p.109). Primary production should by definition exclude substantial *backward* linkages, except for a number of inputs such as seeds, fertilizers, etc. Nevertheless; *forward* linkages are also weak in agriculture in developing countries. A large part of the production is sold on informal markets, used for own consumption or exported. Another important part is subject to basic processing (adding only little value relative to the value of the product itself), while only a minor part receives extensive processing, and that usually takes place abroad (Hirschman, 1958).

Hirschman continues with the notion that there have been countries that have developed sectors producing primary materials after having end-product industries first, which previously imported primary materials (e.g. clothing industries first imported cotton, but afterwards sourced locally). This shows that it is important to first establish final product industries that are capable of developing backward linkages to primary industries, such as agriculture. With a stable and reliable market for their products, primary producers see the need and have the opportunity to invest in production to develop a local base of raw materials. This illustrates that it is easier to set up backward linkages than forward linkages. Moreover, forward linkages cannot emerge without backward linkages that result from demand pressures. 'The existence or anticipation of demand is a condition for forward linkage effects to manifest themselves' (Hirschman, 1958, p.116-117).

To summarize, there are many opportunities emerging both in domestic and in international markets for agri-business from developing countries. Yet, because smallholders have difficulties developing forward linkages, they have a hard time exploiting these opportunities. Therefore, industries should make efforts to develop backward linkages and provide a long-term market perspective for smallholders as a foundation for a sustainable relation. Alternatively, smallholders can to be supported in their efforts to link up to the market by experts who know what it takes to be competitive in an industry. In order to gain a true understanding of how to build bridges between smallholders and the market requires detailed analysis that explains the decisions that need to be made on a micro-economic level. Particularly, this analysis should focus on the organization of the supply chains and the direct interaction between the actors in the chain.

3.2 Value chain Analysis

The value chain approach allows for analysis on a sectoral and microeconomic level. A value chain is a 'vertical alliance or strategic network between a number of independent business organizations within a supply chain' (Hobbs, Cooney & Fulton, 2000, p.9). Recently, this approach has gained a lot of recognition and has it been widely used for the analysis of global production networks in a development context. More specifically, 'global value chain [GVC] research and policy work examine the different ways in which global production and distribution systems are integrated, and the possibilities for firms in developing countries to enhance their position in global markets' (Gereffi, Humphrey & Sturgeon, 2005, p.79). There exists a large body of literature dealing with global value chains. Particularly sectors such as coffee and cotton have received a lot of attention in value chain research (e.g. Perez-Aleman & Sandilands, 2008; Muradian & Pelupessy, 2005; Gibbon, 2001; Neilson, 2008). These types of value chains are typical examples due to their strong international orientation and involvement of developing countries. Coffee and cotton are raw materials that are mainly produced in developing countries but mostly consumed in western markets. This results in complex, international production networks with different types of integration and coordination. By taking a closer look at the organization of these global production networks, GVC analysis provides valuable insights into the structure of transnational economic activities.

3.2.1 Global value chain history

Global value chain analysis as we know it finds its roots in the World Systems approach which was an inspiration for globalization thinking in the 1970s and 1980s. Hopkins and Wallerstein (1977, in Bair, 2005) came up with the term 'commodity chain', which refers to the chain of interlinked processes that ultimately produce a consumable item. Industries of the sixteenth century were used as unit of analysis in this research. The focus of this approach is put on the investigation of the influence of commodity chains on the creation of a hierarchical world-system (Bair, 2005). In 1994, Gary Gereffi introduced another typology, namely the *Global* Commodity Chain (GCC) approach. The GCC approach agrees with world systems thinking in that the commodity chain thinking is a practical tool to analyze the international organization of capitalist production. Yet, both views also differ in several fundamental assumptions. GCC analysis sees commodity chains as inter-firm networks that include all the actors that are involved in the production of an end-product. 'They [GCC researchers] are

principally concerned with the question of how participation in commodity chains can facilitate industrial upgrading for developing country exporters' (Bair, 2005, p.156). The GCC approach is also more contemporary while the world systems approach has a more historical focus. GCC analysis looks into goods as clothing and electronics and those industries' configuration in today's global economy. The World Systems approach argues that commodity chains are not a contemporary issue, but have existed for centuries since the inception of the capitalist economy in the sixteenth century. There is also a difference in perceived purpose of commodity chain research. The GCC approach investigates how different actors influence the production and distribution of a certain product, thereby differentiating different levels of involvement in a chain between different countries. The World Systems approach does not support this assumption, simply because 'there is no such thing as national development' (Wallerstein, 1974 in Bair, 2005, p.157). The correct level of analysis is the world system, instead of the country-level or the network-level. As a result of these differences in assumptions, the GCC concept has moved away from the world systems theory, making it 'a network-based organizational approach to study the dynamics of global industries' (Raikes, Jensen & Ponte, 2000 in Bair, 2005, p.158).

Over the years, the GCC approach has been widely adopted by scholars to investigate commodity chains, creating a vast array of literature on global industries from both developed as well as developing countries. The rejection of the world systems approach has enabled the detailed analysis of many different case studies in various industries, while adding a developmental dimension to the nature of the research (Bair, 2005).

In the GCC approach Gereffi (1994) identifies that there are 'leaders' in every industry that exert a strong influence on the organization of the industry in which they operate. This is often referred to as the concept of governance, which has been widely investigated in GCC studies. The most famous distinction in the governance discussion is that of the buyer- and producer-driven chains by Gary Gereffi (1994). Both these types of coordination support the notion that 'in the contemporary international economy, dynamics of power and control are not necessarily correlated with traditional patterns of ownership' (Bair, 2005, p.159).

Bair (2005) also emphasizes the policy implications of GCC research. With a thorough understanding of the structure and organization of global commodity chains, policy-makers

can better estimate where value is added and skills are gained. These findings can contribute to the development of industrial policy and regulation to support domestic industries that are operating in these commodity chains.

The Global Value Chain (GVC) approach is the latest generation in the commodity chain literature (Bair, 2005). The case studies that were done within the frame of the GCCs showed that the GCC approach did not take sufficiently into account that there were many different varieties of network forms in global production networks. Gereffi, Humphrey & Sturgeon (2005) have therefore developed a typology of governance structures that try to explain the types of relations between the lead firm and its suppliers in these different varieties of networks (appendix 4). The GVC approach has a strong policy orientation and is, similar to the GCC approach, very much focused on the micro and meso level. The GVC approach is strongly inspired by International Business literature and therefore it looks mainly at the sectoral level and less at the institutional environment in which a firm operates. An important continuity between GCC and GVC analysis is that both look at industrial upgrading at the level of the firm (Bair, 2005).

Value chain upgrading refers to the process of improving one's position within a particular commodity chain, 'and this is generally associated with increased competitiveness that allows for the capture of greater value-added through the production process' (Bair, 2005, p.165). There are several different types of upgrading, of which some are easier to achieve than others. This can be explained by the fact that barriers to entry are increasingly relevant the more one moves downstream the value chain. When moving down the value chain *intangible* activities become increasingly important. These include activities such as design, marketing and R&D. Since these activities are more and more complex, it is difficult for firms to effectively assume these functions. In contrast, *tangible* activities are becoming increasingly standardized, which makes it easier to enter a value chain and thereby increases competition. This is particularly challenging for firms from developing countries.

Bair (2005) identifies a few particular problems with upgrading and GVC research in this area. First of all there is a strong focus on the individual firm. The problem with this focus is the generalizability of the findings of the research. It is not clear how the findings of an individual case can be used to determine the precise implications for the development of

larger units of analysis such as a country or a region. Secondly we can ask ourselves who exactly benefits from upgrading. If firms take on more responsibilities does this automatically mean they receive a larger part of the rents? Fitter & Kaplinsky (2001) have provided a valuable contribution in this matter by showing that price differentiation at the retail-level does not necessarily lead to higher rents at the producer/farmer level. Third, upgrading often leads to an obvious segregation in an industry, between those who *are* and those who *are not* part of the global value chain. Firms that are integrated in global value chains are in a better competitive position, having more potential for upgrading. Finally, it is interesting to consider the concrete improvements for the work force as a result of upgrading. Do employees benefit proportionally the same from upgrading as the firm?

Despite its limitations and the doubts regarding the concept of upgrading, it is widely used to explain and develop competitiveness in value chains. Upgrading is relevant for all actors within a commodity chain, from smallholder farmers to international retailers. However, because the activities of the different actors in a value chain are so diverse, it is impossible to speak of only one generic form of upgrading. In order to create a better understanding of firm innovations and the difference between activities upstream and downstream in a value chain, Kaplinsky & Morris (2002) identified a typology of upgrading. They distinguish four types of upgrading in their 'Handbook for Value Chain research' (Kaplinsky & Morris, 2002), i.e.: process upgrading, product upgrading, functional upgrading and chain upgrading (appendix 5). This typology is a result of the recognition that regular innovative processes only take a firm-centered perspective. Yet, in a value chain perspective one should take a broader perspective that incorporates the entire chain of value-adding activities.

However, while acknowledging the significance of upgrading activities for the opportunities and competitiveness of small producers in new markets, the primary focus should lie on the inclusion in a value chain. Where better firm level capabilities increase the chances of being included in a value chain, the opposite is true as well: when included in a value chain, there are better opportunities for the development of firm level capabilities. Moreover, this is particularly true for producers in developing countries that have difficulties facilitating their own development. Therefore, upgrading can be considered as a sign of the competitiveness of a firm, and the result of insertion in a value chain. Integration in a value chain and its governance are of primary importance, often posing the biggest challenges for chain integrators in developing countries.

3.2.2 Local value chain

Where most of the attention in value chain analysis has gone *global* value chains, *local* value chains have received relatively little attention. Yet, the value chain approach can provide similar insights in the functioning of local chains as in global ones. Altenburg (2007) compares value chain analysis to subsector analysis, and sees many similarities. Subsector analysis was developed in the 1960s and has been used for the analysis of agricultural supply chains by institutions such as the World Bank, USAID and FAO (Altenburg, 2007). 'A subsector is a vertically linked chain of production, marketing and transformation activities that move an agricultural commodity from the field to final distribution to customers' (Holtzman, 2002; in Altenburg, 2007, p.13). This definition does not emphasize the global orientation of production chains, leaving more space for a discussion at the local or domestic level. In addition, Altenburg (2007) refers to the fact that contemporary value chain research is biased toward global chains. Much less work has focused on local value chains that might provide viable market opportunities as well, particularly for smallholder farmers and rural populations. Shepherd (2007) supports this argument. '[The] development of export markets is expensive and complex, particularly where small farmers are involved' (Shepherd, 2007, p.14). Export market opportunities are often investigated even without indications that smallholders can live up to international production standards and required volumes. Therefore, Shepherd (2007) suggests a stronger focus on the local chains. The value chain approach can provide useful insights in how value is created and be increased, also in a local setting.

3.3 Chain integrators

After having introduced the history and use of global value chain analysis, it is now time to return to the central theme of this thesis; the chain integrator. The GVC literature was introduced with the purpose of serving as an analytical tool, but it will also serve as an inspiration for the identification of the role of the chain integrators in the creation of market linkages. Despite the fact that chain integrators play such an important role in the creation of market linkages, they are not always explicitly mentioned in GVC articles.

Barrett (2008) acknowledges the need for interventions that can create market linkages, particularly for smallholder farmers. Nonetheless he does not go into detail about which actor should manage the intervention. He argues that 'interventions aimed at facilitating smallholder organization, at reducing the costs of inter-market commerce, and, perhaps especially, at improving poorer households' access to improved technologies and productive assets are central to stimulating smallholder market participation and escape from semi-subsistence poverty traps in the region' (Barrett, 2008, p.301). Trade policies and other macro policy instruments alone are insufficient to build market linkages for smallholder farmers. These policies and instruments need to be supported by 'ancillary interventions at the micro-and meso-scale along the lines of more traditional agricultural development policy (Barrett, 2008, p.301).

These statements by Barrett (2008) indicate the need for interventions at the micro- and mesolevel, which is congruent with the line of reasoning in global value chain analysis. In order to get a better idea of the types of chain integrators and the roles that they play in the creation of market linkages, it is valuable to review global value chain literature and learn from other cases. The term 'chain integrator' is thus a generic term, as should be understood as a role that can be played by several different actors, as will become clear through the analysis of several value chain articles. We will be looking for the chain integrator as a *driver* that develops market linkages and strengthens the configuration of a certain value chain. By *acting as* and *working with* value chain actors, chain integrators try to improve efficiency and enhance competitiveness. They may be directly involved in a value chain such as a producer, or indirectly such as an NGO.

Chain integrators have a number of instruments that can be implemented to develop market linkages for smallholders. As Barrett (2008) argues, interventions should aim to reduce costs of inter-market commerce, organize smallholder farmers and improve smallholders' access to improved technologies and productive assets. The instruments available to chain integrators should therefore focus on these three purposes. In a GVC context, Gereffi et al.'s (2005) notion of governance captures a similar consideration in the organization of international production. International production might be organized through markets or within transnational firms. This decision is made based on *transaction cost economics*. Simply put, outsourcing usually occurs when the transaction costs for outsourcing are low. Standard

products are therefore bought at arms-length transactions, due to low asset specificity. In contrast, when products are more customized, there is a greater chance that they are produced in-house to prevent opportunism. In addition, complex products require greater coordination, also adding to the transaction costs.

However, high transaction costs for complex products need not always result in internalized production. Another way to address opportunism is by developing *production networks*. 'Repeat transactions, reputation and social norms' (Gereffi et al., 2005, p.81), are different ways to control opportunistic behavior. Networks have the capacity to develop trust, reputation and mutual dependence that can lower transaction costs and allow for more complex divisions of labor.

Alternatively, the *resource view of the firm* 'provides other reasons why firms are prepared to buy key inputs in the face of asset specificity and therefore construct relatively complex interfirm relationships' (Gereffi et al., 2005, p.81). If a firm manages to create a competitive advantage that is hard for competitors to replicate this might provide an incentive for buyers to ignore the transaction costs and engage in more complex relationships. 'In practice, even the most vertically integrated firms rarely internalize all the technological and management capabilities that are required to bring a product or service to the market' (Gereffi et al., 2005, p.81). This argument goes against the reasoning of transaction cost economics, because it means that even if transaction costs are high, products can be sourced externally.

Particularly in developing countries these dynamics strongly influence value chain development. Transaction costs are high; production networks are weak; and firms have weak capabilities, and therefore a weak competitive advantage, if any advantage at all. In order to develop sustainable and competitive value chains in developing countries, there is a need for an even stronger focus on value chain coordination and integration. Besides lead firms that were identified by Gereffi (1994), GVC literature has identified a wide range of other value chain actors that have attempted to contribute to better functioning value chains. These chain integrators try to reduce transaction costs, improve networks and firms' resources to develop functioning market linkages (see figure 4). In order to do so, they each have their own set of intervention instruments that are dependent on the nature of the chain integrator and the local context or industry. Some of these integrators are actors within the chain (e.g. cooperatives,

retailers), while others are not directly involved in the production activities in the chain (e.g. NGOs, governments).



Figure 4: How chain integrators develop market linkages

Based on findings in GVD literature, the following value chain actors that operate as chain integrators will be discussed: International lead firm; cooperatives/business associations; NGOs; governments; and other actors. While discussing these actors in their role as chain integrators, this literature review will also describe some of the intervention instruments that they use to develop market linkages through organization and integration.

3.3.1 International lead firm

Many GVC analyses have found evidence that global buyers or lead firms act as an integrator for their global value chains (e.g. Tokatli & Kizilgun, 2004; Kaplinsky, Morris, et al., 2002; Ivarsson & Alvstam, 2005). Especially in technology-intensive sectors with complex products, many buyers assist their suppliers by sharing technologies to improve product quality standards. These are often producer-driven chains, such as the automotive industry (Okada, 2004). However, also in industries that produce less complex products, buyers tend to support their suppliers with advice on production methods and product quality, for example in the garment industry (Bair & Gereffi, 2003) or in shoe manufacturing (Schmitz & Knorringa, 2000). Even though the products are not particularly technical, buyers have special knowledge regarding the production process or quality standards that can help their supplier to deliver better products.

Lead firms will not just support any firm to become a supplier. First of all producers should fulfill certain requirements to become a supplier. A global buyer will usually not cooperate with a supplier with only minimal capabilities. Therefore, producers that are more developed are more likely get involved in global value chains. Secondly, support from the international lead firm tends to evolve over time. At first, the buyer will help to improve the basic product and processes of the supplier. When the supplier becomes more mature and developed, the lead firm will become less active in this support and leave the supplier regarding how to structure its value chain and direct operating environment. However, at all times the lead firm will (attempt to) ensure that the supplier will not engage in activities that are the core of its profitability, i.e. facilitate functional upgrading (Schmitz & Knorringa, 2000).

Sometimes a supplier manages to achieve functional upgrading, i.e. taking on new activities that increase the value added of the firm (Kaplinsky & Morris, 2001). A famous example is that of Erak Clothing Company from Turkey. This firm started out as a full-package producer for well-known fashion brands as GAP and Calvin Klein, but through this relation it developed its own design capabilities and created a new brand, Mavi Jeans. It still supplies to other fashion brands but its own line is also very successful. Erak had to develop its own marketing strategy and retail channels which it has managed to do successfully. However, even though this type of upgrading is registered more often nowadays, it is probably the most complex type of upgrading and therefore requires a complete set of skills to engage in this process successfully.

As there are industries in which lead firms actively organize their value chain and support their suppliers in their upgrading processes, there are other industries in which leaders make very few efforts to do this. An example is that of the African horticulture industry, where UK supermarkets are the principal leaders of the GVC. In this chain the supermarkets are barely involved in upstream value chain activities. Due to a lack of commitment from the supermarkets, uncertainty is high, which puts a lot of pressure on the exporters. As one exporter stated about innovations for products and packaging: "Occasionally a supermarket will come up with an idea. But this is really part of our business. You have to do this." (Dolan & Humphrey, 2000, p.164). As a result, the exporters seek support with the UK importers because they cannot develop the products on their own. The costs of these innovations are born by the exporter, who is never sure of whether the product will sell in the UK. In this industry, the lead firms only play a marginal role in organizing the chain and supporting upgrading activities. They make few purchasing commitments, and put pressure on their suppliers with the threat of switching to another supplier if quality standards or delivery agreements are not respected.

A better example of integration and coordination activities of a lead firm is the involvement of German car manufacturers in the South African automotive industry (Barnes & Morris, 2004). After regulatory changes in 1995 that opened up the market, foreign competition in the supply chain increased rapidly. Domestic suppliers that were in the network of German car manufacturers were able to handle this situation relatively well. The German car manufacturers shared knowledge with the suppliers and built local capacity. As a result these suppliers were more competitive in the South African market than other domestic suppliers that served US and Japanese car manufacturers. US and Japanese firms did not support their suppliers as the Germans did. In addition, the increased competition in the market kept the domestic suppliers focused and sharp, because now they also had to compete against more advanced international suppliers.

In stark contrast with the case of South Africa is that of shoe-manufacturing in Brazil (Schmitz, 1999). This industry has experienced a much more negative influence from lead firm involvement. When in 1994, the cooperation in the sector was developed named 'Shoes from Brazil program', the aim was to involve many local actors to facilitate upgrading in the industry as a whole. Unfortunately, the leading local manufacturers were not that much engaged in this program due to long term contracts with US buyers. These suppliers had become more independent over the years due to vertical integration. They depended less on the other firms in the value chain but yet remained influential due to their leading position in

the Association of Shoe Manufacturers (Schmitz, 1999). Even though they initially supported the program, during its implementation they were strikingly passive. Their lack of support for upgrading of the sector and the lack of interest from the international buyer hindered the development of the shoe manufacturing sector in Brazil.

For intensive, direct cooperation between large MNCs and smallholder farmers in developing countries, little evidence was found in GVC literature. Perez-Aleman & Sandilands (2008) mention Starbucks' involvement in coffee production. Starbucks has helped develop new production quality standards and monitoring mechanisms for a range of specialty coffee. Yet, Starbucks did not engage in this project alone, but in cooperation with and initiated by an NGO (Conservation International). Conservation International did most of the ground work and needed Starbucks' guarantee to that it would buy the coffee. Therefore, Starbucks' interaction with the smallholders was only marginal and does not represent the direct nature of cooperation as described in the cases above. Usually there is a local actor or NGO that deals with the direct relations with the smallholders.

To summarize, value chain coordination and upgrading through lead firms or global buyers has the potential of a lot of benefits but also poses some threats. For the lead firms it is a delicate matter to support their suppliers. On the one hand they want to develop and direct their suppliers but on the other hand they do not want to educate future competitors. Value chain coordination and development require a lot of effort and dedication which some global buyer might simply consider to be too demanding. There is no doubt that suppliers from developing countries can learn a lot from global buyers. In general these buyers have a lot of experience in the value chain and know very well how to organize it. Skills are most likely to be transmitted in technology intensive industries, but also in other sectors suppliers receive support in production, product quality improvements and the organization of the sub-supplier network. The buyer-supplier relation is likely to evolve over time as the suppliers become more mature. An important incentive for supplier upgrading is increased competitiveness. Competition keeps a company sharp and gives it an incentive to monitor its own development. However, if a supplier is only loosely integrated in a supply chain and has a strong hierarchal relation with the global buyer, upgrading effects for the entire value chain seem to be limited.

3.3.2 Cooperatives/business associations

The original cooperatives that were formed by many nationalist governments in less developed countries aimed to modernize traditional economies (Simmons & Birchall, 2008). However, these cooperatives rarely served their official purpose, as they were often strictly managed by the government or the rural elite. Despite some successful exceptions, most cooperatives did not belong to the farmers and thus their potential has never been fully realized (Simmons & Birchall, 2008). In the 1990s many of these original cooperatives collapsed because the members did not believe in them anymore. More recent, the cooperatives have gained again in popularity, particularly with support from NGOs, as vehicles that can provide valuable services to their members. The poor are starting to rediscover that cooperatives can generate many synergies for partners in a network but also that it requires a lot of effort to make the networks work.

Bacon (2005) discusses the role of the cooperatives in the Nicaraguan coffee-producing sector. These cooperatives negotiate the prices with the certified markets on behalf of the farmers. This directly affects the transaction costs of working with the smallholders, because the buyers need not to negotiate the price with every individual farmer. Farmers that are not a member of the cooperative do usually not produce sufficient coffee and have no access to international markets. Farmers are also encouraged to keep up their performance because they will be reprimanded if they defect. However, there was no clear evidence that farmers who produce exceptional quality receive special rewards, although this might develop in the future due to an increased push from international roasters for better quality coffee.

In the case that is described by Bacon (2005) also products with fair trade certification were sold at a premium price. Part of this premium was used to develop the local infrastructure and develop the capabilities of the farmers through education, training, technical assistance and the provision of loans. These actions are all aimed at developing the production capacities of the firms and improve quality. Farmers that are not involved with the cooperatives do not have access to these benefits, making it harder for them to ever be exposed to international markets and their benefits.

Mesquita & Lazzarini (2008) make a strong argument in favor of inter-firm cooperation in developing countries. By investigating 232 furniture SMEs in the Buenos Aires region in
Argentina that focus on export they come to the conclusions that there are several benefits to both horizontal and vertical relations with firms in the same industry. They argue that selforganization can help overcome institutional failures by developing norms and values in a cooperation. The lack of legal measures to enforce contracts often raises transaction costs in developing countries. Firms try to overcome this problem by working closely together with other producers and suppliers in order to develop stronger informal ties. Cooperation can also help achieve common goals. For example, it is more effective to lobby for policy changes together with other firms in a similar situation and it is often cheaper to buy a certain technology or resource together with others.

3.3.3 NGO

Over the past few decades NGOs have become increasingly active in many developing countries. Their presence has expanded greatly, and they are now able to influence policy-makers as well as company decisions. They are working at many different levels in society from serving the poorest of the poor with development aid such as food and shelter, to building farmers' production capabilities and help them to start a small business. Regarding the latter, NGOs now realize that their activities are 'no longer sufficient to ensure sustainable income growth' (Shepherd, 2007, p.1). Therefore, NGOs are trying to refocus their efforts in such a way that it takes into account market demand and the linkages to entire value chain (Shepherd, 2007).

In the capacity as mediator and service provider NGOs have a good track record. They make an excellent partner serving both public and private interests. They provide a wide range of services such as research, training, technology diffusion, negotiation partner, financial services provider, etc. In this role they have proven to be an effective capacity builder.

Particularly in the coffee industry we have seen a lot of NGO involvement (e.g. Raynolds, 2004; Perez-Aleman & Sandilands, 2008; Muradian & Pelupessy, 2005). Their activities have mainly been constructed around the improvement of production techniques in order to fulfil Western quality standards. As a result, farmers can explore new markets by engaging in the global coffee trade. Especially the case discussed by Perez-Aleman & Sandilands (2008) provides us with valuable information regarding this matter. Conservation International (CI) is an NGO that has helped small coffee-producing farmers to improve their production

methods in order to be able to supply to Starbucks Coffee, a leading American coffee retailer and coffee house holder. The efforts of CI have focused on improving the quality of the beans by giving advice and support to the farmers. If the beans were of sufficient quality the farmers would receive a certification that enabled them to sell internationally. In addition, it has engaged other organizations in this process such as local universities, local government institutions, banks, microcredit organizations and international donors. According to Perez-Aleman and Sandilands (2008), this involvement is crucial to the success of the attempt to upgrade. Local actors should be involved in developing the certification for the farmers to keep the standards realistic and reachable. Access to affordable financial resources is another key to success. Upgrading requires investments in new equipment and technologies in order to meet the production standards. If credit is too expensive producers often forsake investments in new equipment leading to a deterioration of production capacity.

It is clear in this case that the NGO has played an important facilitating role. It has brought the stakeholders together to develop a pragmatic certification scheme that would help small coffee producing farmers to sell to international markets. Perez-Aleman & Sandilands (2008) suggest that this approach can be implemented in other sectors than coffee, for example in agro-industrial chains or manufacturing chains.

3.3.4 Government

The government is a special case in its role as a chain integrator. First of all its responsibility is to set the framework in which companies operate, such as rules and regulations, industrial policies and education. In this way it creates the environment in which business can develop in a country, and it defines the space for chain integrators to intervene. Secondly, the government can act as a chain integrator itself, by actively using its institutions to support the integration of value chains. This second role is not often practiced, as it is essentially not the role of the government to intervene in the business life of its country. Nonetheless, there are some examples of government initiatives in which its institutions have played a positive role as chain integrator that has developed sustainable market linkages for smallholders.

Governments in developing countries are regularly criticized for their inadequate policies, weak law-enforcement and a general incapacity to provide ample support to firms and industries with a lot of potential. Another critique that is often heard is the incapacity of the

government to provide basic services as education, infrastructure, and electricity or water (Fisman & Khanna, 2004; McCormick, 2001; Gibbon, 2003). Particularly the level of education is repeatedly mentioned as a major constraining factor for upgrading of firms. As a result, firms have to invest in training facilities to train their own workforce. These investments are expensive, time-consuming and difficult to justify due to high labor turnover.

It is often unclear to governments which role they should exactly play in private sector development. Ideally governments play a facilitating role in which they create the right circumstances for firms to operate. The least a government should do is to build a functional infrastructure including education, communication and physical infrastructure to ensure that the foundations for profitable business activities are in place. Policies should therefore be developed in cooperation with, not in isolation from, firms and industries. Apart from that, interventions are very situational and should be carefully judged.

In their role as chain integrator that develops market linkages, governments have a mixed track record. For example, research by Hanna & Walsh (2008) in developed countries as Denmark and the US has found that the state is not the ideal facilitator for arranging inter-firm cooperation of small manufacturing firms. Because the state is not an economic efficient actor and is not a direct member of the value chain, it has difficulties to assess which are the essential requirements for cooperation. Even though this problem is also encountered in more developed countries, the weak capabilities of developing country governments enforce the problem, resulting in even weaker policies.

There are also examples of situations in which the government has played a positive and supporting role in a sector's development. One particularly suitable example is that of Mahagrapes in India (Roy & Thorat, 2008). Mahagrapes is a marketing partner to a group of producer cooperatives which was originally established by the local authorities and is now privately owned. The function of this organization is to promote the Indian grape-production sector and the procurement of new technologies and standards for the entire groups. It is a successful example of a Public-Private Partnership (PPP) in which several public agencies together with some producers. Particularly interesting in this case is that Mahagrapes now is completely privately owned and that it operates *for* profit. The initiative has enabled firms to

increase international sales which yields higher revenues and has also made the producers more competitive in the domestic market.

Hobday and Rush (2007) argue that instead of the government picking the winners in terms of companies and industries to support, governments should let industries pick their own winners. In each industry there are firms that perform better than others, with more resources and better skills. If a government is competent and these firms need any support they will approach the government themselves. As a result, the institutions will have a better idea of what might actually support the industry instead of hinder it. Note that this is not an argument for firm-led industrial policy development, but a plea for an interactive discussion between firm and government. Even with the best intentions some policy decisions have not been effective due to inadequate considerations of their impacts (Morris, 2001). Especially the consultation of several leading firms in an industry or producer-cooperatives is useful for policy-development. Firms can also lobby with the government when they know that new policies are being developed.

3.3.5 Other actors

The actors that were discussed in the analysis of GVC literature before are the most common chain integrators. Yet, this list of chain integrators is not limited to these actors. Also other players in global value chains can take up the role of chain integrators, but so far, they have been less frequently researched. Here are some examples of other value chain actors that can potentially play the role of chain integrator.

Firstly there are the private consultant companies. Hanna & Walsch (2008) refer to these actors as constructors of networks of small firms. Their interventions are similar to those by NGOs, with the difference that they usually have a stronger business development focus and more experience in this area. Secondly, academia and universities can serve as an advisor to the value chain actors with regards to their business development. For example, Schmitz (1999) and Perez-Aleman & Sandilands (2008) mention universities that support lead firms or NGOs in their efforts to organize value chains. Thirdly, leading farmers can act as a chain integrator for small farmers (Shepherd, 2007). These farmers have a larger capacity and serve formal markets. In this capacity they can stimulate local smallholders to cooperate and serve the same markets. Fourthly and finally, multi-stakeholder platforms often also possess certain

linking capabilities. Muradian & Pelupessy (2005) discuss a number of certification initiatives for small coffee farmers that would enable them to get general recognition for the quality of their coffee. With such a certification, farmers would be able to look for new markets and customers. These multi-stakeholder platforms can contain a wide range of actors, such as trade associations, industry associations and representatives, social groups, fair trade institutions, etc.

3.4 Analytical framework

The literature review illustrates that there are two dimensions that need to be considered when analyzing the development of market linkages: the *chain integrators* and the *instruments* they use to develop market linkages. In this research, the aim is to investigate how the *different* types of chain integrators use the *same* set of instruments to develop these linkages. This is relevant, because it shows which are the strengths and weaknesses in the approach of the different drivers, enabling them to learn from each other's activities and serve as an inspiration for future interventions. In order to develop a comprehensive analytical framework, it is necessary to define the chain integrators and their instruments that are used to analyze the Tanzanian Dairy industry. Consequently, this framework will provide the basis for analysis of the data that was collected during the field research.

3.4.1 Chain integrators

The discussion of GVC literature in the previous section mentions a number of actors that have the potential to assume the role of chain integrator. To allow for a more comprehensive comparison, it is desirable to categorize the chain integrators under investigation. Based on Shepherd (2007), Vorley et al. (2008) developed a model of the typical organization of smallholder production (figure 5). In this model, they introduce three different categories of value chain actors that act as drivers who aim to organize smallholders and develop market linkages. These drivers include the actors that were identified in the theoretical discussion of chain integrators. Therefore, this model provides an appropriate framework for the classification of the chain integrators that are discussed in this thesis. Because this model is designed to analyze the organization of *smallholder* production, it is particularly suitable to analyze the case of the dairy industry in Tanzania As such, the chain integrators will as of now be framed in terms of producer-driven models, buyer-driven models and intermediary-driven models.

Туре	Driver	Objective
Producer-driven	Small-scale producers themselves	new markets
		 higher market price
		 stabilise market position
	Large farmers	 extra supply volumes
Buyer-driven	Processors	 assure supply
	Exporters	
	Retailers	
Intermediary-driven	Traders, wholesalers and other traditional market actors	 supply more discerning customers
	NGOs and other support agencies	 'make markets work for the poor'
	National and local governments eg via 'Dragon Head' companies in China	regional development

Source: Vorley et al., 2008

Producer-driven models of chain integrators include initiatives such as cooperatives and farmer-owned businesses. The models 'have had a mixed record of providing members with economic benefits in terms of access to dynamic markets' (Vorley et al., 2008, p.197). These producer organizations engage in a wide range of supporting activities, but rarely focus on providing an effective marketing channel. Even in cases where the organizations operated as marketing channel they were avoided by agribusiness because of problems in cooperation (Vorley et al, 2008). Yet, these kinds of farmer organizations are an important tool to increase competitiveness. In comparison to welfare organizations they are more focused on building competitiveness capacities and are better able to build on informal linkages in the market. In Europe we have seen the potential of farmer cooperatives but in the developing world its potential has not yet been utilized.

Buyer-driven models stand for a more direct relationship between the buyer and the producer that is usually managed and maintained by a retailer or processor in an industry. There are several cases in which buyers had to include smallholders in their business model, because these were the only sources of raw materials available. In these instances the inclusion of small-scale producers has led to a sustainable relationship, such as in certain milk industries (Vorley et al., 2008). Traditionally, buyers (processors) integrate backwards and try to coordinate the production. This is also stimulated by a lack of initiative from the side of the farmers. The buyer usually attempts to cut out the middleman to create a direct relation with the producers and promotes this as a win-win situation for the producer, the customer and the buyer himself. Prices are supposed to be fairer for the producer and the buyer has a better control over production.

Intermediary-driven models pose an alternative to producer- and buyer-driven models. 'Integrating forward (for producers) or backwards (for retailers or processors) is timedemanding and expensive' (Vorley et al., 2008, p.201). In essence these are attempts to cut out the middlemen to save costs, but in reality they often result in high transaction costs and mixed outcomes. Therefore, working with middlemen might not be such a bad alternative as it is often perceived. This gives the opportunity to current as well as new intermediaries to engage in a certain value chain (Vorley et al., 2008). Particularly the transaction costs of working with many smallholder farmers are overwhelming. In addition, the coordination efforts required to organize these farmers are discouraging retailers to directly source from smallholders (Vorley et al., 2008). In some industries, there have been intermediaries that have developed into an important facilitator in the chain. They have introduced new standards and technologies in the sector that have supported smallholder farmers in improving their production quality and quantity. These intermediaries often have a strong focus on service provision but with a commercial attitude. Their focus on increasing the competitiveness of the chain and their market orientation can make them effective and efficient facilitators.

3.4.2 Instruments

As previously described, the instruments that chain integrators use to develop market linkages for smallholders serve three major purposes, i.e. reducing transaction costs, creating production networks and developing firm level capabilities. The review of GVC literature served as an inspiration for which kinds of concrete instruments can contribute to these purposes. Based on the findings of the literature review, these instruments will be briefly discussed below. However, it is important to remember that the instruments are very context specific. Therefore, these instruments merely served as an inspiration for the field research. The actual instruments that were used to analyze this case will be introduced in the chapter5. The analytical framework will accordingly be framed in terms of the purposes of the interventions, in order to give it a stronger conceptual value.

To reduce *transaction costs*, chain integrators have tried to ensure *price stability* for certain commodities. Particularly for smallholder farmers price stability is essential. For subsistence

farmers with low incomes, fluctuating prices can have devastating effects and may lead them to abandon a business agreement. Important with regard to pricing is also the negotiation process in which the prices are determined. Chain integrators have been active in *price negotiations* to support the weaker party in order to get fair price agreement. Another instrument that is used to reduce transaction costs is the introduction of *production and quality standards*. These standards are useful for buyers as they guarantee quality inputs. For producers they increase sales opportunities and sometimes a premium price can be earned. A final important field of intervention for chain integrators in the light of transaction costs has to do with the *logistics* of the products. This is a broad topic, concerning not only transportation, but in the light of smallholder production, also the collection of agricultural products and the use of informal channels such as middlemen.

When looking at *network theory*, chain integrators have mainly focused on developing and improving *production networks* such as farmer cooperatives and business associations. Cooperation of value chain actors at the same level has many advantages, among which increased bargaining power, learning opportunities and collective investment opportunities. However, production networks also encounter many obstacles, such as a lack of resources, weak capabilities and fraud by its members. Therefore, chain integrators with relevant expertise have been able to play an important role in strengthening the capabilities of such networks.

Finally, the *resources of firms* have also been enhanced with the support of chain integrators. This was done in two ways. First, the *technological capabilities* of suppliers have been strengthened. By means of sharing information regarding production techniques, training and R&D, chain integrators have attempted to develop the production processes of suppliers. Second, supporting producers generating *financial resources* for investment is a strength of chain integrators. They usually have a bigger network than producers that include financial institutions or donors. With support of chain integrators producers have been able to improve their access to finance.

3.4.3 Summary

In summary, this research attempts to identify the way that chain integrators develop market linkages for smallholder farmers. To develop these market linkages, chain integrators have a set of instruments at their disposal that serve three generic purposes. The concrete instruments are highly case-specific, and will therefore be defined in more detail in the case analysis. Each chain integrator takes its own approach to employing the instruments, which leads to different outcomes of their interventions. By investigating how chain integrators each give their own meaning to the instruments at their disposal, it is possible to come to unique insights of the functioning of chain integrators. This enables a comparison of their approaches, uncovering the advantages and disadvantages of each approach. Consequently, different chain integrators can learn from each others' approach, and it can serve as an inspiration for future development interventions. A schematic summary of the analytical framework is exhibited in figure 6.





4 Case

This chapter will focus on the dairy industry in Tanzania. In order to analyze the market linkages for smallholders it is necessary to get a better understanding of the local context. Therefore, this chapter will give an overview of the industry, the regions that were visited and the actors that were investigated.

4.1 Dairy industry in Tanzania

The case that is used in this thesis to assess the role of the chain integrator as a developer of market linkages for smallholder farmers is the dairy industry in Tanzania. This industry is especially interesting because it contains all the models for smallholder integration that were introduced in the previous section. The fact that all the models exist in one industry is a big advantage because it enables us to compare different chain integrators in a similar context, enabling us to identify the pros and cons of each their approaches.

4.1.1 Production

Smallholders: The dairy industry in Tanzania can be characterized by its reliance on smallholder dairy producers. Approximately 70% of the total national milk production comes from smallholder dairy farmers (MMA, 2008), representing around 1,272,000 households (RLDC, undated). The dairy processors are therefore very dependent on the smallholder farmers for their raw milk supply. Most of the farmers in Tanzania are pastoralists (RLDC, undated). The farmers send their wife(s) or children out with their cows to find grazing land and water. This is a traditional farming principle and most farmers still adhere to it. Only in the mountainous regions the zero-grazing principle is more frequently applied. The density of the forests in these areas prevents the cows from moving around freely because they would get lost otherwise. Therefore these cows are kept in wooden stables and are fed by the farmers.

Livestock population: Tanzania's livestock population ranks 3rd in Africa (after Ethiopia and Sudan) with around 18 million cattle (MMA, 2008). 98% of the cows are traditional, indigenous Zebu cows that have a very low milk production. Only 2% are of improved dairy breed, which have a much higher milk production. Indigenous cattle produce around 49 liter

of milk per cow per year while improved dairy cattle can produce up to 842 liters per cows per year. The total annual milk yield is around 1.15 billion liters (MMA, 2008) (appendix 6). The entire livestock sector (including meat, milk, etc.) is estimated to contribute 5,7% of national GDP, and the dairy sector makes up 30% of that percentage (RLDC, undated).

4.1.2 Dairy processing

Capacity: During the past decades the Tanzanian dairy industry has experienced some drastic transformations. Particularly the privatization of government-run Tanzania Dairy Limited was a big shock to the industry. After the privatization it turned out that the factories' operations were very inefficient, causing many of them to close down. Out of 35 companies 13 were forced to cease their operations in this period, leading to a sharp decrease of processing capacity (RLDC, undated). Currently, the total daily milk processing is about 60,000 - 80,000 liters while the total installed capacity in 2006 was about 507,000 liter per day (MMA, 2008; RLDC, undated). The current capacity utilization is estimated to be between 12% and 16%.

Dairy processors: The major processing regions in Tanzania are Mara, Tanga, Arusha and Iringa. In Mara there are two large processors (Musoma Dairies and Mara Milk) with a daily production capacity of more than 10,000 liters (actual daily production is variable). Tanga currently houses the largest processor of the country (Tanga Fresh) with a daily capacity of 50,000 liters and an actual daily production of around 20-30,000 liters. One medium-sized processor (International Dairy Products Ltd.) is located in Arusha, who handles around 4,000 liters of milk every day. In addition, there are several microprocessors that serve their localities and the cities Moshi and Arusha. These microprocessors are often supported by NGOs that are located in and around Arusha. Finally, there is Iringa where there is one large processor (ASAS Dairies) who currently handles around 10,000 liters of milk daily. This last processor is not included in the research sample as it was too far away to conduct field visits. For a complete overview of the dairy processors in Tanzania see appendix 2 & 3.

Foreign processors: The local firms in Tanzania face fierce competition from foreign dairy companies (MMA, 2008). Most of the processed milk is sold in urban areas, with Dar es Salaam as the biggest market. Because the local firms cannot meet the demand in the urban areas, the foreign companies have the opportunity to compete. To put things into perspective, in 2005 29.9 million liters of milk were processed locally. In the same year, 20 million liters

of milk were important for abroad and nearly all of that was directly sold on the formal market. This means that around 40 % of milk sold at the formal market is imported from abroad (MMA, 2008). Imported milk mainly comes from Kenya and South Africa and the United Arab Emirates. In addition, milk powder gets imported all the way from the Netherlands.

4.1.3 Market

Consumption: The processors in the dairy sector in Tanzania produce a variety of products. Many companies produce fresh milk or Mtindy (fermented milk). Also UHT milk is produced in Tanzania but only in Mara by Musoma Dairies and Mara Milk. The equipment that is used to produce UHT milk is very expensive and thus not available to every processor. The advantage of UHT milk is that it can be kept much longer than fresh milk and can also be consumed at room temperature. Therefore it can be transported over longer distances, which is very convenient for the producers in Mara region because the distance between Dar es Salaam and Mara is 2,000 km. Also cheese and yoghurt are produced by several firms but the consumption is relatively low. These products are mainly produced for the hotels and resort in the touristic areas in the north and at the coast. This market is very seasonal because it depends on holiday seasons.

One remarkable finding during the field research was that people do not like to consume refrigerated milk during the wet (cold) season. This was particularly applicable in the Arusha/Kilimanjaro region. During the wet season, temperatures range between 10 and 25 degrees Celcius. Instead, they prefer to consume milk at room temperature. This is a problem for the market in the wet season for two reasons. First, in the wet season the cows produce a lot of milk. There is often an oversupply of milk in this period, so there is abundant milk available to the consumers. Second, Processor products need to be refrigerated, or they will expire quickly. Only UHT milk can be conserved at room temperature for a longer period of time. Therefore, demand for refrigerated products often decreases in this period.

Compared to other countries in the region, Tanzanians consume relatively little milk. With only 39 liters of milk per annum (2007), average milk consumption per capita in Tanzania is lower than that in Uganda (50 liters per capita) and Kenya (100 liters per capita). 'The WH recommends a per capita consumption of 200 liter per year' (MMA, 2008, p.12). Reasons for

this low level of milk consumption are low purchasing power and traditionally low milk consumption in Tanzania.

Informal market: The informal market in Tanzania is far greater than the formal market. According to a study by RLDC (undated), 72.5% of total milk production (i.e. 1.15 billion liters, MMA, 2008) is consumed or lost at the farm. Of the remaining 27.5% over 90% is sold through informal marketing channels. Only 9.5% of the marketed milk is traded in the formal market, representing around 30 million liter of milk annually (RLDC, undated). This should be considered as an indicator of the fierce competition that the formal dairy market faces in the Tanzanian dairy market. Even though this research does not focus on the marketing side of the dairy industry, the impact of the informal sector on dairy collection and processing activities needs to be taken into account. For example, the dairy processors face fierce competition from the informal sector when approaching farmers to sell their raw milk.

4.2 Supply chain

In order to get from raw milk to milk products, several actors are involved. The main actors in the supply chain include: the smallholder farmers who produce the milk, the hawkers who sell the milk to the informal market, the traders who transport the milk from the farmer to the MCC, and the processors who process the milk. Figure 7 presents an overview of the route of raw milk from producer to final consumer (also see Appendix 7).





The focus in this thesis will be on the Milk Collection Center (MCC), because it is the place where the farmers/traders and the processors meet to engage in a formal market transaction. The farmers/traders bring the milk to the MCC once or twice a day. At the MCC there is usually a big cooling tank with a capacity of 1,000 or 2,000 liters. Every day or every two days a big truck passes by that collects the milk and bring it to the processing factory.

Because the MCC is such a central place in the milk collection process, this is the place where the chain integrators can build their relation with the farmers and engage in long-term market agreements. The direct contact between the seller and the buyer of the milk raises many opportunities to interact and communicate. At the MCC, it is possible to reduce transaction costs by negotiation and by developing trust between the buyer and seller through repetitive transactions. By establishing links in a certain community the buyer can try to persuade the farmers to bring their milk to the MCC on a regular basis and develop a good reputation. The MCC is also an excellent place to start the development of production networks. Because farmers meet each other at the MCC on a daily basis they get to know each other and can keep track of the developments within the network and the relation with the MCC. Moreover, the MCC is the perfect place to stimulate and support the development of the networks and can be the place for meetings. The chain integrator can also provide incentives to form the networks at the MCC. Finally, the MCC provides the opportunity to develop the resources of the farmers. Farmers can be stimulated to buy input supplies, such as fodder, medicine or tools, at the MCC and they can be educated in their usage. Through creative pricing mechanisms farmers can repay the inputs that they use. The MCC could also be a place for farmers to get loans or advances of their payments in order to create financial opportunities.

4.3 Key regions & actors in milk processing

The case in this research is the dairy industry in Tanzania. This focus on one industry in one country enables a detailed analysis and comparison of chain integrators, but nevertheless there are some regional characteristics that need to be taken into consideration when drawing conclusions. The geographical, social and institutional context differs slightly per region and that has an influence on how the milk collection is organized and how effective this organization is. To describe the situation and context in which the chain integrators operate, the regions will be discussed in terms of the regional characteristics that are presented in table

1. The three (sets of) regions that have been included in this study are Mara & Mwanza, Arusha & Kilimanjaro and Tanga (appendix 8).

- Climate		
- Types of cows	Whether farmers own cross-breeds or traditional cattle	
- Types of farming	Whether farmers apply pastoralism or zero grazing farming principles	
- Traditional motivations for	Whether farmers keep cattle for social prestige	
keeping cows	when we have been a see in the set of the se	
- Population	How the population is geographically distributed in the region	
- NGO presence	Whether many NGOs are active in the region or not	
- Processor density	Number of processors in a region	

Table 1: Regional characteristics

Mara & Mwanza

Mwanza:	2,312,375 cattle (Appendix 9)
Mara:	1,359,791 cattle
Processors:	Mara Milk, Musoma Dairies

In the lake region (Lake Victoria), a large number of cattle as well as two large milk processors are present. The climate in the Mara and Mwanza regions is relatively dry and hot. Areas close to the Mara River and Lake Victoria have better access to water but many cows are also kept in the inland regions. These regions have a long tradition of cattle farming but milk production is rarely the main reason for keeping cows. Only 0,5 % of the cows is improved dairy cattle while the other 99,5 % is of traditional breed. These cows give little milk but are very resistant to the harsh and dry weather conditions in the region. In these regions, cows are seen as an asset, so having many cows gives a lot of prestige and respect. If quick money is needed then a cow is sold for its meat and the income is readily available. In the past, the milk processor Tanzania Dairy Limited operated in these regions with collection centers in many small villages. It made farmers get used to the concept of milk collection. The current processors are tapping into that awareness and try to get the milk from the farmers again. Most of the farmers are pastoralists and the zero grazing principle is rarely applied. The regions offer a lot of open terrain where the cows can graze so it is most practical to bring the

cows to fertile grazing lands. Furthermore the scarcity of water contributes to the need to apply the pastoralist farming principle.

Part of the population is clustered in small villages but many farmers also live in more remote locations. This limits their willingness to deliver the milk to the collection centers on their own and gives an opportunity for middlemen and transporters to provide this service. There has been little mentioning of NGO activities in both regions and their impact has been very limited. There is no strong tradition of NGO activities particularly in the dairy sector. There are two large processors in Mara that are both located in Musoma. They each have a daily processing capacity of over 10,000 liters per day but don't operate at full capacity. Most of their MCCs are located in the Mara region and some of the centers owned by different companies are located close to each other which creates competition between the centers.

Arusha & Kilimanjaro

Arusha:	1,610693 cattle
Kilimanjaro:	633,616 cattle
Processors:	International Dairy Products Ltc., Llima Numbe, West Kilimanjaro
	Dairy Products, Nronga Women Dairy Cooperative Society.

In the Arusha/Kilimanjaro region there is one medium-sized processor and there are several micro processors. The land in this region is very fertile due to its elevation but it is also much forested. Especially on the slopes of Mount Meru and Mount Kilimanjaro this is the case, implying that there is a stable supply of water. In these regions there are relatively many cross-breed cows that were introduced in the region since the 1970s. The Tanzanian government brought these cows from Kenya after discovering how the dairy sector was developing there. Due to the lack of grazing land the farmers often apply the zero-grazing concept. This also implies that farmers prefer not to keep large numbers of cattle. Feeding the many cows under the zero-grazing principle is very cost-, time- and labor-intensive and therefore farmers prefer to keep only a limited number of cows (less than 5 cows). Calves are sold to neighbors or on local cattle markets. In Arusha and Kilimanjaro traditional reasons for keeping cattle such as prestige play a less important role.

People in these regions that engage in dairy farming often live in small communities that are scattered on the slopes of the mountains. The variations in altitude complicate the transportation of milk which is why usually only the farmers that live relatively close to a MCC deliver their milk there. The Arusha/Kilimanjaro Region is characterized by a large number of NGOs that over time have been involved in the dairy sector there. These projects have assisted many farmers to organize themselves and have given them management and financial training. There is one medium-sized processor in Arusha with a maximum capacity of 10,000 liters per day and some micro-processors with a maximum capacity of 1,000 liters per day. Until December 2008, also Brookside from Kenya was actively sourcing milk in these regions⁴. Combined with the hawkers that serve the informal markets in Arusha and Moshi it means that there is substantial competition for raw milk.

Tanga

Tanga:	322,351 cattle
Processor:	Tanga Fresh

In the Tanga region, one large processor as well as some MCCs from processors in other regions are present. Part of the region is mountainous and relatively fertile and there are also several rivers along which cattle farming is feasible. Several farmers have cross-breed cows that were introduced over the years by government farms and heifer projects but there are also a substantial number of traditional cows. Some of the farmers apply the concept of zero grazing for keeping their cows yet pastoralist farming is a common practice as well. Tanga does not have a long tradition for cattle farming so cattle are mostly held for milk and meat production.

The population in the Tanga region is scattered over the entire region and there are many small villages. Most MCCs are located in these small villages where the farmers bring their own milk every day. Several NGOs as well as a foundation from the Netherlands (Farm Friends) support the breeding and distribution of improved dairy cows in Tanga. There is one major processor (Tanga Fresh) in the area with a maximum processing capacity of about 50,000 liters per day, which has some competition from smaller processors and a processor from another region that also sources raw milk from Tanga.

⁴ http://www.theeastafrican.co.ke/business/-/2560/593162/-/5y59l6z/-/index.html

4.4 Challenges

There are a number of structural challenges that have an impact on the functioning of the dairy industry in Tanzania. These problems are faced throughout the industry and form an obstacle to its development. They are the obstacles that the chain integrators need to take into consideration and try to address in their efforts to link smallholder farmers to the market.

Lack of trust. The lack of trust in the dairy industry is expressed by the unstable milk collection at the MCC. Farmers are usually not very dedicated to delivering their milk to the MCCs, which is a major problem for the dairy processors in Tanzania. Because of their opportunistic behavior, they are easily tempted to sell their milk to other processors or through other channels. For the processors, the uncertainty regarding their supply of milk can result in complications during the production process. At the same time, processors have also proven unreliable buyers of milk in some cases.

Unstable prices. The prices for milk fluctuate a lot. There are large differences between regions and between the wet and dry seasons. Prices for a liter of milk at the MCC range from 300 to 420 TZS. However, sometimes farmers receive a lower amount because they sell via a trader, who operates as a transporter, for a fee. On the informal market the prices can range between 400 and 600 TZS per liter. Yet, this price is difficult to determine as hawkers go from door to door and charge different prices for each customer.

Lack of organization. The many smallholder farmers in Tanzania show little initiative to organize themselves in production networks. These are important because they enable the farmers to speak with one voice and make it easier for the chain integrators to approach the farmers. Even though there are some registered farmers groups, there are too few and they have often received intensive support to help them formalize. It is not a disqualification to receive support in organization efforts, but the chain integrators need to ensure that the participants are motivated and dedicated to the network.

Seasonality. Another issue for the dairy sector is the seasonality of supply. In the dry seasons the milk production is very low and this intensifies the competition for raw milk between the hawkers (to informal market) and the processors (for milk processing). As competition is

mainly based on price, it enforces the opportunistic behavior of the farmers. In contrast, in the wet season raw milk is abundant, and not even all the milk can be bought and processed.

Market demand. The market for milk and milk products in Tanzania is a big challenge for milk industry. Official data suggest that Tanzanians only consume 39 liters of milk per year (MMA, 2008). The WHO recommends that a person should consume about 200 liters per year. This indicates that the consumption of milk in Tanzania is very underdeveloped. At the same time, the market is still largely served by the hawkers who operate in the informal market, leaving little opportunity for the milk processors.

Weak institutional support. The government's involvement in the sector is not very strong. There is little guiding regulation or support for the companies or the market in general (MMA, 2008). Regarding quality, the government does not indicate what the minimum standard should be. It is left up to the companies to decide their own standards. Also programs to support the market demand for processed milk are poorly organized. For example the school milk program that was initiated by the government several years ago was not sustained. The large informal market is not actively addressed by the government even though selling milk informally is officially prohibited.

These are urgent obstacles that hinder the dairy industry to further develop and complicate the activities of the chain integrators in their efforts to promote market linkages between smallholder farmers and the market. Nonetheless, chain integrators aim to address some of these challenges through their interventions in the industry. They way they do this will be discussed in the following chapter.

5 Analysis

In this chapter the chain integrators will be assessed in terms of their ability to address the challenges to the dairy industry in Tanzania that were presented in the previous chapter. In order to do so, first, the instruments that are available to the chain integrators need to be defined in their local context. Thereafter, the local chain integrators will be introduced, and their interventions aiming to reduce transaction costs, creating production networks and developing the resources of the firm will be analyzed per type of chain integrator.

5.1 Instruments for chain integrators

To enhance market linkages for smallholders, three purposes of interventions were previously identified, i.e. reducing transaction costs, creating producer networks and developing the capabilities of the firm. During the exploratory field research a number of topics were identified that need to be taken into consideration when organizing milk collection from smallholders. These topics were inspired by discussions with experts from the dairy industry. When looking for the practical implications of these topics, we come to the instruments that are used to organize milk collection in Tanzania, and thus the instruments that chain integrators can work with to create market linkages for smallholders. These instruments are available to each of the chain integrators in the Tanzanian dairy industry, but they are attributed a different meaning and value by each type of chain integrator. This will expose the intention and approach of each type of chain integrator to create market linkages for smallholders, and provides the basis for their comparison. The precise instruments will be explained below.

Reducing transaction costs

The following instruments are used to reduce transaction costs of working with many smallholder farmers.

Formalization indicates whether a model is formalized in terms of contractual agreements between the farmer and the processor.

Pricing refers to which actor sets the price in the value chain. It can be seen as a proxy for the division of bargaining power in the chain.

Reliability of supply deals with the stability of supply (in terms of quantity as well as quality) from a processors' perspective.

Payment shows assesses the models on the importance and prevalence of timely payments to the farmers.

Ownership is comprised of the following aspects: ownership of property, ownership of equipment, purchase of equipment, maintenance of equipment. Property includes the land on which the MCC is located, the premises on which it is located, and the building it is located in. Equipment is taken to include storage equipment (tanks), generator, scales, measuring equipment, and administrative supplies.

Management of MCC investigates whether the MCC is run by an agent or a manager from the company, and how the risk is allocated between the chain actors (i.e., who is liable in case of spoiling of the milk).

Transportation looks into who bears the costs for transportation, the distances that are covered for milk collection, and the use of mobile milk collection points in the model.

'Middlemen' shows the prevalence of hawkers / traders in the model, as well as their desirability from a farmers' and a processors' point of view.

Creating production networks

The following instrument measures to the organization of smallholders in formal production networks.

Farmer organization shows the degree of organization of farmers in farmer groups (presence of registered farmer groups) as well as the level of commitment of the farmers to the value chain.

Developing the resources of the firm

The following instruments focus on developing the resources of the firm.

Quality of milk assesses on which aspects and using which methods the quality of the milk is checked at point of intake (MCC).

Quantity of milk is comprised of the following aspects: Average capacity at the MCC level, ranking of models regarding minimum required intake to function well, and average dry season collection as a percentage of wet season collection (MCC level data).

Financial services shows whether credit and loans are made available to farmers and / or their organizations by downstream and / or external actors in the value chain.

Input supply services shows which input supply services (sometimes called extension services, taken here to include hygiene and animal handling training, availability of in-kind loans such as cow fodder, veterinarian services as well as support with AI or improved cattle breeds) are made available to farmers and their organizations by which downstream and / or external actors in the value chain.

5.2 Tanzania's chain integrators

After the development of this list of instruments, each of the chain integrators was tested and assessed, based on these criteria. Before presenting the findings of the field research, it needs to be clear who exactly are the actors that act as a chain integrator in the dairy industry in Tanzania. Table 2 presents the research sample of the actors that were investigated. As can be seen, each of the models of chain integrators is represented by one or more actors in the dairy industry. In addition, the region in which each of the actors operates is indicated to be able to take the regional context into consideration during the analysis (see section 4.3). A complete overview of the findings of the field research per type of chain integrator and per instrument is summarized in appendix 10.

	Mara & Mwanza	Arusha & Kilimanjaro	Tanga
Buyer-driven	Mara Milk Musoma Dairies		Tanga Fresh
Intermediary-driven		InternationalDairyproductsLlima NumbeWest Kilimanjaro DairyProductsNronga Women DairyCooperative SocietyLand o'Lakes ⁵	
Producer-driven			Tanga Fresh

 Table 2: Research sample of chain integrators

This sample was constructed during the preliminary research phase in which the models of chain integrators were determined. The final selection was determined by the willingness to cooperate, the relevance to the research as well as on several practical considerations such as time limitations and transport opportunities. Their activities that aim to develop market linkages for smallholders were analyzed in terms of the instruments that were introduced in section 5.1. Because these instruments are similar for each of the actors, the investigation will point out how each of the chain integrators gives meaning to the instruments. Consequently, this enables a detailed comparison of the approach of each of the chain integrators and provides an opportunity to assess their advantages and disadvantages.

5.3 Findings

The actors that are mentioned in table 2 will be described as an introduction to each of the models of chain integrators. Consequently, these actors will be assessed on their approaches

⁵ American NGO that has supported several farmers groups to develop their activities in the dairy industry.

to reduce transaction costs, build production networks and develop the resources of the firm, in the light of developing market linkages for smallholder farmers.

5.3.1 Buyer-driven model

The cooperation in the buyer-driven model is based on a direct transaction between the dairy processors and the smallholder farmers. The dairy processors have to turn to smallholders for their raw milk supply due to a lack of large milk production farms and a lack of capital to invest in private production facilities. The processors usually do not cooperate with intermediaries or farmer organization, and work with the smallholders on an individual basis. There is no contractual arrangement between the farmers and the processors so there is no obligation to buy or deliver for either party. Competition between processors or with hawkers is mainly based on price and trust. The cooperation with the farmers is usually initiated by the processor who is also in control of the entire collection process. This means that milk collection can be stopped at any moment if the milk cannot be processors have a hard time creating a common sense of responsibility. Consequently, input supply services (e.g. advance payment, trainings) are rarely provided as they require a greater dedication from the farmers.

Chain integrators

Following table 2, this model exists in two regions, namely in Mara & Mwanza and in Tanga. In Mara & Mwanza, Musoma Dairies and Mara Milk are the two prominent processors. These two firm have establishes several MCC that are spread over both regions. Each firm has a daily processing capacity of about 10,000 liter per day, with fairly modern processing equipment. Both firms produce UHT milk, which can be conserved up to six months after packaging in an unrefrigerated environment. Both firms have their largest markets in Mwanza (Tanzania's second largest market) and Dar es Salaam. They are only able to serve Dar es Salaam due to the fact that they produce UHT milk. The distance between Musoma and Dar es Salaam (about 2,000 km) would too much of an obstacle to transport fresh milk. The advantage of producing UHT milk is also that it can be consumed at a room temperature in the cooler wet season. Many Tanzanians find refrigerated milk too cold during this season, making UHT milk a good alternative in this time.

Also in Tanga we encounter the buyer-driven model, namely at Tanga Fresh. In fact this is quite a peculiar situation, because Tanga Fresh's origin lies in the producer-driven model. However, due to limited growth in production capacity and increased investments in processing equipment, Tanga Fresh was in need of more milk to be able to produce up to capacity. Because the farmer groups could not deliver more milk fast enough, Tanga Fresh decided that it needed to take its own initiative and look for more milk independently. The result is that the configuration of some of its MCCs has a strong resemblance to the buyer-driven model, which is why Tanga Fresh is represented in two of the models. Tanga Fresh mainly produces Fresh milk in small sachets that are mostly sold in Tanga and Dar es Salaam. Fresh milk needs to be refrigerated and will expire within a few days.

Transaction costs

In terms of reducing transaction costs, the buyer-driven model has a mixed track record. Due to the pure market transactions and low degree of commitment to the delivery of milk from the farmers, transaction costs are high in this model and pose a big problem for the milk processors. Delivery contracts are uncommon in Tanzania, because it is hard to enforce them legally. As some MCCs receive milk from over 500 farmers, it is very difficult to control the deliveries for stability. This makes it easy for the farmers to sell to the informal market if the price is better and thus leaves space for opportunism. Also interpersonal relations between the farmers and the MCC do not seem to have a clear positive or negative impact on the stability of supply. Therefore, the legal and moral arguments for a stable delivery are poor and create space for behavior that is solely focused on attaining the maximal personal benefit.

The problem of low commitment is enhanced by the fact that the equipment at the MCC (such as cooling tanks, milk barrels, generators, building, etc.) is usually owned by the milk processor. This makes sense as it is the processor who initiates the transaction, but it does not increase the sense of responsibility for delivery of the farmers. This type of ownership thus gives a lot of bargaining power to the processor, who decides on the price, the quantity and the terms of payment. However, in terms of building a durable relationship between the smallholder and the processor this seems not to be a particularly effective approach.

The management of the MCC is another issue that can be used as a tool to develop a better relationship between the buyer and smallholder farmers, and thus reduce transaction costs.

This specifically refers to the remuneration of the people working at the MCC. Most MCCs are managed by employees of the processing company (a 'manager') who receive a stable pay. However, in the buyer-driven model there are some MCCs that were run by an agent who is not a direct employee of the company. These agents are usually paid per liter of milk collected, i.e. in terms of performance. The key difference between these two types of management is their incentive to collect milk. Whereas the 'manager' receives a low incentive to raise performance because his salary is stable, irrespective of the quantity of milk that is collected, the agent has a higher incentive to perform because his salary is determined by his performance. Even though there are many factors that determine the supply of milk to a certain MCC, agents seemed to be more creative in building lasting relations with farmers than managers. This is expressed by handing out small presents (such as matches or salt) to farmers who deliver to the MCC regularly. A problem for payment according to performance is the low milk production in the dry season. In this period there is often a fierce competition for milk between the formal and informal sector that is mainly based on price. Because the agents have little influence on the price that is paid at the MCC and the prices on the informal market fluctuate a lot, agents have a hard time to compete with the informal market. Consequently this leads to lower incomes and a loss of motivation to perform well for the processor in the dry season. Nonetheless, the fact that the processors attempt to approach the matter in a more creative way shows that they are looking for new ways to create incentives for delivery. Working with agents brings the costs of the MCC more in line with its performance and can stimulate a more stable milk collection.

One of the processors in this model developed an entirely new system for the payment of management of the MCC. In order to raise the involvement of the farmers, the processor proposed to leave the management of the MCC up to the farmers themselves. To make this system work, farmers would have to unite in a registered farmer group and share the responsibility for the collection of milk. The farmers that are part of the farmer group would receive a small price premium as an incentive to join the cooperative and deliver to the MCC. Non-members would receive the same price per liter as in the current system. This method was not in operation during the time of the research so it is not possible to judge its effectiveness. However, the involvement of farmers in the milk collection process and giving them economic incentives to do so has the potential of building a closer relationship between the processor and dairy farmers and thereby to raise the commitment to deliver to the MCC.

Middlemen play an important role in the buyer-driven model. In particular as a transporter they provide an important service to the farmers and processors. Farmers who live far away from the MCC are often not able to deliver milk because it is too time-consuming. The transporters can reach the farmers by bike and collect a lot of milk (up to 100 liters per bike) which they bring to the MCC. Middlemen have both a positive and negative influence transaction costs. As a benefit to the MCC and the farmers they provide valuable transportation services that expand the reach of the MCC and give more farmers the opportunity to deliver to an MCC. In addition, they are often able to transport large quantities of milk, and by working with middlemen farmers can save a lot of time that they can spend on other productive activities. Nonetheless, middlemen are not always desirable in a milk collection system. Problems of working with middlemen concern their reliability and the indirect communication between the farmer and the MCC as a result of working with middlemen. Particularly the latter poses a problem for the long term relation between the MCC and the farmer. Middlemen are sometimes dishonest about prices and terms of sales, leading to a negative perception of the processor by the farmer. Without direct contact between the farmer and MCC, they both have to rely on information that they get from the middlemen. A more direct line of contact between the two parties would therefore be desirable and would probably reduce the problems that are incurred through the cooperation with middlemen.

Networks

In the buyer-driven model, very few registered farmers groups were encountered. The dairy processors did not make many serious efforts to support official producer cooperation either. The processors did not see it as their task to organize the farmers in registered groups, because it takes a lot of time and effort. They suggested that it was up to the farmers themselves to develop and manage farmer organizations. Nonetheless, the processors recognized the potential of working with farmer groups instead of with individual farmers. It is easier to negotiate and make specific agreements with such organizations and build a long-term relationship with the producers. It would provide the processors with a more stable supply and give them the opportunity to develop capacity together. Despite these advantages, most of the transactions occurred on an individual basis, either with the farmers or the middlemen.

The farmers did not have a particular interest in forming the farmer groups either. They did not see any notable advantages and thus made no efforts to work together. One farmer mentioned an initiative of cooperation, but instead of focusing on exploiting new opportunities with other farmers, the main purpose of this organization was to attract subsidies that the state provided for newly established farmer groups.

Resources of the firm

The resources of the firm were relatively poorly enhanced by the buyer-driven model. When talking about the resources of the firm, this mainly refers to the farmer level, i.e. the types of cows, fodder, medical care, milking equipment etc. In Tanzania, most farmers are not specialized in dairy farming. This means that they keep cows aside from their other farming activities. The milk is used for private consumption and the animals are also kept for meat. The surplus of milk is sold to earn money that can pay for the expenses of the cows and earn some extra income. As dairy farming is not the priority of most farmers, they usually do not actively aim to increase production quality or quantity. However, the dairy processors could inform the farmers of the benefits of developing their resources and production capacity. If farmers would take a more professional attitude towards their dairy farming activities, they would be better able to serve the formal market and work with other actors in the industry.

Processors have the capacity to raise the awareness of better production methods through their pricing mechanisms. By developing saving schemes that can pay for emergency expenses such as medical care or artificial insemination, the production capacity of the farmers can be further developed. Also food supplements or equipment can be made available at the MCC and included in the price for a liter of milk. The field research demonstrated that the dairy processors rarely tried to include any production enhancing pricing mechanisms. The farmers were paid a fixed price with few opportunities to save money or buy input supplies.

The development of the recourses of the farmers should be seen in relation to their commitment to the model. These kinds of activities are only worthwhile if they can be scaled up and are appreciated. In the current system where milk supply is unstable and farmers have a low sense of responsibility it is not wise to invest in services for the farmers. To make these kinds of activities effective they require dedication from the farmers and continuous

communication between the farmers and the processor. Therefore, processors first need to develop the commitment of the farmers in order to offer the input supply services effectively.

5.3.2 Intermediary-driven model

The 'intermediary' in the Tanzanian dairy industry usually refers to an NGO. There are foreign NGOs that operate in a number of different industries among which the dairy industry. An important characteristic of this model is that the NGOs require registration as an official farmer group in order to be eligible for assistance. The NGOs often try to strengthen the farmer groups e.g. by means of training and financial assistance. Usually, the NGO identifies existing farmer cooperations and tries to further develop these into a formalized group. These groups are likely to engage in small-scale dairy processing of their own, and have a relatively high degree of bargaining power vis-à-vis larger processing firms. A strong point of this model is the involvement of the local community and the social systems within a farmer group. Its members feel responsible for the activities of the group and its performance. Therefore they are committed to deliver their milk to the MCCs and ensure a stable supply. In most cases, the group manages its own collection and processing and organizes the distribution of the products. Additional services are likely to be available in this model. NGOs often support the provision of input supplies that help develop the production capacity or establish connections with organizations that can provide financial or other services.

Chain integrators

The actors that were investigated who represent this model all come from the same regions, namely Arusha/Kilimanjaro. Of major influence on the dairy activities in this region is the American NGO Land o'Lakes. This NGO has been actively involved in the sector for a number of years and has supported many farmer groups in their efforts to formalize and professionalize their activities in the milk industry. The farmers groups that received support from the NGO possess basic processing equipment with a limited capacity (usually not more than 1,000 liter per day). The capacity of the Llima Numbe farmers' cooperative should even be considered very basic. Important for the farmers groups is that they at least possess some cooling and collection equipment. In case of problems of production or lack of demand for products they can sell their milk directly to the market. Because the quality of the milk that passes through a collection center is usually checked and therefore has good reputation, this

milk can be sold quite easily on the informal market. The processed milk or yoghurt is usually sold in small sachets in small shops or kiosks in the vicinity of the farmer groups.

An exceptional case in this model is the dairy company International Dairy Products Limited with an average daily processing of 4,000 liters of milk. This company mainly produces yoghurt, cheese and ice cream for the tourist sector and sells to hotels all over the country. This firm is included in the intermediary model as is buys mainly from professional dairy farmers (who are outside the focus of this research) and farmer groups that have worked together with an NGO. The latter case is interesting because it is one of the only situations in Tanzania in which a farmer group that has received external support works together with a larger, private dairy firm. Even though the farmer group also sells directly to the market on its own, it sells about half of its daily collection to the dairy company at pre-negotiated terms. The farmers did not seem particularly happy with these terms of sales, yet the relation had been rather stable for an extended period of time.

Transaction costs

In the intermediary-driven model there is *usually* no large dairy processor involved. Instead, the farmer groups engage in their own processing activities. This also has an influence on the transaction costs. These are usually addressed by the 'management' of the farmer group with support of the NGO. Because the basis for this model is the formation of an official farmer group, a sense for cooperation should be present. It is expected that this willingness to work together and shared responsibility reduces the transaction costs to some extent, but it is still worthwhile to investigate the concrete efforts that are made in this model.

The voluntary participation of the farmers in a farmer group demonstrates their intention to be a part of the system and indicates a high motivation to do so. In addition, the support of the NGO usually works as extra motivating factor. Even though legal contracts are also not common in this model, there is a strong social control over the performance of the members. This sense of responsibility makes farmers more committed to the model and reduces opportunistic behavior such as selling to spot markets for incidentally higher prices.

An additional factor that positively influences the functioning of this model is that the equipment at the MCC is usually owned by the farmer group. This makes the members of the

farmer group feel more responsible for the operations at the MCC and its performance. As soon as one of the members produces less milk than usually there is an incentive to address this problem as it has an impact on all the members.

Even though the ownership situation in the intermediary-driven model raises commitment, it also has some drawbacks. The equipment for the MCC is sometimes provided by the NGO. This is useful because it might be too expensive for the farmers to buy all the equipment at once. Farmers are unlikely to make such a big investment on their own as they have few savings and probably would not be very tempted to spend all their money on the equipment. The result is that the equipment is often given to the farmer group without any costs for the smallholders. This raises the question whether the equipment will be used with the same care as when the farmers would have had to pay for it themselves. In any case it poses unfair competition to farmer groups who did not receive the support. One of the NGOs tried motivate farmers by setting up a repayment scheme in which money was saved with the intention to pay for the equipment. When enough money was saved up, the NGO suggested that the amount should be invested in better equipment or a generator to support the business. The aim was thus to show the farmers that it was possible to earn money while at the same time saving money for new investments. This approach was often successful according to the NGO.

Another matter is that small farmer associations who own their own equipment are unlikely to work with larger dairy processors. Processing in the intermediary-driven model usually occurs on a limited scale and is unlikely to exceed a daily capacity of about 1000-2000 liters. NGOs normally support an association until its functioning is stable. After that it is up to the farmers. This is an important limitation to the intermediary-driven model, because a daily production of up to 2,000 liter does not provide ample economies of scale. In addition, it turns out that farmers in the intermediary-driven model are unwilling to cooperate with larger dairy processors and are unable to come to satisfying price agreements. They have such a strong bargaining power because they are full owners of the equipment; this thus leads to a power imbalance that is the opposite of the situation in the buyer-driven model. There is one case in Tanzania in which the farmer association works together with a processor because they could not find a purpose for all the raw milk that they collected. Therefore, they opted to sell part of

the milk to the processor, even though they were unsatisfied with the terms of their arrangement.

The management of the collection centers in the intermediary-driven model is usually in the hands of a member of the farmer group. Payment of this person is usually not dependent on the performance of the MCC, so he or she receives a steady salary. As discussed in the buyer-driven model, this type of remuneration does not specifically stimulate the performance of the manager at the MCC. Despite this, and due to the fact that the manager and the farmers are a member of the same farmer group, it is expected that farmers and managers are intrinsically more motivated to deliver to the MCC for it to perform well. Due to these circumstances it is expected that the type of payment to the manager of the MCC is therefore of lower importance in this model.

Middlemen are largely ignored in the intermediary-driven model. In this model, the interest of the farmers to stay closely involved with the MCC is high. Working with middlemen often increases the distance between the MCC and farmer. Because farmers are partial owners in this system they prefer to work in close contact with the system. Farmers thus prefer to bring the milk to the MCC on their own. Another factor adding to this is that some of the farmers groups are located in mountainous areas. In these areas it is hard to move around with large quantities of milk by bike. This also offers an explanation for the relatively short distances that are covered in this model.

Networks

Networks are an important part of the intermediary-driven approach. The precondition to be a registered farmer group indicates that it is very important to take cooperation seriously. Networks are mainly stressed so much because it is the aim of the intermediary to cease the intervention after a certain period, after which the farmer group is expected to operate independently. NGOs have experienced that the sense of responsibility for the operations at the MCC is stronger when shared with other farmers. When farmers notice that their efforts pay off they are willing to make investments in production and processing equipment in order to develop their market opportunities. Most farmers in this model seemed to be happy with the operations and took it seriously. Even though the gains were not very high, they were content with the opportunity to earn a little extra money that could cover their expenses.

Resources of the firm

The intermediary-driven model takes a more professional approach to the development of the resources of the farmers. With the support of NGOs, farmers get training in how to handle their animals and take care of them when they are ill. In addition, farmers are stimulated to make use of artificial insemination to breed better cows that give more milk and meat. Fodders with nutritious ingredients that are good for milk production are also available at the MCC. Many farmers in the intermediary-driven model own cows that are cross-breeds. These cows give more milk and better and more meat. It is a result of stimulating farmers to breed better cows for a long period of time. Already in the 1980-1990's the government promoted artificial insemination and this trend was continued by the NGOs after the government reduced its activities. Most of the NGO support went to farmers in mountainous regions. Due to dense forests on the mountain slopes, the traditional herding principle of pastoralism cannot be applied. It thus takes a lot of effort to maintain and feed the cows as they have to be held close to the house in a small enclosed space. Therefore It is convenient to keep better cows so that farmers only need to keep a limited number of cows to reach a satisfactory production capacity.

Due to the close relationship between the farmer group and the MCC, it is also possible to get advance payments in case of emergency. Farmers will repay this advance with their milk delivery. Sometimes the NGO also makes loans available. Farmers use these loans to invest in small businesses or pay unexpected bills. The social system that is created around the milk collection ensures repayment. If farmers in a farmer group default in their loans this has a negative impact on the rest of the group. Therefore this can be considered as a form of social pressure that pushes farmers to repay their loans.

5.3.3 Producer-driven model

The producers are in a central position in the producer-driven model. Similar to the intermediary model, the farmer groups require registration and membership to enjoy most benefits in the model. Primarily this is the guarantee of buying the milk that provides a lot of certainty to the farmers and thus creates a lot of trust. In addition, the farmer groups and the processor provide the opportunity for smallholders to buy better cows, to buy input supplies and to obtain loans or advance payments which are beneficial to the farmers and their production capacity. The farmer group is also in charge of the MCC and gets a small amount

from the union to pay for its expenses such as diesel for the generator, rent and salaries. Middlemen are uncommon in the producer-driven model because they are not a direct member of the farmer groups.

Chain integrators

Tanga Fresh from the Tanga region is the only case that could be investigated that represents the producer-driven model. This company is by far the largest dairy processor in Tanzania, with a daily processing capacity of 50,000 liters of milk and an actual daily processing of 20,000 - 30,000 liters. The structure of this model in the Tanzanian context is as follows: The dairy farmers that want to deliver to the MCC can become a member of the farmer group that runs the MCC. Also non-members can deliver, but in case of oversupply (in the wet season), the non-members are the first ones that are denied to deliver. Several farmer groups together have formed a cooperative union, in which each of the groups is represented by one or two representatives. Furthermore, the union has invested in professional processing equipment and a factory that is now Tanga Fresh. Originally, this model was supported by dairy farmers from the Netherlands and donor aid, but this support was officially ended in 2005. Because of investments in a new and larger processing facility, the union currently has a large stake in the company together with a financial institution from the Netherlands (sleeping partner) and two private investors. The main market for Tanga Fresh is Tanga region and Dar es Salaam. The milk is contained in small sachets of 250 or 500 ml. A truck brings the milk to Dar es Salaam after which is it distributed over a number of smaller vehicles that go around town and sell directly to the customers. Some of the milk also goes directly to small shops or supermarkets.

Transaction costs

Similar to the intermediary-driven model, transaction costs are partially addressed by the great involvement of the smallholders. As the farmers are the actual owners of the processing facilities they have a high responsibility to make the model work. The MCC is important for them and they feel responsible for its performance. It feels natural to sell the milk to the MCC, especially if you are a member of the union.

There is only one case of the producer-driven model in Tanzania. The area in which it is located is not a milk producing area by origin. The fact that it was developed as a dairy production area adds to the trust that the farmers put in the model. Even though there are no official delivery contracts, farmers bring their milk to the MCC on a daily basis and actively participate in the model.

Farmers are member of a farmer group in this model. Membership of the union is preferred, especially if a farmer plans to sell his milk on a regular basis. The farmer group organizes regular meeting. In these meetings, someone is chosen to represent the group at the union's meeting. The union consists of about 28 groups. It has an important say about what happens with the dairy processing plant.

The ownership of the equipment at the MCC is probably most in balance in the producerdriven model. As the farmers are also the owners of the factory, they also own the equipment in part. In reality this means that the equipment of at the MCC only supplies to the processing plant. Farmers cannot decide to use the equipment to sell to other processors. On the other hand, the processor cannot decide to replace the equipment and source the milk from a different location unless the farmers agree to that. This creates a good balance of power and divides the bargaining power between the farmers and the processor. As a result it increases the commitment from both the farmers and the processor.

Nonetheless, one of the striking findings in this research was that one of the MCCs in the producer-driven model was selling milk directly after collecting it. Up to 30% of daily collection would be sold to people from the village. Management of the MCC justified this by arguing that the price that the processor paid was insufficient to cover costs. The margin of the milk that was directly sold was higher and therefore it was difficult to resist the temptation. At the same time the processing plant was in dire need for more milk. Due to a recent investment in expanded processing capacity the plant was currently operating under its capacity. In order to minimize the operational costs more milk was needed. The processor attempted to solve this problem by setting up MCCs of its own. These were not operated by farmer groups and are comparable to the MCCs in the buyer-driven model. Clearly, this example shows a high level of miscommunication between the factory and the members of the union. As the model requires a high level of participation, it also requires a high level of communication.

The situation of management in the producer-driven model is rather similar to that in the intermediary-driven model. At the MCCs there is no incentive remuneration that motivates the managers to perform better. Membership of the farmer group and the union should provide for sufficient intrinsic motivation to encourage farmers to deliver to the MCC. The example of 'side-selling' points out that there are currently some issues with the intrinsic motivation of the management of the MCC. Management has lost its motivation to fully cooperate with the processing plant. Nonetheless, the delivery levels by the farmers remain relatively high. It thus seems that the farmers don't need an extra motivation by the MCC's management to perform well, but that the management needs to work closer together with the processor.

Also in the producer-driven model the middlemen are largely ignored. Because they are unpredictable and hard to control they are often excluded from the milk collection process. Their unreliable nature would raise transaction costs in terms of monitoring costs. To be able to work with them would require a strict dedication to the system and a free flow of information. The middlemen could act as a connecting factor instead as a dividing factor. In such case, the middlemen would become a mediator that brings farmers together and has the potential to reduce transaction costs.

Networks

As in the intermediary-driven model, the farmer groups provide the backbone of the system in the producer-driven model. Farmers become a member of a group, and in exchange they are allowed to always deliver to the MCC. They get preference over non-members, which is particularly relevant in the wet season when there is a large supply of milk. In the past this has led to intentional waste of milk by the processing factory, just to retain the confidence of the farmers in the system.

The farmers groups are so important because they are a member of the dairy union. This union owns a large share of the dairy processing plant, shared with a bank and two private actors. Through this union the farmers are directly affected by the dairy processing and sales activities. This is why they feel a strong commitment to the model. Nonetheless, the many layers in this model also increase the 'distance' between the different actors, which could develop into a disintegrating factor in the future.
Resources of the firm

The possibility to develop the resources of the farmers is probably best enhanced in the producer-driven model. The pricing mechanism for a liter of milk is designed in such a way that is it provides for many additional services if the farmers want to upgrade their production. One of the major opportunities for the farmers is the dairy breeding farm. On this farms special dairy cows are bred that can deal with the local weather condition and give the maximum amount of milk in these circumstances. Farmers can pay for these cows by delivering milk to the MCC. Many farmers have taken advantage of this opportunity and as a result the quality of the cows of the farmers in this model is very high.

The MCC also offers several services to develop production quality and capacity. Farmers usually get paid for their deliveries once a week or once a month. During this period farmers have the possibility to buy medicine for animals that are ill. This amount will be subtracted from their total income at the end of the period. Also fodder for the cows can be purchased in this manner. This is special fodder for cows that gives them necessary vitamins that they don't get in their regular diet. This way, the milk production can be optimized.

Finally, the smallholders also have access to some financial services. It is possible for farmers to get an advance payment of their future income in case of emergency. This amount will later be subtracted from their periodical payment, just like when they buy other input supplies. Farmers also pay a small fee of 2 TZS per liter of milk. This amount goes into a kind of fund to which the farmers can apply to get small loans. They can use these loans to invest in small shops or other initiatives. These loans need to be repaid.

5.4 Summary

Table 3: Summary of findings

	Buyer-driven model	Intermediary-driven model	Producer-driven model
Reducing transaction Costs	Low level of commitment Equipment owned by processor leads to unbalanced bargaining power Fixed and performance-based salary for MCC management creates incentives to perform Middlemen are used as transporters	High commitment due to involvement and trust Equipment owned by farmers leads to unbalanced bargaining power Fixed salary for MCC management but intrinsic motivation to perform Middlemen are undesired as they reduce contact between farmer and MCC	High commitment due tohigh involvement andownershipEquipment owned byfactory and farmers leadsbalance of bargainingpowerFixed salary for MCCmanagement but intrinsicnotivation to performUse of middlemenuncommon for members offarmers groups
Creating production networks	Processors not motivated to create farmer groups Little initiative from farmers to cooperate	Registered farmer groups a precondition for intervention from NGO The networks create a connection to the model and enhance performance of the farmers	Farmer groups are the foundation of the model The networks are the drivers of the model and create a sense of responsibility through ownership
Developing the resources of the firm	Resources of the firm poorly enhanced in the model Little interest from buyer to develop resources and provide financial flexibility	NGOs train farmers to improve production methods Certain input supplies are available as are financial services	The processing factory organizes many services to improve production (dairy breeding farm) Input supplies and financial services available at the MCC

6 Discussion

This chapter will discuss the findings of the preceding analysis by comparing the different types of chain integrators on each instrument. This approach provides a good indication of how each chain integrator treats its instruments that aim to develop market linkages for smallholders. In addition, this chapter will come to the generalizations of this study.

6.1 Importance of chain integrators

At the outset of this thesis the assumption was made that smallholder farmers have difficulties linking up with formal markets. Factors such as low levels of education, limited financial resources, low production capacities and weak cooperation between farmers contribute to the market isolation of smallholders. They mainly serve local markets with low quantities and low growth potential. The result is that smallholders usually have to engage in several different farming activities such as keeping cattle, growing corn or maize, and cultivating some vegetables, in order to be self-sufficient. The money that they earn by selling some of their produce is immediately spent on basic commodities, resulting in a low savings rate.

Global value chain literature supports the notion that small farmers have difficulties entering new markets individually. With markets becoming increasingly international and specialized, complexity increases. Many industries face stronger foreign competition and require higher quality and production standards. Smallholders cannot live up to these standards, and therefore have a hard time to compete in international markets.

Chain integrators have played an essential role in raising the competitiveness of small farmers in developing markets. GVC literature provides several examples in which small suppliers or farmers have been enabled to serve new markets thanks to the support of a chain integrator. These examples confirm the importance of the chain integrator, yet they fail to explain their approach and motivation to do so. Those factors are largely dependent on the shape and capacity of the integrators, which is also determined by the type of actor they represent. Vorley et al. (2008) acknowledge this fact and have consequently developed a typology that combines groups of actors to enable comparison between these groups.

In the Tanzanian dairy industry we also see the involvement of chain integrators in the development of market opportunities for smallholder farmers. Due to the informal and unorganized nature of the dairy industry in Tanzania, most farmers keep few cows, serve local markets and consider dairy farming as only one of several farming activities. Through the presence and interventions of chain integrators, smallholders now have access to new, formal markets and sometimes even start to realize the potential of a more professional approach to dairy farming. Many farmers that are involved with chain integrators work with them on a regular basis, as it provides an attractive alternative to the informal, local markets that pose many uncertainties. Serving new markets together with or in service of a chain integrator often offers security and stability. Farmers get the opportunity to develop their production facilities and learn to take better care of their animals. In Tanga, farmers are even guaranteed a market for their milk if they commit themselves to the system by joining a farmer group. The traditional system does not offer these specific benefits, which makes the chain integrator an attractive partner to work with.

6.2 Role of chain integrators

Smallholders in Tanzania often face several different problems that hinder their ability to develop new market opportunities independently. An obvious lack of education limits their ability to recognize or develop business opportunities. Furthermore, traditions and routines can also pose a problem for business development, for example when cows are solely perceived as a sign of wealth, reducing its importance as a producer of milk and meat. Financially, producers are in a weak position as well. Low incomes lead to low savings, and their lack of collateral and/or education reduces their creditworthiness. It is very difficult to enter new markets without capital to invest. Yet another problem is the small scale of production. Farmers usually own traditional cows that are very well able to withstand the local weather conditions in Tanzania but they produce little milk and meat. In addition, most farmers only own a limited number of cows (usually fewer than 10 cows), leading to a low production per farm. Combined with fact that these farmers live in remote, rural areas that are hard to reach, their position on the market is particularly weak.

Chain integrators attempt to address these weaknesses of the farmers and help them to create new opportunities. Their attention goes to education and training, organization and improving production facilities. Overall, their efforts aim to serve three purposes, i.e. reducing transaction costs, creating production networks, and developing the resources of the firm. On a microeconomic level this means that they have to pay attention to many details. Of central importance in the Tanzanian dairy industry is the milk collection center. This is the place where the buyers and sellers meet to engage in market transactions, and is therefore the logical place to start building a sustainable relationship aiming to trade raw milk.

The preliminary field research exposed that there are many things that need to be taken into consideration when developing a sustainable system for milk collection. The set up of factors such as remuneration, transportation, additional services, etc. (section 5.1) all influence the decisions of smallholders and thus have the ability to contribute to a durable cooperation arrangement. It is sometimes a challenge for the chain integrators to align their interests with those of the farmers. This research showed that farmers generally take a short term perspective, meaning that they are focused on direct gains (as in cash) and invest little in the development of their production capacity and market access. In general, chain integrators take a long-term perspective, meaning that they prefer build durable market relations with smallholders and would prefer that farmers develop their production capacity and quality and commit to the dairy business.

Producer networks are a useful tool to strengthen the position of farmers vis-à-vis the market. The aim of these groups is to create a shared responsibility among farmers and to have them stimulate each other to perform and deliver. These groups are seen as a starting point for a system in which the farmers take a higher level of responsibility or even manage their own dairy processing activities. Particularly NGOs and producer-driven initiatives have a strong track record in this area, as they often focus on the empowerment of smallholders.

Furthermore, chain integrators put their attention on the development of the productive resources of the farmers. With poor quality resources it is very challenging to develop new market linkages. Farmers therefore need to upgrade their resources, in terms of better quality cows, special fodder, good animal handling and the opportunity to attract capital to invest. For the traditional smallholders this requires a change of mindset, from considering their dairy activities as a side-activity, to approaching it with a more professional attitude.

6.3 Chain integrators compared

When comparing the three types of chain integrators, it is clear that each type has its own strengths and weaknesses. The regional context has an influence on the functioning of a chain integrator, but the emphasis here lies on their background and motivation to intervene. This section compares the different approaches of the chain integrators to develop market linkages for smallholders, thereby giving a recommendation of which elements contribute to the performance of an approach and in which way these elements should be implemented.

Transaction costs will be discussed in terms of four topics that were also touched upon in the analysis chapter, section 5.3 in particular. These topics are: commitment/trust; ownership of equipment; remuneration of MCC staff; and use of middlemen.

Trust is an important factor when trying to build a durable business relationship with smallholder farmers. On the informal dairy market in Tanzania, there exist many uncertainties. Farmers are never certain whether they can sell all the milk that they produce on the informal market. If they are too late or if there is too much competition (for example in the wet season when the production is high), they are not sure to sell all their milk. Sometimes they work with hawkers that collect the milk at the farms and then try to sell it at the market. Many farmers have experienced that these hawkers are very unreliable, especially regarding their payments. Thus, in order to compete with the informal market, chain integrators can focus on earning the trust from the farmers. This research shows that the trust of the farmers is higher in the intermediary-driven and producer-driven models, than in the buyer-driven models. In the buyer-driven model the dairy processors mainly try to create commitment through stable prices, timely payments and regular milk intake. Even though many farmers appreciate those aspects, they are not a binding factor for the farmers. Sometimes, the dairy processors cannot live up to their promises, damaging the faith of the farmers in the model. Despite the fact that problems are often a result of external factors such as power cuts or a lack of clean water, farmers prove to be very unforgiving and demand time to regain their trust in the model. In the intermediary-driven and producer-driven models, farmers have a much stronger belief in the functioning of the model. This is probably because they feel much more involved due to the membership of a farmer group. Membership enables them to contribute to the decision-making process. Farmer groups thus have a much better ability to communicate with the farmers in case of unforeseen events. Farmers that are member of the groups also have a special interest in the performance of the milk collection, because they pay membership fees or receive special benefits. If one needs to distinguish between the intermediary-driven and producer-driven models, trust is probably highest in the producerdriven model. This can be explained by several factors that will be discussed later on, but also due to the fact that the producer-driven case in Tanzania has a large capacity and a wellstructured organization to support its activities. Despite the side-selling activities at the MCClevel (discussed in section 5.3.3), the commitment of the farmers to the MCC is very high. Deliveries are relatively stable and the collection of milk has grown at a stable pace over the past couple of years. At the same time this poses one of the biggest threats to this model. Due to its current size (in terms of liters of milk and number of farmers), the communication between the farmers, the union and the processor seems to be disturbed. Communication lines become indirect, leading to a greater distance between the farmers and the processor. This is a dangerous development for the model, and a continuation of this trend can severely reduce the trust of the farmers in the model. Therefore, it is important that the managers in this model stay in close contact with their members and try to refocus on the essentials of this model.

The ownership of equipment is a factor that can bring balance to the model and thus reduce transaction costs. By creating ownership for the farmers they become more committed to a model and feel responsible for its performance. In the buyer-driven model we saw that the farmers do not own any of the equipment at the MCC. This does not contribute to their sense of responsibility and commitment to the model. In the intermediary-driven model the farmers are usually the full owner of the equipment. Sometimes this leads to a high sense of responsibility, especially if they have contributed to the purchase of the equipment through saving plans and by participating in the decision-making process. However, this case also shows that intermediary-driven projects usually stay limited in size, because the external support is often reduced after the initial phases. If the capacity is not further developed after a certain point this can be a demotivating factor for the farmers, and easily tempt them to fall back into old habits. In addition, due to the habit of working independently and process the milk on their own, intermediary-driven projects are not easily tempted to work together with larger dairy processors that have a larger capacity. Most farmers groups reject this option in advance, even though it could provide a viable solution to their own deficiencies. The ownership of equipment is probably best arranged in the producer-driven model. In this model the interdependence between the processor and the producers is in balance leading to a high commitment from both the processor and the farmers. . None of the actors has the possibility to solely decide to use the equipment to serve other actors, which is a compelling factor. It provides an incentive for both parties to perform and negotiate, creating the optimal results in return

The remuneration of the MCC-staff can work as an extra incentive for the performance of the MCC. It is also an aspect on which the chain integrator has a large influence. It should be said that the buyer-driven model uses most creativity regarding this factor of the three models. By using different types of payment, in the buyer-driven models the dairy processors try to stimulate their employees or agents to perform better and to build lasting relationships with their suppliers. The performance payment that is applied in the buyer-driven model can be one way to motivate employees to work harder. It is certain that the price is an important motivator for farmers to deliver to the MCC. Approaching the price in a creative manner can therefore lead to new solutions that stimulate farmers to work with an MCC. The initiative by one of the processors to work with self-management of the farmers and pay them a premium thus seems a very persuasive initiative in this respect. As for the other two models, their approach is the same. There is no performance payment or membership premium. A mediating factor in these models can be that the management is usually in the hands of members of the farmer groups. They are therefore assumed to be intrinsically motivated to perform well, and so should be the farmers. A performance pay thus seems a bit redundant. However, paying membership premiums can be an attractive option in these models as well. At most MCCs there are also non-members delivering their milk, thus a price premium could stimulate more farmers to commit to the model and take a more professional approach to their dairy activities.

Working with **middlemen** is a delicate issue in the Tanzanian dairy industry. The ones that are delivering to the informal market are generally considered unreliable and arbitrary. They pay a different price to each farmer and are said to add water and cassava flour to fresh milk to increase the quantity of 'milk'. Despite these accusations, many farmers and dairy processors work or have worked with these 'hawkers' on a regular basis. The negative attitude towards middlemen is also expressed in the models for chain integration. The buyer-driven model is the only model that actively uses middlemen to supply their MCCs. The middlemen work in the capacity of transporter, and usually bring (a part of) their collected milk to the MCC. For the dairy processors it is convenient to work with the middlemen as they usually deliver large quantities. However, problems with the quality of the milk and the distant relation with the farmers are complicating factors. Particularly the latter is a problem. If the farmers have no direct contact with the MCC, they are unaware of the prices and conditions of selling milk at the MCC. This gives a high bargaining power to the middleman relative to the individual farmers. Middlemen use this as an advantage and push down the price for the farmers. This reduces the incentive for the farmers to perform well and adds to a negative attitude towards the MCC and the dairy processor. The loss of contact is probably also the reason why middlemen are rarely encountered in the intermediary-driven and producer-driven models. Because farmers prefer to be closely involved with the MCC, middlemen are undesirable and hardly ever used. Nonetheless, middlemen can fulfill an important function in the milk collection process. Due to the fact that they are very mobile, can transport large quantities and have detailed knowledge of the region, they should not simply be ignored. It would be interesting to see if these middlemen can also be integrated in the dairy collection model. They could be given a stake in the performance of a collection center or they could be employed by the farmers or dairy processors. This can contribute to making their involvement fairer to the other actors while still making use of their unique position in the value chain. Only the buyer-driven model currently attempts to work with them. For the other models, this might be a missed opportunity.

In **summary**, the transaction costs are addressed differently by each of the models, although the intermediary-driven and producer-driven models take a similar approach. Their aim is to increase the trust and sense of responsibility of the farmers so that their actions reflect their commitment to the models. This reduces the need to create micro-economic incentives, such as motivating MCC manager by performance payments, but at the same time it puts strong faith on the integrity of the farmers. On the other there is the buyer-driven model that places a stronger emphasis on economic incentives to develop trust and commitment. This research concludes that the efforts in the buyer-driven model are generally not sufficient, at least not to build a reliable, long-lasting relation with the farmers. It seemed that every day the collection of milk was uncertain and that any interruption in the daily operations of the dairy processor could also lead to a disturbance of the relation between the farmers and the dairy processor. In comparison, the intermediary-driven and producer-driven models build trust and commitment trough participation of farmers in milk collection to develop their sense of responsibility for

the performance of the model. This seems to be an effective way of reducing transaction costs, yet these models should be wary of complacency. Direct communication and interaction with the farmers is a precondition for success with this approach. This should not be taken for granted because that would lead to problems and annoyances that can have destructive effects on the models.

The formation of formal production networks is another important factor that sets the models apart. The distinction between the models in this respect is quite clear: the buyerdriven model does not actively support farmer organization in registered farmers groups, whereas the intermediary-driven and the producer-driven models do. In fact, in the latter two models, organization and self-management of the farmers is a precondition. This is because the chain integrators aim for farmers taking the responsibility of the dairy activities in their own hands. Nonetheless, there are some farmers that are not a member of an association that delivers to the MCCs in these models. The focus of the intermediary-driven and producerdriven models on farmer groups is aimed at developing a sense of shared responsibility among the farmers. This means that performance is not only important for the individual farmers, but it also affects the others farmers in the group. It thus creates social pressure to commit to the model and perform in terms of milk delivery. The difference between the intermediary-driven model and the producer-driven model is the scale of activities. In the producer-driven model the aim is to scale up from the level of the farmer group to a union of farmers groups and possibly professional processing activities. The intermediary-driven model does not express this ambition, as it stops at the farmer group level. When a system is successfully designed at this level the chain integrator usually ceases the intervention. In addition, in the intermediary-driven model there is a stronger support from the external actors that functions as a chain integrator to develop the networks. In the producer-driven model, this pressure for organization comes from within the model though the farmers groups.

The development of the **resources of the firm** is the final factor on which the models were compared. This is mainly assessed by whether farmers are supported and encouraged to develop the quality of their herd and production and if there are input supplies available that help them to take better care of their animals. Also loans or advance payments can develop the resources of the producers, as it gives them financial means that they can invest in more or better animals. Particularly in the buyer-driven model the advancement of the resources of the

farmers was weakly supported. There are no specific programs that offer input supplies to the farmers. The veterinarians worked independently from the MCCs and also medicines were not readily available. Moreover, farmers had little opportunity to generate additional financial resources or advance payments. Due to the unstable delivery of raw milk to the MCC, the processors saw no opportunity to offer financial resources to the farmers. This could only work in a system, in which the farmers are truly dedicated to the model. As this was not the case, the processors showed no interest in offering additional services to the farmers. Consequently, the farmers also did not see the need or opportunity to professionalize their dairy activities. This resulted in a vicious circle, in which neither party seemed to take responsibility for the development of the resources of the smallholders. The intermediarydriven and producer-driven models both made many more efforts to develop the resources of the farmers and professionalize their dairy activities. In the intermediary-driven model, particularly the NGOs stressed the need to develop the resources of the farmers. They realized that to made the milk collection systems sustainable, it would be necessary to scale up the activities to achieve economies of scale. This would lead to lower production costs per unit which would make the products more competitive. Therefore, next to the organization of the farmers and creating trust among them, the NGOs also stimulated the availability of input supply services. Fodder and occasionally also medicine were available at the MCC. In addition, the farmers were trained in animal handling, and some veterinarian services were available. Moreover, the intermediary-driven model also attempted to support the farmers financially when it was necessary. Besides providing most of the equipment for milk collection and processing, NGOs also developed savings schemes and enables advance payments. In this way they aimed to educate the farmers about the value of money, investment opportunities and the profitability of their activities. The producer-driven model takes a similar approach to the development of the resources of the smallholders as the intermediary-driven model. The major difference is the scale and necessity of these activities. In the intermediary-driven model the chain integrators offer the farmers to help them develop their resources, but there exists a weaker necessity to do so due to the fact that the capacity is a limiting factor. In the producer-driven model there exists a stronger focus on the development of production capacity both at the farmer and the processor level. Currently, the capacity of the processor is not fully utilized by the production of the farmers; .thus there is a strong need to develop the resources of the farmers in order to increase production of raw milk.

6.4 Contribution to the literature

When discussing the contribution of this research to the literature, it is necessary to distinguish between statistical and analytic generalizations (Yin, 2003), as indicated in section 2.4. Statistical generalization refers to the 'inference [that] is made about a population, on the basis of empirical data collected about a sample' (Yin, 2003, p.32). In terms of this research it means to what extent the sample that is investigated represents the industry as a whole. On the other hand, analytic generalization refers to a situation 'in which a previously developed theory is used as a template with which to compare the empirical results of the case study' (Yin, 2003, p.32). If the case supports the theory analytic generalizations can be made. These two types of generalization will now be discussed in detail.

This research allows for a relatively strong **statistical generalization** for several reasons. Firstly, the fact that the formal dairy industry in Tanzania is relatively small, provided the opportunity to investigate a substantial part of this industry. Through interviews with the most important dairy processors and field visits to several MCCs, a complete image of the situation could be created. Therefore, the analysis that is made to describe the local situation is expected to be accurate and gives a reliable representation of the state of development as it currently is.

Furthermore, the fact that the instruments that were used to investigate the way that chain integrators develop market linkages were specifically designed to fit to the case also adds to the statistical generalizability of the findings to the rest of the industry. Through close interaction with many stakeholders, the list of instruments was developed with the aim to capture all the essential considerations when setting up milk collection centers. Because the MCC is so important for the development of market linkages for smallholder dairy farmers, these instruments need to be inspired by the actual situation.

Nonetheless, it is more complicated to generalize the findings of this research to dairy industries in other countries or other industries (in Tanzania or abroad), because the specific instruments that were used to assess the approaches of the different chain integrators are designed to fit this case. In order to come to such generalizations this particular framework needs to be replicated in other industries and/or countries, which would lead to a multiple case

study. Because this thesis focuses merely on one single case, such generalizations would be inappropriate.

As for the **analytic generalization**, this research makes a couple of important contributions. First, this thesis has taken global value chain literature as an inspiration for the analysis of a commodity chain, in this case the Tanzanian dairy industry in particular. GVC literature is especially relevant in this case because it investigates how production systems are integrated. Many GVC articles make mention of a driver that organizes value chain activities. The most famous examples in this regard are the buyer- and producer-driven chains by Gereffi (1994). However, other articles refer to other actors that also play an important role in the organization of the value chain, particularly in relation to local value chains and smallholder farmers. Vorley et al.'s (2008) framework proved especially relevant and applicable in this respect, which is why it is used as the central framework in this thesis.

Unfortunately, Vorley et al. (2008) do not provide exact tools that can be used to analyze and assess the drivers of value chain organization. Therefore, the framework needed to be extended, so that a complete picture could be generated. The inspiration for the tools to analyze the chain integrators' interventions was also found in GVC literature, but it was soon discovered that more contextual tools were needed for a thorough analysis. Nonetheless, GVC was an inspiration for the three generic focuses of chain integrators' interventions, i.e. reducing transaction costs, developing producer networks and building capabilities of the firm. These three can be used in other case studies as generic tools that can be adapted to the local context.

Consequently, the case was investigated in terms of the three types of chain integrators and the three generic sets of instruments. The case study proves that each chain integrator and set of instruments is relevant in terms of developing market linkages for smallholders. In the Tanzanian dairy industry we find evidence of the existence of substantially different types of chain integrators that take a different approach to the development of market linkages for smallholders. It can therefore be assumed that this typology of chain integrators provides a valuable differentiation between different approaches to the development of market linkages. But more interestingly, this case provides three purposes of interventions that can be used in order to assess the interventions of chain integrators. Chain integrators have a set of contextspecific intervention instruments that contribute to achieving these purposes. This is a practical contribution to the literature that can be replicated in other industries and/or countries.

7 Conclusion

When returning to the research question that was posed at the beginning of this thesis: *How do chain integrators develop market linkages for smallholder farmers in the Tanzanian dairy industry?*, this analysis shows that chain integrators have a set of intervention instruments that serve three generic purposes. The configuration of these instruments consequently determines the impact of the intervention of the chain integrators on the market linkages for smallholders. Before being able to answer the research question, the two variables need to be defined in detail. First, it is necessary to identify the chain integrators in the Tanzanian dairy industry. Second, the instruments and their purposes that can be used by these chain integrators to develop market linkages for smallholder farmers need to be explained.

The aim of this research was not to investigate *whether* chain integrators have the opportunity to build market linkages for smallholder farmers, but *how* they do so. Smallholder farmers often have a lack of resources and capabilities that prevent them from entering and competing in formal markets. Consequently, they usually operate in the informal circuit, making little effort to upgrade their production facilities. Chain integrators can play an essential role in linking smallholders to the market. Through focused interventions and incentives they can involve the farmers in the formal markets and stimulate them to develop their production facilities, also referred to as upgrading. Due to the diverse nature and background of the value chain actors that operate as a chain integrator, their motives and approaches differ. This thesis has investigated this issue by comparing several different types of chain integrators within the dairy industry in Tanzania with each other on a number of instruments that they use to develop these linkages. Value chain literature provided a source of inspiration for both the identification of the chain integrators and the intervention instruments.

The first conclusion of this thesis is that there are three different models of chain integrators that can be distinguished in this industry. Firstly, there is the buyer-driven model, in which the dairy processors (or dairy companies) act as an initiator for the development of continuous market transactions for milk that they use as an input in their factories. These actors have a strong business orientation, and prefer to buy stable quantities of milk for a relatively affordable price. Secondly, there is the producer-driven model, through which the producers

try to cooperate and achieve economies of scale that allow them to engage in processing activities and serve new markets. The focus of this type of chain integrator is on the cooperation with fellow producers by building networks, share knowledge and build new capabilities. Thirdly, there is the intermediary-driven model, in which an external agent assists in the development of market linkages for smallholders with the aim to increase their incomes and improve their livelihoods. This type of chain integrator aims to develop the capabilities of the farmers though the development of networks, basic processing facilities and education.

The second important conclusion of this research is that there are a number of instruments available to the chain integrators to develop these market linkages for smallholder farmers. These instruments aim to contribute to one of the following three purposes; i.e. reducing transaction costs, creating production networks, and developing the capabilities of the firm. When working with a large number of smallholder farmers, transaction costs are usually relatively high, for example due to high monitoring and search costs. Chain integrators can contribute to the reduction of transaction costs by supporting the development of a trust relationship between the farmers and the buyer that leads to repeat transactions. Also several micro-economic decisions and incentives at the point of interaction can influence transaction costs and add to the development of sustainable relationships. In terms of creating production networks, chain integrators can play an important supportive role. Despite the fact that farmers are sometimes interested in organizing in production networks, they often do not know how to do so and have difficulties to commit to a group. Chain integrators are in a position to motivate them; either thanks to their experience in this area or though their authority vis-à-vis the members. In addition, chain integrators can help to develop production networks through the provision of resources that enhance the resources of the networks. Thirdly, chain integrators have the opportunity to improve the individual capabilities of the smallholders. Through training; the provision of fodder, medicine and financial capital; and by introducing better breeds of cows, the capacity of the individual farmer is enhanced. These efforts support the specialization of farmers which asks for a more professional attitude towards their activities.

By combining these two variables in a matrix (section 5.4), it was possible to construct a clear image of the way that the chain integrators attempt to develop market linkages for smallholders. This matrix gives a good impression of the motivation of the chain integrators,

and the way that they implement the instruments in practice. In terms of how the different types of chain integrators develop market linkages, there are some substantial differences. The chain integrators in the buyer-driven model seem to take a strong economic focus, with particular attention to the costs. In its attempt to reduce transaction costs, the buyer-driven model aims to motivate farmers to participate through financial incentives. Production network are of little importance in this model. Even though they are positively perceived, they are not actively supported. The resources of the smallholders in this model are relatively underdeveloped, but the chain integrators do not provide substantial incentives to improve them. The intermediary-driven model has a strong focus on the organization of the farmers to develop market opportunities. When aiming to reduce transaction costs, this model puts a strong emphasis on social relations and intrinsic motivations to grow commitment. Therefore, there is also a strong focus on the development of production networks. These need to involve farmers more actively in the dairy industry. Also the resources of the farmers are enhanced in this model, because the external agents often have the opportunity to offer additional services to the farmers. Nonetheless, this model is often hindered by barriers regarding capacity and growth opportunities that smallholders seem not to be able to surpass. Finally, the producerdriven model also aims to create a collective approach to milk collection, with the aim to scale up its activities in order to reach economies of scale. Similar to the intermediary-driven model, the producer-driven model tries to reduce transaction costs through collective action and organization. Nonetheless, the size of the model poses a threat to its ability to interact with its members. Production networks form the foundation of this model, and are a strong institution at the local level. Also the resources of the farmers are strongly enhanced in this model, through the provision of a wide range of services.

This thesis has shown that it is necessary to distinguish between chain integrators in order to accurately assess the approach that chain integrators take to develop market linkages for smallholders. In addition, this thesis has explained that the instruments that chain integrators use are very context-specific, but that those instruments serve three general purposes, i.e. reducing transaction costs, creating production networks and developing the resources of the firm. This framework proved to be an appropriate tool to investigate the case of the Tanzanian dairy industry, but is expected to allow for replication in other industries or countries. In this sense, this thesis has contributed to the development of theory, while at the same time adding an interesting case study to existing literature.

Future research

Regarding future research it would be very attractive to test whether the approach in this thesis also provides an applicable analytical framework for the analysis of other value chains that involve smallholder farmers. The differentiation between the different types of chain integrators and the purposes of their intervention approaches provides a complete picture of the approach that chain integrators take when developing market linkages for smallholder farmers. Such a detailed analysis can inspire micro-economic decisions that have the potential to positively influence the market opportunities of smallholders. If this type of analysis also holds in other value chain, it can provide a useful tool that can structure future value chain interventions.

Furthermore, and in direct relation to the Tanzanian dairy industry, this thesis should serve as a tool for the chain integrators in the industry to assess their current intervention approaches. This analysis provides a clear overview of *their* current activities, but it also shows how the *other* chain integrators organize their interventions in the value chain. Therefore, it would be a good idea to investigate per actor or chain integrator in which way they can improve their current configuration of interventions, inspired by the other approaches. This would require a detailed analysis per milk collection center and dairy processor, but would enable the development of the ideal configuration in the local context.

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9 Appendix

Date:	Company:	Respondent(s):	
9-7-2009	Tanga Fresh	Rachid Mohammed	
10-7-2009	Tanga Fresh	Alnoor Hussein	
10-7-2009	Tanga Fresh	Lut Zijlstra	
13-7-2009	Tanzania Dairy Board	Charles Mutagwaba	
13-7-2009	Ministry of livestock	Yakobo Msanga	
13-7-2009	Ministry of Livestock	Mark Tsoxo	
14-7-2009	TAMPA	Mr. Mmari	
15-7-2009	Shambani Graduates	Victor Mfinanga	
15-7-2009	Tan Dairies	Production managers	
23-7-2009	Land 'o' Lakes	Edmund Moshy	
4-8-2009	Mara regional livestock advisor	Dr. Mzee	
4-8-2009	Musoma Dairies	Mr. Mazara	
6-8-2009	Mara regional livestock advisor	Dr. Mzee	
6-8-2009	Mara Milk	James Mathayo	
13-8-2009	Musoma Dairies	Mr. Mazara	
15-8-2009	Mara Milk	Mr. Mathayo	
19-8-2009	Llima Numbe	Nahum Meyasi	
21-8-2009	International Dairy Products Limited	Yusuf Alladin	

Appendix 1: List of interviews & field visits

Field visits

Date	Company	Location
14-8-2009	Musoma Dairies	Kongoto
14-8-2009	Mara Milk	Sirori Simba
14-8-2009	Musoma Dairies	Magonge

14-8-2009	Musoma Dairies	Isenye		
19-8-2009	Llima Numbe	Arusha, Tengeru		
24-8-2009	TDCU	Muheza, Tanga		
24-8-2009	Tanga Fresh	Pongwe, Tanga		
28-8-2009	Masama MCC	Masama, Kilimanjaro		
28-8-2009	Nronga Women Dairy Cooperative Society	Machame		





Figure 2: Map of Tanzania showing Milk Processing Plants

Source: Ministry of Livestock and Fisheries, Dairy Investment Opportunities in the Livestock Sector, June 2009.

Location	No.	Plant name	Current status	Installed capacity (Its/day)	Current production (Its/day)	Capacity Utilization
	1	Royal Dairy Products Ltd	Prod. Suspended	90,000	0	0.0%
	2	Azam Dairy	Operating	3,000	N/A	
Dar-es-	3	Tommy Dairy	Prod. Suspended	15,000	0	0.0%
Salaam	4	Tan Dairies	Operating	15,000	4,000	26.7%
	5	Azania Dairies Ltd (Ex TDL)	Operating	12,000	6,000	50.0%
	6	Tanga Fresh	Operating	15,000	14,000	93.3%
Tanga	7	Morani	Operating	5,000	1,000	20.0%
	8	Ex TDL New Northern Creameries	Operating	45,000	2,500	5.6%
	9	International Dairy Products	Operating	5,000	1,200	24.0%
Arusha	10	Arusha Dairy Company	Operating	5,000	2,000	40.0%
	11	Nronga Women	Operating	5,000	2,000	40.0%
	12	West Kilimamnjaro	Operating	1,000	300	30.0%
	13	Mboreni Women	Operating	1,000	200	20.0%
	14	Marukeni	Operating	1,000	200	20.0%
	15	Ng'uni Women	Operating	1,000	200	20.0%
Kilimanjaro	16	Kalali Women	Operating	1,000	280	28.0%
	17	Ex TDL Musoma Dairy	Closed	45,000	0	0.0%
	18	Ex TDL Utegi Plant	Closed	45,000	0	0.0%
	19	Baraki Sisters	Operating	3,000	2,500	83.3%
Mara	20	New Mara Milk	Operating	8,000	4,500	56.3%
	21	Victoria Dairy (Kishimba)	Closed	45,000	0	0.0%
Mwanza	22	Lake Side	Closed	5,000	0	0.0%
	23	Kagera Milk (KADEFA)	Operating	3,000	350	11.7%
	24	Kyaka Milk Plant	Operating	1,000	450	45.0%
	25	Del Foods	Operating	1,000	250	25.0%
Kagera	26	Mini Dairies (several)	Operating	1,800	1,500	83.3%
	27	SUA	Closed	3,000	0	0.0%
Morogoro	28	Shambani Graduates	Operating	700	250	35.7%
Tabora	29	Ex TDL plant	Closed	5,000	0	0.0%
Coast	30	Mojata	Closed	6,000	0	0.0%
	31	ASAS Dairy	Operating	12,000	5,500	45.8%
Iringa	32	CEFA Njombe Milk Factory	Operating	2,000	650	32.5%
Mbeya	33	Ex TDL plant	Closed/dismantled	16,000	0	0.0%
	34	Mbeya Maziwa	Operating	1,000	500	50.0%
S	everal m	icro-dairies in the country	Operating	83,500	8,350	10.0%
		TOTAL		507,000	58,680	11.6%

Appendix 3: Dairy processors in Tanzania

Source: MLD 2007, Rapid survey

Appendix 4: Value chain governance

1. *Markets*. When transactions are easily codified, product specifications are relatively simple, and suppliers have the capability to make the products in question with little input from buyers, asset specificity will fail to accumulate and market governance can be expected. In market exchange buyers respond to specifications and prices set by sellers. Because the complexity of information exchanged is relatively low, transactions can be governed with little explicit coordination.

2. *Modular value chains*. When the ability to codify specifications extends to complex products, value chain modularity can arise. This can come about when product architecture is modular11 and technical standards simplify interactions by reducing component variation and by unifying component, product, and process specifications, and also when suppliers have the competence to supply full packages and modules, which internalizes hard to codify (tacit) information, reduces asset specificity and therefore a buyer's need for direct monitoring and control. Linkages based on codified knowledge provide many of the benefits of armslength market linkages – speed, flexibility, and access to low-cost inputs – but are not the same as classic market exchanges based on price. When a computerized design file is transferred from a lead firm to a supplier, for example, there is much more flowing across the inter-firm link than information about prices. Because of codification, complex information can be exchanged with little explicit coordination, and so, like simple market exchange, the cost of switching to new partners remains low.

3. *Relational value chains*. When product specifications cannot be codified, transactions are complex, and supplier capabilities are high, relational value chain governance can be expected. This is because tacit knowledge must be exchanged between buyers and sellers, and because highly competent suppliers provide a strong motivation for lead firms to outsource to gain access to complementary competencies. The mutual dependence that then arises may be regulated through reputation, social and spatial proximity, family and ethnic ties, and the like. It can also be handled through mechanisms that impose costs on the party that breaks a contract, as discussed in Williamson's analysis of credible commitments and hostages (Williamson, 1983). The exchange of complex tacit information is most often accomplished by frequent face-to-face interaction and governed by high levels of explicit coordination, which makes the costs of switching to new partners high.

4. *Captive value chains*. When the ability to codify – in the form of detailed instructions – and the complexity of product specifications are both high but supplier capabilities are low, then value chain governance will tend toward the captive type. This is because low supplier competence in the face of complex products and specifications requires a great deal of intervention and control on the part of the lead firm, encouraging the build-up of transactional dependence as lead firms seek to lock-in suppliers in order to exclude others from reaping the benefits of their efforts. Therefore, the suppliers face significant switching costs and are 'captive'. Captive suppliers are frequently confined to a narrow range of tasks – for example, mainly engaged in simple assembly – and are dependent on the lead firm for complementary activities such as design, logistics, component purchasing, and process technology upgrading. Captive inter-firm linkages control opportunism throughthe dominance of lead firms, while at the same time providing enough resources and market access to the subordinate firms to make exit an unattractive option.

5. *Hierarchy.* When product specifications cannot be codified, products are complex, and highly competent suppliers cannot be found, then lead firms will be forced to develop and manufacture products in-house. This governance form is usually driven by the need to exchange tacit knowledge between value chain activities as well as the need to effectively manage complex webs of inputs and outputs and to control resources, especially intellectual property.

Source: Gereffi, Humphrey & Sturgeon, 2005, p. 86-87.

Appendix 5: Four types of upgrading

Process upgrading

Increasing the efficiency of internal processes such that these are significantly better than those of rivals, both within individual links in the chain (for example, increased inventory turns, lower scrap), and between the links in the chain (for example, more frequent, smaller and on-time deliveries).

Product upgrading

Introducing new products or improving old products faster than rivals. This involves changing new product development processes both within individual links in the value chain and in the relationship between different chain links.

Functional upgrading

Increasing value added by changing the mix of activities conducted within the firm (for example, taking responsibility for, or outsourcing accounting, logistics and quality functions) or moving the locus of activities to different links in the value chain (for example from manufacturing to design).

Chain upgrading

Moving to a new value chain (for example, Taiwanese firms moved from the manufacture of transistor radios to calculators, to TVs, to computer monitors, to laptops and now to WAP phones).

Source: Kaplinsky & Morris, 2002, p. 38.

Appendix 6: Milk marketing systems in Tanzania



Milk marketing systems in Tanzania (source: Scanagri and Business Care Services, 2005)

Source: MMA, 2008









Source: http://www.africa.upenn.edu/CIA_Maps/Tanzania_19886.gif

Livestock Industry resources available

Tanzania is endowed with a [livestock resource and ranks third in Africa in terms of cattle population. The estimated livestock population amounts to **18.8** million cattle, **13.5** million goats, **3.6** million sheep, **1.4** million pigs, **33** million indigenous chickens and **20** million chickens.

REGION	CATTLE	GOAT	SHEEP	PIGS	LOCAL
-					CHICKEN
Dodoma	850,265	707,723	123,433	54,355	1,825,867
Arusha	1,610,693	1,802,732	729,807	9,868	931,178
Kilimanjaro	633,616	625,413	272,156	192,287	1,561,340
Tanga	322,351	330,391	83,824	7,788	1,788,767
Morogoro	119,004	302,949	58,640	55,783	2,100,861
Pwani	132,252	70,346	8,034	4,555	1,420,152
Dar es salaam	20,610	75,492	7,611	16,111	525,052
Lindi	6,953	99,992	8,124	6,145	1,261,290
Mtwara	23,777	261,516	22,330	7,803	710,132
Ruvuma	97,353	930,758	60,183	167,339	1,555,617
Iringa	1,159,288	368,054	100,347	224,321	2,241,683
Mbeya	881,443	360,880	70,916	284,537	2,559,913
Singida	1,872,881	1,247,886	462,723	7,905	1,658,178
Tabora	1,894,146	939,481	251,651	7,795	2,507,469
Rukwa	431,514	259,176	13,334	72,855	1,122,432
Kigoma	137,161	489,748	43,799	29,386	797,537
Shinyanga	4,037,318	2,143,845	847,902	4,050	2,979,590
Kagera	861,727	885,979	65,446	180,744	918,858
Mwanza	2,312,375	901,818	169,868	756	2,620,818
Mara	1,359,791	678,769	198,716	2,987	1,521,166
*Manyara				62,867	699,345
Total	18,764,518	13,482,947	3,598,843	1,400,237	33,307,248

Table 1: Livestock Population

Source: Ministry of Livestock and Fisheries, Dairy Investment Opportunities in the Livestock Sector, June 2009.

	Buyer driven	Intermediary	Producer driven
		driven	
Transaction costs			
1. Formalization	Low	Low	High
2. Pricing	Processor	Farmer group	Processor
3. Reliability of supply			
Quantitative stability ⁶	Low	Low	Medium
Qualitative stability	Medium	High	High
4. Payment			
Importance of timely payment	High	High	High
Prevalence of timely payment ⁷	Low	Medium	High
5. Ownership			
Ownership property	Private/processor	Private	Private
Ownership equipment	Processor	Farmer group	Union
Purchase of equipment	Processor	NGO/farmer group	Union/processor
Maintenance of equipment	Processor	Farmer group	Processor
Responsibility	Processor	Farmer group	Farmer group
6. Management of Milk Collection Centre (MCC)			
Agent / Manager	Mixed	Manager	Manager
Liability (for spoilage) at MCC gate	Farmer	Farmer	Farmer

 ⁶ This factor indicates stability of the milk supply throughout the year.
⁷ This factor indicates whether payment usually occur on time or not.

Liability between MMC and transport	Farmer in case of manager-run MCC / Agent in case of agent-run MCC	Farmer group	Farmer group		
Liability transport to processor	Farmer in case of manager-run MCC / Agent in case of agent-run MCC	Farmer group	Processor		
Liability for spoilage at processor level	Processor	Processor	Processor		
7. Transportation					
Distancescoveredforcollection(farmertoMCC)	High	Medium	Medium		
Mobile Milk Collection	Some cases	Some cases	Some cases		
8. Middlemen					
Prevalence	High	Medium	Medium		
Desirability ⁸	High	Medium	Low		
Production Networks					
9. Farmer organization					
Registered farmer groups	No	Yes	Yes		
Farmer commitment to chain ⁹	Low	Medium	High		
Resources of the firm					
10. Quality of milk					
Acidity (alcohol test)	YES	YES	YES		
Testing for contamination	YES	YES	YES		

⁸ This factor indicates whether traders are accepted in the model by the processors.

⁹ This factor indicates to what extent the farmers are dedicated to delivering their milk to the formal model of milk collection, and do not engage in selling outside of the model.
11. Quantity of milk			
Capacity at average MCC	Large	Small – medium	Large
Avg. dry season collection as % of wet season collection (MCC level data) ¹⁰	41%	49%	70%
12. Financial Services			
Credit (advance payments) made available by:	None	Farmer group	Farmer group
Loans made available by:	None	NGO	Farmer group
13. Input supply Services			
13.InputsupplyServicesHygiene training	No	Yes	Yes
13.InputsupplyServicesHygiene trainingAnimal handling training	No	Yes Yes	Yes Yes
13.InputsupplyServices	No No None	Yes Yes Fodder	Yes Yes Fodder
13.InputsupplyServicesSupplyHygiene trainingSupplyAnimal handling trainingIn kind loans, madeIn kind loans, madeavailable by:	No No None N/A	Yes Yes Fodder NGO	Yes Yes Fodder Processor
13. Input supply Services Supply Hygiene training Supply Animal bandling training Supply In kind loans, type: 11 Supply In kind loans, made Supply Veterinarian Services Supplied in model Supplied	No No None N/A No	Yes Yes Fodder NGO Some	Yes Yes Fodder Processor Some

¹⁰ This calculation is based on information obtained at the collection centers that were visited. The information for the producer-driven model is company data. Since the company is using both the buyer-driven model and the producer-driven model for milk collection this figure is only indicative.

¹¹ In kind loans refer to the provision of fodder for the cows that can be paid with the earning for the milk.

