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Small-Scale Farmers, Private Enterprises and Innovations in Food Value Chains: Applying the Actor-Network-Theory in rural Tanzania

Masterthesis

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Content

List of Abbreviations

AIS	Agricultural Innovation System
ANT	Actor-Network-Theory
ARI	Agricultural Research Institute
ASDS	Agricultural Sector Development Strategy
CEZOSOPA	Central Corridor Sunflower Processors Association
FAO	Food and Agriculture Organization of the United Nations
FVC	Food Value Chain
GDP	Gross Domestic Product
GVC	Global Value Chain
IFI	International Financial Institution
LDC	Least Developed Country
LGA	Local Government Authority
NGO	Non-government Organization
RLDC	Rural Livelihood Development Company
SAGCOT	Southern Agriculture Growth Corridor of Tanzania
SNV	Netherlands Development Organization
SSA	sub-Saharan Africa
TAFSIP	Tanzania Food Security Investment Plan
TEOSA	Tanzania Edible Oil Seeds Association
UPS	Upgrading Promising Strategies
URT	United Republic of Tanzania
VEO	Village Executive Officer
WFP	World Food Programme
WTO	World Trade Organization

List of Figures

CHAPTER ONE

1 Introduction

"Make poverty history – Overcoming poverty is not a gesture of charity. It is an act of justice. It is a fundamental human right, the right to dignity and a decent life. While poverty persists, there is no true freedom" (Nelson Mandela in: SHAW 2007: 387)

The United Republic of Tanzania is an emerging country in the global south with high potential of development. But despite impressive growth in its gross domestic product (GDP) over the past decade, Tanzania remains one of the world's least developed countries in terms of per capita income (IFAD 2014). African cities are having a high level of urbanization and are growing rapidly. In opposition to this trend the major part of the population is still living in rural areas. In Tanzania 66.7% of the people live in rural areas, with a share of 33.3% (2012) living under extremely poor conditions (URT 2014: 36; The World Bank 2014).

Raising food security is one of the most challenging tasks for humankind. The economy of Tanzania largely depends on agriculture, which employs about 80% of the population's workforce. Thus, the agricultural production is the main source of income to the inhabitants and is primarily dominated by small-scale farming subsistence-oriented structures. The majority of agricultural producers faces tremendous challenges in accessing input and output markets and finds itself trapped into a vicious circle of low income, low output and low productivity. Furthermore, the sector is faced with falling labor and land productivity because of application of poor technology and dependence on unreliable and irregular weather conditions, caused by climate change. This has remarkable influence on food security (IFAD 2014: 1-2). These current trends lead to the opinion that small-scale farmers in rural Tanzania need to change something in the production and distribution of their commodities in order to counter these challenges.

As smallholder farmers in Tanzania are increasingly confronted with production system problems due to environmental and market volatilities there is a need of innovations in farming practices. Innovations need to fit both the context and the capabilities of people involved in order to be effective, as there is no "one size fits all" solution. Creating better links between small-scale farmers and firms in the food value chain therefore becomes a pressing issue for agricultural development in African countries like Tanzania. Across the continent, groups of

farmers, government agencies, private enterprises and NGOs are trying to improve these links. In economic theory, innovation generally is associated with increased competitiveness, value creation and economic development and focuses on advanced technologies in western economies. However, more and more authors acknowledge innovation as a precondition attaining competitive economies in countries of the global south (WOLF 2007, GELLYNCK et al. 2011, VOETEN et al. 2013).

As the study is conducted in rural Tanzania it focuses on one of the most important crops in the country's agricultural production system: the sunflower. In this thesis the sunflower food value chain (FVC) was examined and how it contributes to improving the food security of small-scale farmers. It was tried to identify factors affecting the dissemination of agricultural innovations and additionally to figure out the role of existing private actors in the sunflower oil production. Because of the given barriers for smallholders of being competitive a better embeddedness in the production process is of great significance. Thus, the concept of vertical and horizontal coordination might be useful in order to achieve economies of scale. This concept in combination with the agricultural innovation system approach and the actor-network-theory build the foundation in this research. It was tried to examine how linkages in such an innovation system are built and influenced. In this the interactions and relationships between the internal and external actors of sunflower production are taken into account.

This thesis is structured as following: In chapter one the terms food security and food value chains are introduced and discussed about its possible correlation in detail. In addition, the Tanzanian sunflower oil subsector, the description of the research area which is followed by a short explanation of East African agriculture. Chapter three gives an explanation of the research design. This contains the specific research objective with precise research questions. Chapter four deals with the two combined theoretical approaches, agricultural innovation system approach and actor-network-theory and is followed by AIS and ANT in their methodology. In chapter six then the empirical field findings applying the AIS and ANT are presented. Chapter seven closes this thesis with a short discussion about the results of the study and a conclusion.

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CHAPTER TWO

2 Food Security and Value Chains – A promising combination?

Confronted with the topics of food security, poverty related to hunger and innovations in food value chains, scientists and experts all over the globe disagree with clear definitions referring to these topics. For a better understanding of the present study this plurality will be illustrated in the following and lead to ones used here.

2.1 Food Security and Poverty in Tanzania

Food security is a multi-dimensional phenomenon and flexible concept as reflected in many attempts as definition in research and policy usage. The continuing evolution of food security as an operational concept in public policy has reflected the wider recognition of complex technical and policy issues involved. The most recent careful and used definition to food security is the one negotiated in the process of international consultation leading to the World Food Summit (WFS) in November 1996, which states, that […]

"food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life".

From this widely accepted definition, four important dimensions of food security can be identified:

- Food availability
- Food access
- Utilization
- Stability (FAO 2006: 1).

To obtain a complete and more nuanced picture of the state of food security in a population, it is necessary to comprehensively analyze these four dimensions. Each of them can be measured by a set of indicators (developed and presented by FAO in Annex 2) who provide detailed information for the food security situation in a country or region like Tanzania. Measurements and analysis like these inform the design of targeted strategies and policies to tackle food insecurity and to pave the way to its sustainable reduction. The key is *availability of food from domestic production* as economies begin to develop themselves. Domestic agriculture is

still the main provider of food and the principal source of income and employment especially in rural areas. At this stage, increasing agricultural productivity improves access of subsistence food producers to food. However, increasing productivity may not sufficiently address problems of access to the net food buyers and other vulnerable groups who may require targeted policy interventions such as strengthening safety nets and other social protection.

As economies grow and diversify away from food and agriculture, *access to food* becomes increasingly important to achieve food security. Higher rural labor productivity may raise income levels, which should/could help to improve access. However, remaining access difficulties for vulnerable population groups still need to be tackled through policy interventions. There are still many countries that have made little or no progress in improving food security. A combination of adverse factors such as natural disasters, conflicts, price hikes, weak institutions and poor governance, often manifested in repeated food crises, is often the reason for this stagnation. *The State of Food Insecurity in the World 2010* showed that protracted crises can create vicious circles in which recovery is fragile and may become more difficult over the time. The price hikes on international food markets in 2007–08, 2010 and 2012 highlighted how sudden price shocks can trigger severe and prolonged crises, underlining the importance of ensuring steady and reliable food supplies to safeguard the *stability* dimension of food security. This is given when the supply on household level remains constant during the year and in the long-term. That includes food, income and economic resources. Progress in improving availability, access and stability alone does not guarantee food security,.Compromized *utilization* cause d by poor hygiene can generate nutrition failures manifest in high levels of wasting and stunting, while inappropriate diets can give rise to obesity and diet-related non-communicable diseases. The coexistence of under- and overnutrition has taken a heavy toll on countries undergoing rapid transformations, resulting in the double burden of malnutrition (FAO, IFAD, WFP 2014: 13-14).

The World Food Programme (WFP) in contrast defines food security, as *"people are considered food secure when they have all-time access to sufficient, safe, nutritious food to maintain a healthy and active life."*It combines three main elements – food availability, food access and food utilization (FAO, IFAD, WFP 2014). The dimension of stability, which refers to the temporal determinant of food security is not additionally mentioned, but can have an important impact on the other physical determinants (compare with figure 1).

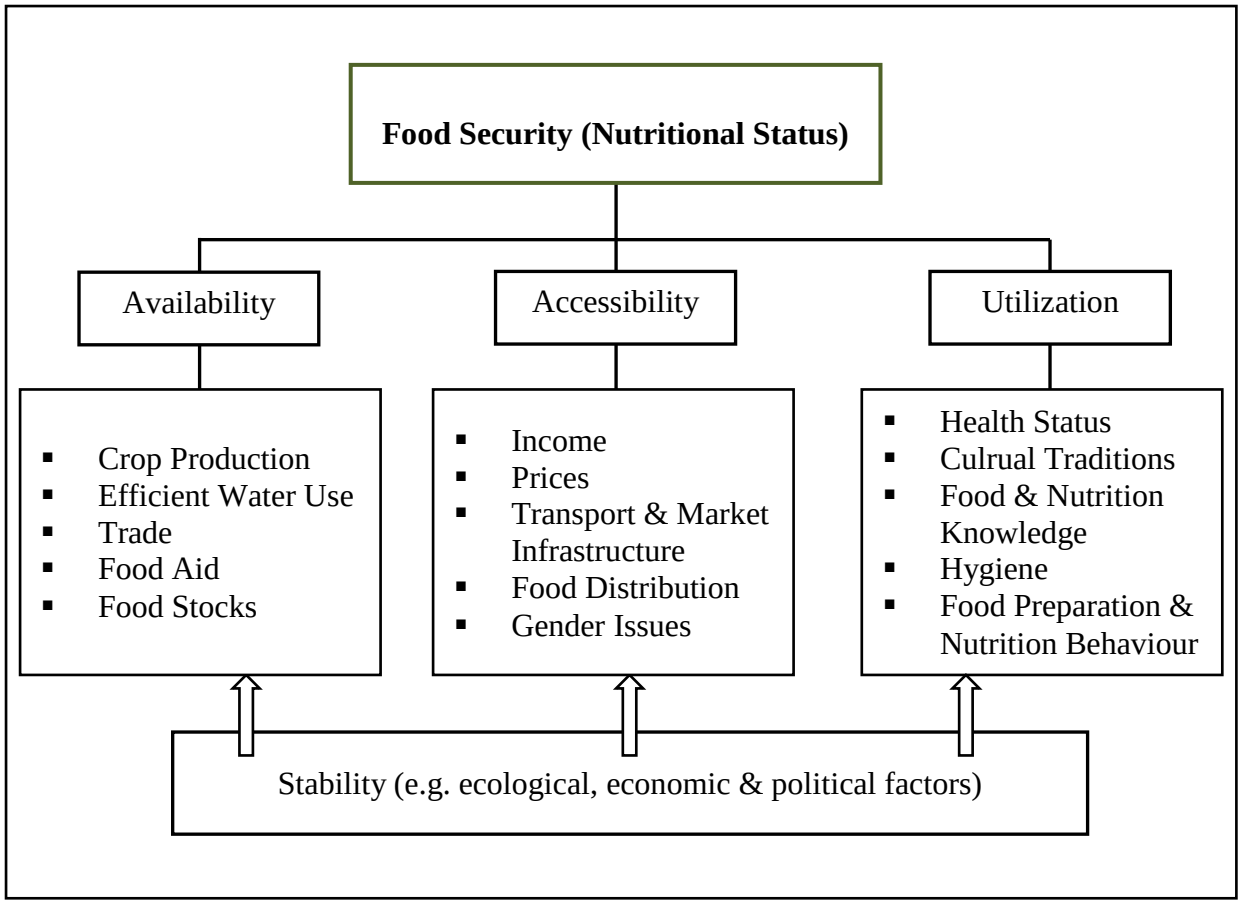


Figure 1: Dimensions of Food Security (Own illustration based on FAO 2006)

In situations of food insecurity, this role food security can be achieved only when sufficient culturally adapted food is available (on meso and micro level) in order to meet its biological and social needs. It is important to distinguish between chronic food insecurity (e.g. occurrence of food shortages before harvest "seasonality" or lack of caring during harvest) and transitory food insecurity (e.g. because of natural and man-made disasters) (GAYI 2007: 284-286). Different types of processes can impact food security at different and/or multiple spatial levels. These include loss of soil fertility and soil degradation (local, regional), urbanization (regional, national), land use changes such as replacement of food crop areas with biofuels, industrialization, population growth, droughts, domestic and foreign government policies, fluctuating market situations (national, global) and climate change (global).

A comparison of these and all the other definitions highlights the considerable reconstruction of official thinking on food security[1] over the past 25 years and demonstrates the complexity

[1] A discussion of all definitions ever published would go beyond the scope of this study. Hereafter the author is using the term food security defined by FAO 2006.

of this issue. These statements also provide signposts to the policy analyses, which have re-shaped the understanding of food security as a problem of international and national responsibility.

However, food security is often recognized as a problem of access. Though it is not always obviously linked to poverty it is still an important element of poverty alleviation. Poverty is now generally regarded as the root cause of hunger and malnutrition, but can in turn be caused by these two terms, because they can have a tremendous effect on the capabilities and capacities of individuals trying to evade poverty (SHAW 2007: 387). Hunger and poverty whereas are still predominantly rural phenomena, especially in countries in the global south such as Tanzania. Much likely they will remain for the next decades (SHAW 2007: 392-394). Following the remarks of the United Nations Economic and Social Council and the recommendations by the Committee for Development Policy (CDP), Tanzania[2] ranks among the 49 Least-Developed-Countries (LDCs) in the world (UNCTAD 2013). A fact which reflects the current living conditions of Tanzania's citizens particularly living - below the poverty line - in rural areas. The per capita income, human assets (e.g. nutrition, health and school enrolment) and the economic vulnerability (e.g. natural shocks, trade-related shocks, economic exposure to shocks etc.) are the three main criteria classifying LDCs most of the based in the global south (UNCTAD 2013). In Tanzania people are considered poor when their consumption is less than the national poverty line[3]. Whereby consumption includes all goods bought and those produced and consumed at home, such as food, household equipment, clothes, personal effects, personal care, recreation, cleaning, domestic services, contributions, fuel, petrol, soap and cigarettes. Not all consumption items are included in poverty calculations. Expenses on health, education and water are excluded. For instance, agriculture is a core factor to upgraded livelihoods that have access to sufficient nutritious food. According to WOLTER (2008:13) "Tanzania could be a major food-exporting country but its dependence on rainfall, poor transport and marketing infrastructures, as well as low access to technology, lead to persistent food security problems".

The hunger crisis in 2011 and 2012 in the Sahel moreover demonstrated the tremendous climate impact on the whole food system and the lack of effective strategies to secure the food

[2] The United Republic of Tanzania

[3] The national poverty line was estimated by the NBS in 2001 based on the 2000/01 Household Budget Survey

supply (MAXWELL & FITZPATRICK 2012). Both human and ecological framework conditions are changing rapidly (LOTZE-CAMPEN et al. 2010, MÜLLER 2011). This raises an urgent and continuous need for a better integrated understanding of food systems. The following part deals with – a for food systems important issue – value chains and leads to a discussion of the significance of value (supply) chains in agricultural research.

2.2 Food Value Chains - Geographies of Value Creation?

Michael PORTER (1985) introduced and popularized the idea of "value chains", which has received increasing attention in the agricultural division and research in recent years in response to a number of economic factors and consumer trends affecting agri-food enterprises. But what exactly is a value chain or commodity chain? In early debates it was described as […] *"a network of labor and production processes, whose end result is a finished commodity"* (HOPKINS & WALLERSTEIN 1986: 159; GEREFFI & KORZENIEWICZ 1994: 2), in which several segments are represented as nodes with a mutually linkage in networks. These consist of acquisition of inputs (e.g. raw materials), labor power, transportation, distribution and consumption. However, DEVANNEY (2006: 1) later described it […] "as a mutually beneficial partnership among all "players" involved in the production of a product in which each partner contributes and shares knowledge, information and contributes expertise to improve (differentiate) the final product to better satisfy consumer demand relative to the chain's competitors". Important in his definition is the involvement of individuals in a value chain and that it […] "must efficiently "add value" to the product for the benefit of all involved in the chain" (ibid.). GEREFFI (1994) one of the leading scientists in terms of economic development, globalization and governance, identifies different types of chains matching the most powerful drivers controlling the others within: the producer-driven and the buyer-driven chain. The producer-driven chains are led by capital and technology-intensive firms, while buyer-driven chains are led by large retailers, branded marketers and trading companies (REJI 2013: 29).

All the studies related to value chains deal with the flow of products and services along the chain, relationships between firms and co-ordination of production chains (REJI 2013: 28). This contains the term governance, which was among others introduced and defined by GEREFFI (1994: 97) as authority and power relationship that determine how financial, material, and human resources are allocated and follow within a chain". This can be seen as a starting point of many efforts working on and analyzing GVCs. Governance is particularly important for the generation, transfer and diffusion of knowledge leading to innovation. This enables firms to

improve their performance and sustain competitive advantage. Later GEREFFI (2005) developed a "typology of governance". The links between industry activities in a chain can be described along a sequence extending from the **market** to **hierarchical** value chains illustrated through direct property of processes in the production. The three further modes of governance, modular, relational and captive, can be settled between these two opposites. In the authors opinion these forms of governance represent a state in which the leading firm practices power through coordination of production (vertical or horizontal) vis-à-vis suppliers. The firm has no direct ownership.

Market linkages do not have to be completely transitory and involve transactions that are relatively simple, information on product specifications is easily transmitted. Producers can make products with minimal input from buyers. Here the level of cooperation among value chain actors is very low as well as the costs of switching the cooperation partners. In modular value chains the provider produces the commodity to a customer's specifications. Switching costs are also low and transaction-specific investments are limited. But buyer-supplier interactions can still be very complex and linkages are more substantial than in simple markets. In relational value chains or networks complex interactions between buyers and sellers can be seen. These are characterized by the transfer of information and embedded services based on mutual reliance regulated through reputation, social and spatial proximity, family and ethnic ties and trust. Furthermore, relational linkages take time to build so the costs and difficulties involved in switching to new partners tend to be high. In captive value chains small producers are more dependent on few customers. Such networks are often characterized by a higher level of monitoring and control by the lead firm compared to the other described types and they are therefore confronted with high switching costs. Suppliers are "captured" in the relationship to the buyers. Ethical leadership should be important in such cases in order to ensure fair treatment for producers and an equitable share of the market price which often is not guaranteed. The last type, GEREFFI mentioned, is hierarchical governance. Here, vertical integration is the main characteristic and structures provide regular employment, guarantee quality and build producer capacity. The benefits like possible protection to local communities by business men providing schools, health facilities etc. can be important to the livelihood strategies of the vulnerable, but the prioritization of social considerations over industry competitiveness represents a potential tradeoff between economic upgrading and social upgrading (GEREFFI et al. 2005: 83-84). Figure 2 shows the main differences illustrated.

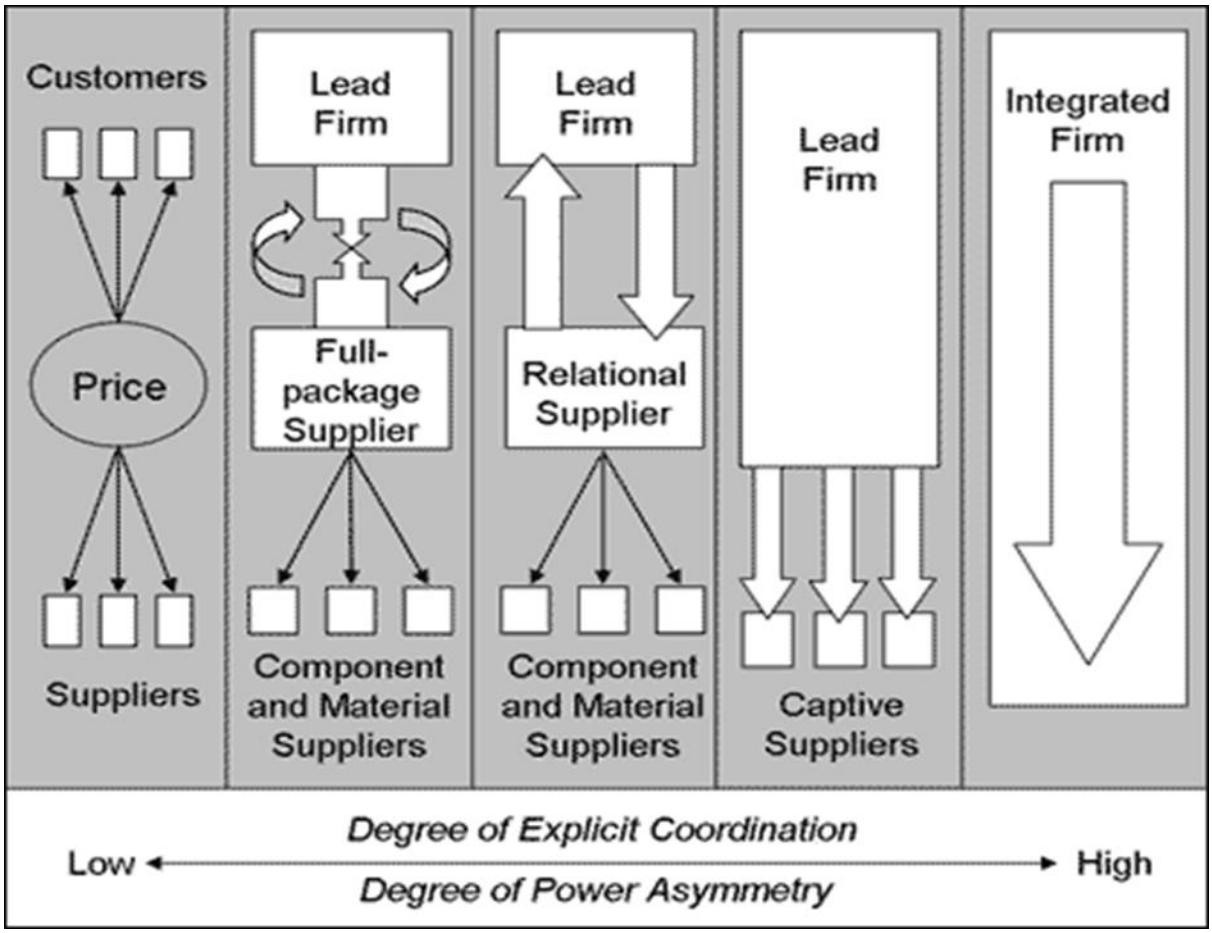


Figure 2: Typology of governance in global value chains (GEREFFI et al. 2005: 89)

Significant literature exists on how global value chains interface with smallholder farmers' participation (e.g. DOLAN & HUMPHREY 2000) in markets. These often represent one of the few options for local firms and producers in the global south to get access to larger markets and to new technologies (PIETROBELLI 2008: 459). Nevertheless, *local* value chains have not received much consideration associated with countries of the global south yet. The tendency of development agencies often lies on the supportive character for smallholders in the global south by identifying profitable markets abroad rather than domestically (SHEPHERD 2007). That's why a debate on the relevance of working on value chains in food systems becomes more important, which will be illustrated in the next section.

2.2.1 Relevance of working/improving value chains in food system

The issue of value chains in (agri-) food systems is not new but still important topic in agricultural or economic research. Scientists like BAKER (2006) underline the current relevance of working on it and argue that "the competitiveness of the agro-food business depends on the competitiveness of the value chain it belongs to", which can be described as systemic compet-

itiveness. Furthermore, an efficient production is necessary. But the quality of linkages and support systems play a critical role in creating competitiveness and the entry into higher value (domestic) markets (also global markets) requires an understanding of the requirements and dynamic forces within the value chain. Moreover, significant changes in global food systems towards chain-oriented production are dictated by the consumer. This can be explained by the terms - market pull and no longer production push. Another point is the changing business relation among actors working or collaborating within value chains (BAKER 2006). A further characteristic of the supply chain is the increasingly importance of buyers and retailers in product development, branding, supplier selection and distribution, especially for agricultural and fresh (vegetable) produce. From an economical point of view it is well established that integration into global value chain helps the firms to improve their competitiveness. How far these new opportunities are available to small-scale producers in the global south is relatively unexplored. Integrating small-scale producers into markets is limited by many factors like a small number of farms, limited access to information, knowledge, technology, resources and access to other business services. Therefore smallholders' integration into high value markets is a concern presently on agenda (REJI 2013: 28), besides farming is the most risky activity in the value chain, subject as it is to the vagaries of the weather (e.g. climate change) and market volatility. In order to meet these constraints "upgrading" in the value chain could be a potential opportunity. This and its different types, developed by HUMPHREY & SCHMITZ (2002), will be explained in the following part.

Upgrading in Value Chains

Often, upgrading in the value chain refers to the acquisition of technological capabilities and market linkages. This enables firms and small producers to improve their competitiveness and move into higher-value activities (KAPLINSKY & MORRIS 2001). Four types of upgrading have been singled out for enterprises within a value chain. **Process upgrading** should increase the efficiency of production either through better (re-)organization of the production process or the use of improved technology. **Product upgrading** means the improvement of product quality and increasing value for consumers. This may be stimulated by changes in end markets usually stemming from changes in customer preferences or the desire for higher value added, higher quality. An example for that would be the issue of fair trade coffee. Consumers are now aware of the coffee's origin with its social and environmental issues of production. In response to this, many producers are realizing this trend and are changing production (upgrading) from conventional to organic cultivation. The third type, **functional upgrading**, is the

entry of a firm into a new and higher value-added function or level in the value chain. **Inter-sectoral (inter-chain) upgrading** as fourth type is the entry of a firm into a completely new value chain or industry using knowledge acquired through production of another product or a specialized service. This would require multiple upgrading strategies in order to enter the chain successfully (HUMPHREY & SCHMITZ 2002). As argued by HUMPHREY & SCHMITZ (ibid.) a significant problem for firms which had been successfully integrated into the value chain characterized by quasi-hierarchical relationships is the danger of 'lock-in'. Firms experience that a large part of their output is going to few customers. They become specialized in one particular activity, normally production and they either do not develop design or marketing capabilities, or allow such capabilities to diminish because of the strengths' relationship with the global buyer. As such, they become heavily dependent on this relationship (FROMM 2007).

The literature concerning GVCs and upgrading opportunities for firms in countries of the global south addresses buyer-supplier relationships and coordination as a mechanism for access to markets and upgrading. It also stresses the role played by the GVC leaders, particularly the buyers, in transferring knowledge along the chains. For small firms in LDCs, participation in value chains means getting information on the requirements of global as well as regional markets and of gaining access to those markets. Nonetheless, specialization in production activities within the value chain may leave these producers with a restrictive understanding of market requirements and few opportunities to develop capabilities in the areas of design and marketing (FROMM 2007). Learning and the acquisition of technology can be stimulated through involvement in value chains, but it is not guaranteed as a result of upgrading. For adequate learning investment by firms and support agencies is required. Moreover, "relational networks offer ideal conditions for all forms of upgrading, but they are the least likely to occur among producers" in the global south (PIETROBELLI 2008: 462). Among the arising features of GVCs, GIBBON & PONTE (2005: 122) emphasize the unlike but decisive rise in *"buyer drivenness"*. Developments in the national and international regulatory frameworks, trade and import liberalization, transport market liberalization and improvements and food safety regulations substantiate this. Both draw attention to the fact that lead firms often sought to explicitly block their suppliers from undertaking functional upgrading. At the same time, lead firms encouraged suppliers to undertake process and usually also product upgrading. GIBBON & PONTE (2005) also argue that the combination of internationalization and functional upgrading in form of moving into multiple downstream functions or processes is often ex-

ceedingly resource-demanding. Some authors working on these issues (e.g. HUMPHREY 2005; HUMPHREY & MEMEDOVIC 2006) recommend that in agricultural and agro-based activities there may be opportunities for higher processing. Retailers are often willing to outsource value chain functions to suppliers and consequently provide new opportunities along the chain. They also encourage smallholders an increasing product differentiation and investing in innovation as well as to build up improved systems in supplying countries in order to reply to the demand for greater emphasis on freshness and agility in the logistics system. The emphasis on parts of the dealing bonds such as reliable delivery, trust, flexibility in supply and the ability to innovate that raises the switching costs for the buyers and may raise the length of contractual relationships for sellers (PIETROBELLI 2008: 462) is another suggestion.

Hence, if the technology required is mainly implied and needs deep interaction, it can be estimated that global buyers are more interested and involved in their providers' upgrading (PIETROBELLI 2008: 465). According to PIETROBELLI (2008: 467)

"[…] upgrading is possible in different value chains, but upgrading tends to be confined to products and processes in quasi-hierarchical governance systems. In contrast, functional upgrading is easier in value chains with a network-based governance, as in the value chains led by the local semi-industrial cooperatives."

A critical question is however how value chain relationships affect the process of learning, innovation and the acquisition of technological capabilities. It is important to analyze if upgrading is relatively easy once firms are within global value chains. Key to any significant upgrading for small-scale farmers within the sunflower value chain in Tanzania is the ability of major suppliers in the studied regions to move into the high-value added activities in the value chain to find a way of dealing with low-cost competition from for instance imported sunflower oil and to develop stronger sources of institutional support from the government and related firms especially in the Central Corridor of Tanzania. Research on value chains, particularly in countries of the global south often deals with issues of food security and improving (upgrading) participants' livelihoods or value added of FVC. It also implies the term of innovation, which will be explained in detail the in following section.

2.2.2 Innovations in Food Value Chains

In literature are many definitions about innovation targeting different subjects. After this literature review, the author now defines by himself agricultural innovation as a successful introduction and exploitation of knowledge and technologies for social and economic benefits. The

adoption of these newly acquired skills can lead to positive changes in cultivation or production and therefore improve the smallholders' livelihoods. However, the WORLD BANK (2006) sees innovation as […] "the implementation of a new or significantly improved product (goods or services) or process, a new marketing method, or a new organizational method in business practices, workplace organization, or external relations." It is irrespective of whether they are new to their competitors, their country or the world. This can be substantiate by MILLER & JONES (2010: 115) saying that

"[…]an agricultural value chain is no longer viewed as a single channel that tracks a product from a farmer to a market, but as a complex chain that is impacted by relationships within the chain, enabling environments, availability of appropriate services and inputs from technology to raw materials, and most importantly, changing market demand".

A reason for small-scale farmers' need to change their way of working to be able to access restructured markets and, above all, to sustain participation over time, as these markets continue to evolve in ever more demanding ways. Smallholders need to innovate to add value to products or services and to make production and marketing processes more efficient. Literature shows, that […] "there seems to be three common elements […] for smallholder participation", namely:

- Upgrading of technical skills, infrastructure and management capacities,
- Specialization within multi-agent organizational arrangements, and
- Increased working and investment capital usually requiring subsidized external support for prolonged periods of time (BERDEGUÉ et al. 2008: 13).

Nowadays it is well known, that, for instance, technical upgrading is essential to meet the quality requirements of modern value chains. For small-scale farmers linked vertically with a private company (global player like Unilever or Nestlé) like a supermarket, it is mandatory. But smallholder farmers not linked vertically and marginalized in rural areas often do not have the possibility obtaining these requirements. Innovation is an essential issue for increasing productivity and thus, to safeguard farmers' food security. Evidence displays that the application of "technological advances leads to a more effective use of productive resources, and the transformation of new ideas into new economic solutions (new products, processes and services) is the basis of sustainable competitive advantages for firms" (CRESPI & ZUNIGA 2012: 273) or in this case could be for small-scale farmers in rural Tanzania. But not only farmers need to innovate; all participating actors of a value chain and the agricultural sector

are in demand for that. Several important innovations for value chains that support the improving exist. These are in accordance with MILLER & JONES (2010: 17) in fact:

- The development of models for market access such as contract farming, lead firm buyers, vertically integrated chains, networks of producers and buyers and various niche markets, including organics and fair-trade, and/or
- Assessing relationships through a range of analysis techniques: e.g., value chain drivers, linkages, power relationships, and value chain control and governance.

Innovations are often characterized by a high degree of novelty, the complexity in the process of development, insecurities and risks on the supply side and the demand side. These particular characteristics and the requirement involved overcoming the suppliers' and the consumers' resistance is crucial for the marketing creation that is oriented towards the innovation process. Innovation, whether it is institutional, technical or social, pursues a non-linear process and uses multiple sources of knowledge (AYELE et al. 2012: 334). That means innovation results not only from trying new things, but also from selection and incorporation into long and complex processes. It can only have a positive impact, when innovations are linked to sustainable processes, which involve actors of different capabilities and resources (SPIELMAN et al. 2009). Scientists have been working a lot on the issue of innovation, not only in terms of agricultural improvement, to a large extend and have been developing different approaches. For knowledge and network creation in agricultural sectors respectively the sunflower value chain in rural Tanzania, the author has determined that a combination of the agricultural innovation system approach and the actor-network-theory considers best economic, ecological and social aspects, which will be explained in detail in chapter four.

2.3 The Sunflower in Tanzania – potential for industrial competitiveness?

Before describing the agricultural subsector of sunflower oil production with its particularities, potentials and constraints, the author will shortly give some information about the edible oil seed production in Tanzania as a whole.

Oil seed production in Tanzania

Apparently the demand for cooking oil in the East African countries is increasing The RLDC estimated the annual consumption of edible oil of about 330.000 tons with an average growth rate of 3 % per annum in Tanzania. About half of the oil consumed in Tanzania is imported, i.e., nearly 170.000 tons in 2009, which is due to missing import taxes. Investing in sunflower

edible oil production could therefore offer competition against imported oil, mainly palm oil from Southeast Asia. A reason for encouraging the greater production and processing of edible oil, such like sunflower oil, in Tanzania is its potential for import substitution. This could generate income and employment especially in rural areas and as a consequence could have a beneficial impact on foreign exchange outflows. Up to now, the oil seed production in Tanzania mainly focuses on groundnuts (40%), sunflower (36%), sesame (15%), cotton (8%) and palm oil (1%) (RLDC 2008:6). However, most of the consumed vegetable oil in Tanzania is still imported due to deficits in domestic production. Since a few years the demand for edible oil is increasing and consequently a large number of newly registered small- and middle-scale oil processors recognized the potential and started, mainly in the central region, working in this subsector.

In Dodoma region, for instance, oil seeds and oil nuts were grown by 269.215 households. In 2012, the total production of oilseed crops was about 110.000 tons from a planted area of around 190.000 ha. Sunflower was the most dominant oil seed crop with a planted area of 83.385 ha, which is 44% of the total area cultivated with oil seed crops. It is followed by groundnuts, with make up for about 79.024 ha and 42%, followed by sesame with about 26.617 ha and 14% (URT 2012a: 33-34). Figure three shows the distribution of oil seed cultivation in Dodoma region.

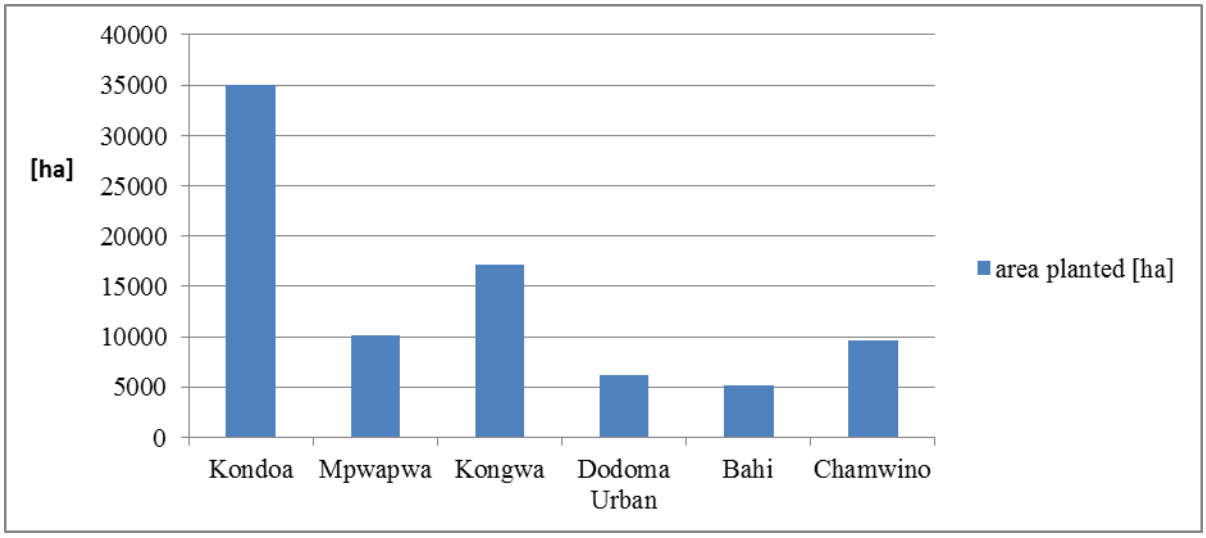


Figure 3: Area planted with sunflower by district (Dodoma region) (own illustration based on URT 2012a: 33-34)

In contrast, Singida region domiciled a total of 127.863 households having planted oil seed crops. The majority of that, almost 90.000 households planted sunflowers, while 30.892 households planted groundnuts and the remaining ones planted sesame. However, the productivity of sunflower seeds was the highest with an average yield of 0.69 tons per hectare, fol-

lowed by groundnuts (0.63 t/ha) and sesame (0.51 t/ha). Oil seeds and oil nut crops have been planted on a total area of 120.237 hectares which is equivalent to 22.1 % of the total area planted in the region (URT 2012b: 57-60). Figure four shows additionally the share of all oil crops planted in Singida region.

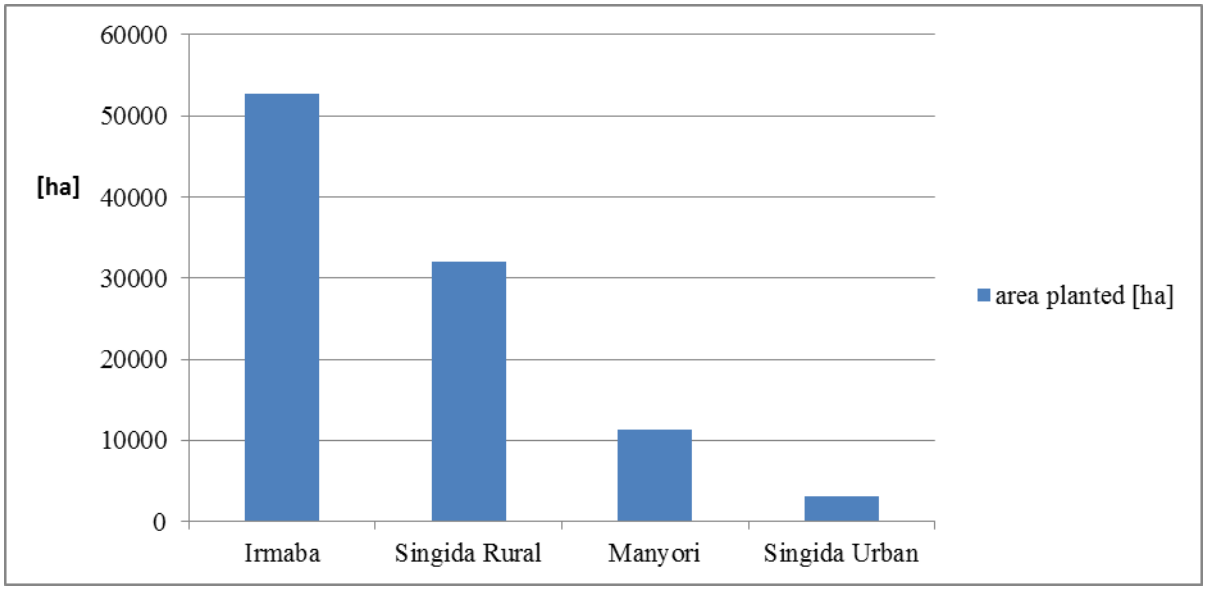


Figure 4: Area planted with sunflower by district (Singida region) (own illustration based on URT 2012b: 57-60)

The Sunflower Subsector

Meanwhile the sunflower has become one of the most important oilseed crops in Tanzania. The crop is adaptable over a wide range of environments and therefore it is widely cultivated in Tanzania. It is popular in the Eastern, Central, Northern and Southern Highlands of Tanzania, but mostly cultivated in the central zone of Tanzania. Sunflower is gaining popularity and current data shows that local production of edible oil whether it is industrial factored or small-scale processed oils contributes to about 40% of the national edible oil requirement. In contrast, the remaining 60% of consumed edible oil is imported (RINGO 2014)[4]. Sunflower has many economic applications like edible oil production, biofuels, animal feed and potentially in latex/rubber production. The edible oil has both favorable economic and nutritional implications. It contains a higher level of healthy monounsaturated fats than most other natural oils, making it nutritionally superior to synthetic edible oils and even olive oil. But the lack of seeds from high-yielding varieties is still problematic. Almost every small-scale farmer is still using his own seeds (previous season) due to high and varying prices and poor availability of seeds from stockists. The sunflower oil industry provides employment at the SME level and

[4] Interview Mr. Ringo 2014.

offers opportunities exporting and importing commodities at the macro level. The sunflower cake, a by-product during processing, is rich in protein and can be used as feedstock for poultry, small animals, pigs, dairy and draught animals, which can be seen an additional benefit especially for smallholders (MPAGALILE et al. 2009: 135-141).

In general, for farmers in Tanzania, reasonable yields can be achieved using basic inputs and simple farming techniques and the processing of the seeds to derive oil is an economically viable endeavor. The cost of producing sunflower oil in Tanzania is lower than other oil seed crops (sesame, ground nuts), and the crop has the added advantage of superior performance in poorer soils and increased adaptability across various ecological zones, as compared to other oilseeds. Sunflowers as a cash crop could increase households' income and therefore its livelihoods. It can have positive impact on unemployment and with consistent promotion sunflower could also contribute to poverty alleviation. But in Tanzania, smallholder farmers are faced a lot of challenges in producing sunflower seeds. These will be illustrated in the next section.

Constraints & opportunities

The sunflower subsector is faced with a number of constraints that include the following:

- Lack of improved and sufficient seeds, forcing farmers to use their own produced seeds,
- Unreliable market, fluctuating & low market prices for sunflower seeds,
- Diseases, insects and other pests,
- Inadequate improved tillage implements such as ox plow or tractors,
- erratic rainfall pattern,
- Inadequate knowledge of improved sunflower production techniques
- poor skilled and generated extension services,
- harsh competition from edible oil imports,
- deficient market information,
- Poor linkages among stakeholders and
- Poor infrastructure (MPAGALILE et al. 2009: 139).

On the other hand, the sunflower subsector has several opportunities for the future namely:

- Sunflower grains are produced by many small farmers in the Central Corridor. Increased production creates a substantial opportunity for increased income and improved welfare to small farmers
- Sunflower oil is relatively easy to produce (at least raw sunflower oil) with a small investment into machinery. Oil production constitutes therefore an opportunity for small oil processors
- Sunflower oil is excellent for human production as it is low in cholesterol. As specialty sunflower oils with high mineral content fetch extra premium prices, it might be worthwhile to further explore this opportunity
- Increased production of sunflower oil reduces the dependency of vegetable oil imports and improves therefore the foreign currency situation for Tanzania (RLDC 2008: 17).

This is just a listing of the challenges in sunflower seed cultivation for small-scale farmers in Tanzania which have been outlined in literature and found out during the field research. Some of these will be explained in detail in the chapter of results.

At the production level the sunflower subsector in the studied regions is characterized by smallholder farmers cultivating on fields less than five acres. On these five acre plots there is usually mixed cultivation, with the most popular combination of maize, beans, sunflower and groundnuts. The sunflower is usually intercropped with the maize as pure stand cultivation is only seen in the extreme minority of cases.

The sunflower seeds when harvested are in most cases sold to local traders either directly from households or at the local markets. These traders are either on commission from local processors or are acting independently. The independent traders may then locate buyers for the seeds, or negotiate with the processors, while the commissioned collectors usually work based on an order from the processor. However, some of the farmers also take their seeds to the processors themselves and sell their seeds. The processors are the pivotal point for the sunflower oil subsector, as all the seeds have to pass through these actors. They therefore come into contact with a wide variety of actors and have different types of transactions. The processors who lack capital are simply paid for their milling services, and the oil and cake are returned to the trader or farmer who brings it. In other cases the processor may purchase seeds or oil after processing. Once the oil is produced, the owner (farmer, trader or processor) may then either sell directly to the rural market, to rural retailers or to other traders who move the

the product towards the urban market. The farmers also use the edible oil additionally for consumption. This should be/is the normal way of production and distribution of sunflower oil, but reality often differs from this nature of production. The next chapter focuses on the study region where the research was conducted.

2.4 Description of the Research Area

As explained before and in one of the following chapters the study for this master's thesis has taken place in rural Tanzania collaborating the international project "Trans-SEC". But due to certain circumstances the study has been conducted independently in Dodoma and Singida region, the main areas of the central zone of Tanzania (see appendix a). This is, also because of the climate conditions, one of the most vulnerable and poor regions of Tanzania and is characterized by edible oil production and its sub-sector sunflower seed cultivation.

Central Zone of Tanzania

- Dodoma Region

Dodoma region is located in the central corridor of Tanzania's mainland – between 4° and 7° southern latitude and 35° - 37° eastern longitude. It covers in total an area of 41.310 km², of which 35.309 km² are land, potentially used for agriculture and has altitudes between 830 and 2.000 meters above sea level. This region is divided in seven administrative districts named Dodoma Urban Municipality, Chamwino, Kondoa, Kongwa, Bahi, Chemba and Mpwapwa District and has a total population of 2.083.354 (URT, 2006:1; URT 2013a: 2). Dodoma Urban District, the capital of Tanzania, is besides Singida region the centre of sunflower sub-sector. The surveyed area is considered as semi-arid climate, characterized as "one of three regions ranked top in the list of drought stricken areas of the country" (NJAU et al. 2014: 375) and by "dry savannah type of climate" with a unimodal and erratic rainfall pattern (rainy season) from end of November – April and a dry period between May – October (URT 2013b: 14). Figure five shows the daily and annual variability of temperature and rainfall in the study area. Thus, daily average temperature ranges between a minimum of 27°C from June to August up to a maximum of 31°C in October until December. Precipitation is less than 600 mm per annum with approximately 85% during rainy season (LIWENGA 2008: 777).

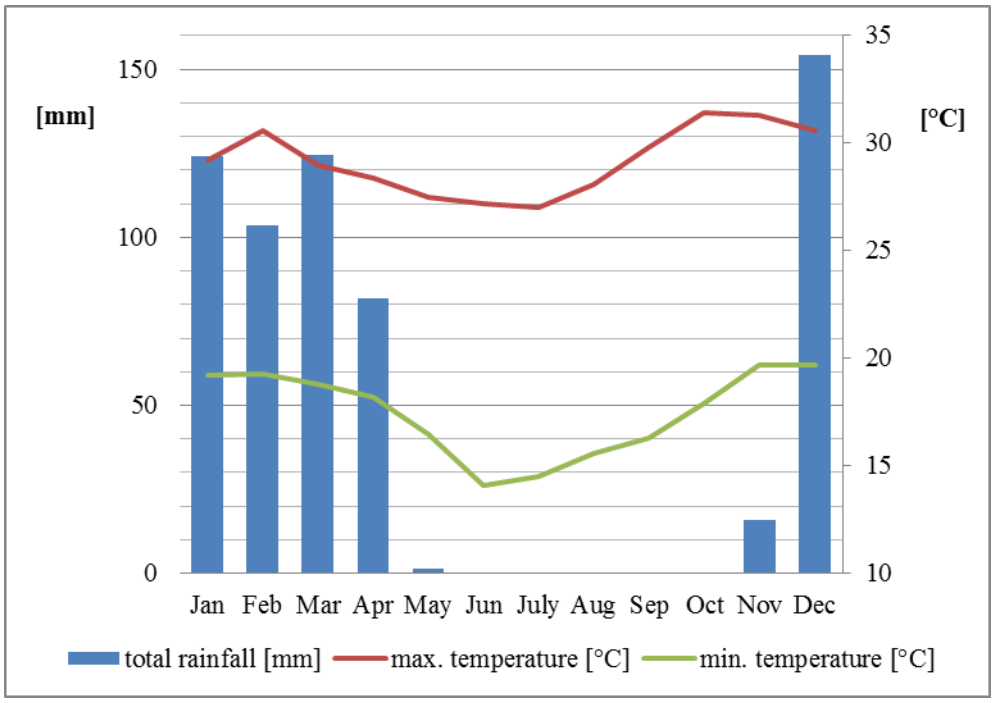


Figure 5: Climate of Dodoma (own illustration based on URT 2013b: 14pp.)

Kondoa District

Kondoa District is located in the north of Dodoma Urban District and lies between latitudes 4°S and 5°S, and between longitudes 34°E and 36°E. The altitude ranges between 1.000 and 2.000 meters above sea level (MADULU 2001: 18). Kondoa District has eight divisions, 35 wards and 160 villages. The district has an average rainfall of about 500 to 800 mm per annum and an annual temperature of about 21° C. Mondo area, is a populated place[5] in Kondoa District and is located in the south-east of Kondoa town (Coordinates 4°58'60" S 35°54'0" E) at an elevation of 1.497 meters above sea level. It covers the sub-villages of Old Mondo, Elele and Aya. All these sub-villages belong to Mondo village (MADULU 2001: 19). It is one of the three CSS of the study. The main economic activities in this region depend on agriculture, which include crops and livestock production, and has the highest share of households "employed" in agriculture in the region and a totally planted area of 199.319 hectares (URT 2012a: 13-21). The main crops grown in Kondoa District are maize, finger millet, **oil seeds**, pearl millet and sorghum (SWAI et al. 2012: 219), but dominated by sunflower seed cultivation (cf. URT 2012a: 20-35).

[5] A Populated place is a city, town, village, or other agglomeration of buildings where people live and work (GIUNCHIGLIA et al. 2012: 70)

Chamwino District

The Chamwino District originated from Dodoma Rural District borders Dodoma Urban Municipally in the east and south (cf. appendix a) and lies between latitudes 4° and 8° S and between longitudes 35° and 37° E. The district has a total area of 8.056 km² and is administratively divided into five divisions, 38 wards and 77 villages (with a total of 773 hamlets) (URT 2012C: 14-15). Generally, people in Chamwino are engaged mostly in farming and small business activities (e.g. small shops, selling of crops or livestock, handcraft etc.), but also has a small share of employees of government (e.g. teachers, extension officers, village executive officers (VEO), ward executive officers etc.). The climate here hardly differs from Dodoma region written before. It is a dry Savannah type of climate characterized by low and unpredictable unimodal rainfall, persistent desiccating winds, low humidity and an average temperature between 21°C and 23°C. Chamwino experiences a long dry season from late April to early December and a short single wet season occurring during the rest of the year. The average annual rainfall ranges from 500 mm up to 800 mm. On the average, about 85 % of the total rainfall in the district is received within the first four months of the rain season i.e. from months of December and March (URT 2012C: 18-19).

- Singida Region

Singida region is located between latitudes 3° S and 7° S. Longitudinally the region is situated between 33° E and 35° E. To the north, it shares borders with Shinyanga, Arusha, Manyara Region and on the east borders Dodoma Region. To the south it borders the regions of Iringa and Mbeya while on the west Tabora Region is located. Singida region has a total surface area of 49.438 km² and is divided in six administrative districts named Singida Municipal, Singida District, Iramba, Ikungi, Mkalama and Monyoni district (URT 2012b: 27).

The climate condition is basically of an inland equatorial type and forms part of the semi-arid central zone of Tanzania experiencing low rainfall and short rainy seasons which are often erratic with fairly widespread drought of one year in four. The region has a unimodal rainfall regime, which is concentrated in a period of six months from November to April. The long-term mean annual rainfall is around 600 mm with a standard deviation of 179 mm and a coefficient of variation of 28.7% (LEMA & MAJULE 2009: 208). This is shown in figure six. Mtipa village, within Mtipa ward, which was also part of the study, is located in Singida Urban District and shows all these pictured characteristics.

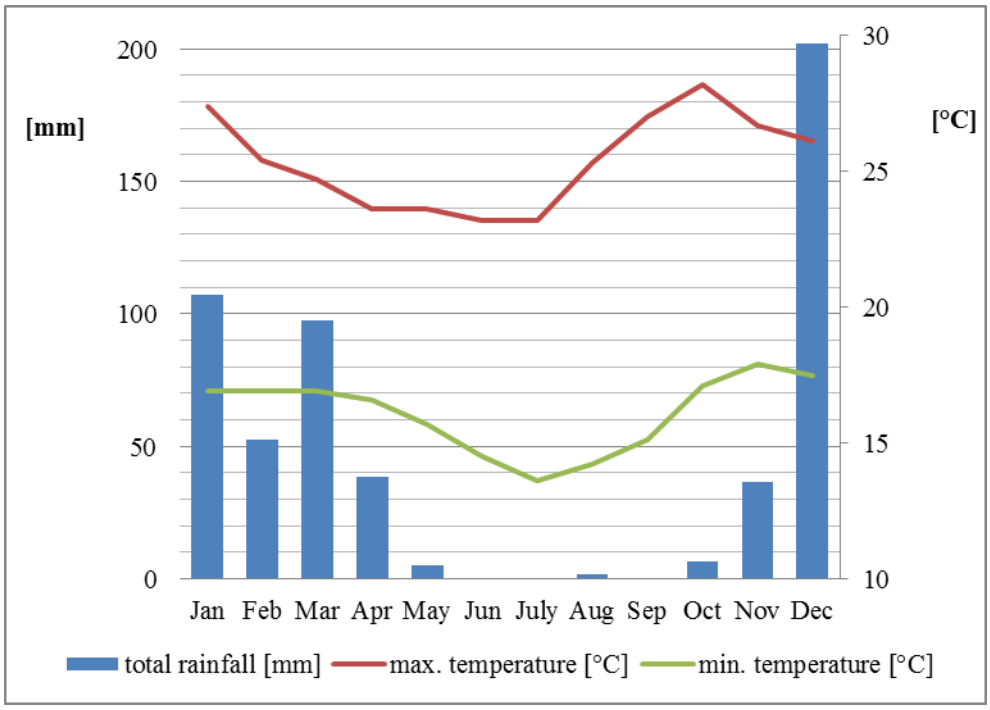


Figure 6: Climate of Singida (own illustration based on URT 2012b: 27)

As written before Dodoma region as well as Singida region show very similar, but on micro level different, climate conditions. This variability of precipitation and the constantly high temperatures during the year, also caused by climate change (LIVERMAN & KAPADIA 2010: 8), are not the best premises for one of the most important economic activities – agriculture – of Tanzanian citizens. In the following subsection agriculture in East Africa, specifically in Tanzania, will be described.

2.5 Agriculture in East Africa / Tanzania

In sub-Saharan Africa, countries like Tanzania can be described as *"agriculture-based"*. This means the agricultural sector is the backbone of the economy, employing 80% of the labor force and contributing substantial share of the gross domestic product (GDP) (SALAMI et al. 2010: 1). Thus, the agricultural production is the main source of income to the inhabitants and is primarily dominated by small-scale farming subsistence structures " […] oriented towards food production, primarily for own consumption" (HOLMÉN & HYDÉN 2011: 23; BARHAM 2007). Furthermore, agricultural production is dominated by food crops or traditional livestock and the majority of agricultural producers faces tremendous long-term challenges in accessing input and output markets, and/or credit, land tenure and finds itself trapped into a vicious circle of low income, low output and low productivity.

The sector is faced with falling labor and land productivity because of application of poor

technology and infrastructure and dependence on unreliable and irregular weather conditions. These are also caused by climate change and in recent years compounded by the volatile food and energy prices and very recently by the global financial crisis occurred during the last decade. This has remarkable influence on food security (IFAD 2014: 1-2; SALAMI et al. 2010: 1-24). Most smallholder operations occur in farming systems with the family as the centre of planning, decision-making and implementation, operating within a network of relations at the community level (SALAMI et al. 2010: 2). In the past 30 years, "*SSA's declining capacity to feed its growing population has commonly been explained as being caused by bad governance and neglect of food crop agriculture*" (HOLMÉN & HYDÉN 2011: 24). The crisis in African agriculture respectively development was to a very large extent caused by the neoliberal economic policies in the 1980s. Although they were expected to favor the farmers by offering better price incentives than before, the same policies have been contributed by taking away the support structures, notably marketing boards, extension services and farmer subsidies (HOLMÉN & HYDÉN 2011: 31-32).

SSA countries have aimed, partially through liberalization reforms in the agricultural sector, to integrate small-scale farmers into the formal market economy to attract investment specifically in processing industries, and adding value addition increasing scales (LYNAM & THEUS 2009: 34). This should lead to organizational and technical innovations. Although Tanzanian Ministry of Agriculture has constituted several agricultural reforms and strategies including the agricultural development framework in the early 1970s and Agricultural Sector Development Strategy (ASDS),most of the policies had no significant impact on the majority of smallholder farmers (SALAMI et al. 2010: 2) due to a lack of implementation strategies and guidelines. In the preceding years the ASDS set an agricultural vision and sought to create an enabling and conductive environment for improving the agricultural productivity and profitability (MPAGALILE et al. 2009). In order to achieve these goals, the government of Tanzania initiated a number of reforms like the KILIMO KWANZA Resolve, the Tanzania Food Security Investment Plan (TAFSIP), the Southern Agriculture Growth Corridor of Tanzania (SAGCOT), Feed the Future Programme, just to present a few examples. However, market reforms are necessary but not sufficient for raising agricultural productivity. As it has been argued by ALSTON (2010), "[…] *growth in agricultural value added has the largest impact on country's economy as well as on poverty reduction"*, which could be a great potential way in Tanzania, because its […] *"production systems are based on complex and multiple interactions and interrelations among a wide range of different biotic and abiotic resources as well*

as socio-economic and cultural parameters" (USAID 2008).

CHAPTER THREE

3 Research Design

The importance of farmers adopting agricultural innovation and its diffusion has long been of interest to agricultural extension services and economists. Several parameters have been identified as influencing the behavior of smallholders for the examination of this subject Scientists investigating farmers' adoption behavior have accumulated considerable evidence showing that demographic variables, technology characteristics, information sources, knowledge, awareness, attitude and group influence can have impacts on the adoption behavior (ROGERS 2003). Reasons for adoption or diffusion of innovations at farm level vary over space and time. Factors influencing these are neither exclusively economic nor purely non-economic. Both are essential motives for shaping the farmers attitude towards new technologies and its adoption and diffusion.

3.1 Research objectives

With regard to the above written state of the art in Tanzanian sunflower oil industry this master's thesis should actually contribute to analyzing possible UPS. The starting point should be the by Trans-SEC developed UPS: *„Enhanced horizontal and vertical coordination, and new product development and diversification of tradable commodities in local food systems (for high value crops, surplus cereals, and livestock and livestock products).“* But due to the absence of large private companies (e.g. international supermarkets, hotels or large-scale processors) investing or entering this aspiring subsector, which was stated in the previous literature review, the surveys' main focus had to be changed on-site. Therefore it is on the market-side organizational innovation of vertical connection of smallholders with companies, as well as horizontal connection of several smallholders in order to obtain economies of scale and access to modern market structures. This in turn could be connected with possible acquisition of a large number of further innovations (e.g. acquisition of new or improved crops, inputs, loans).

The aim of the investigation of this thesis was to analyze the significant changes, caused by these market-side innovations in terms of innovation-, information- or know-how-transfers/-processes in the FVC and the small-scale farmer cooperation and to identify possible livelihood opportunities and risks by applying the Actor-Network-Theory (ANT) and the agricultural innovation system approach (AIS).

As many rural small-scale farmers are facing obstacles and disadvantages regarding accessibility of markets, high transport or trade costs, fluctuating market prices etc. the study will focus on the marketing level of the FVC of sunflower oil production. Private actors, like hotels, supermarkets or exporters and their cooperation with rural small-scale farmers in terms of contract farming have been taken into account. The actor-oriented consideration should also be linked with the Sustainable Livelihood Approach in order to demonstrate the standard of living and the vulnerability of the actors in a FVC related to poverty.

3.2 Research Questions

A qualitative survey was undertaken among the different actors in the sunflower oil FVC in Tanzania's Dodoma and Singida Region in order to identify the factors affecting the diffusion of agricultural innovations for Tanzanian small-scale farmers and additionally figure out the role of existing private actors play in this FVC. The study was explicitly guided by the following research questions:

1. What kind of relationship and interaction exists among the various actors in the FVC of sunflower oil production?
2. Can the competitiveness of small-scale farmers be improved by building networks either vertically or horizontally?
3. What constraints / challenges (environmental, social and institutional) are small-scale farmers within the sunflower oil FVC faced and can these be overcome?
4. What chances / risks exist for small-scale farmers to ascend / descend along a FVC? Does the possibility to expand into niche markets exist?
5. How do private actors affect innovations in a FCV for small-scale farmers? What are the advantages / disadvantages for small-scale farmers arising in the innovation system by private actors?
6. Are marginalized households integrated in the innovation process and do they benefit from innovation and technology transfer?
7. Who are the innovation pioneers in sunflower oil subsector in Tanzania and what does this imply for their living?
8. What are the main differences between the traditional and the modern sunflower oil FVC in rural Tanzania?

CHAPTER FOUR

4 Agricultural Innovation Systems and Actor-Network-Theory

4.1 Agricultural Innovation Systems from scratch

"There is need for a more flexible framework for studying innovation processes in developing-country agriculture — a framework that highlights the complex relationships between old and new actors, the nature of organizational learning processes, and the socioeconomic institutions that influence these relationships and processes" (JUMA 2011: 53).

4.1.1 What is an (agricultural) innovation system?

The agricultural innovation systems (AIS) perspective is increasingly used to explain how innovation takes place and how and by whom benefits are gained out of complex technological and institutional change processes (ASSEFA et al. 2009: 35). As in the AIS multiple conditions and relationships which encourage innovation in agricultural systems are greatly considered, a more flexible means of dealing with the diverse conditions and contexts in which innovation has to occur are offered. The varying actors in the system, their feasible interactions, the role of informal practices in the innovation promotion and the context of agricultural policy are taken into account. Therefore the AIS can be seen as an interactive process among these involved actors (WORLD BANK 2012:4). Obviously, farmers innovate collectively in a process with more or less supporting actors which offer extension service, education, training and agricultural research. These are well known key components of an AIS, which can also be seen […] "as a network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic use together with the institutions and policies that affect their behavior and performance" (JUMA 2011: 51). Such a concept not only covers science provider but also all the actors involved and their interactions of actors within the innovation process. Besides individuals (e.g. small-scale farmer) a set of agents such as government, private sector, universities, research and educational institutions and international development agencies are significant parts of a larger system of knowledge and interactions. This allows different actors with varied strengths and power to pursue, jointly and/or individually, mutual goals (development, diffusion, use of new agricultural technologies) in agricultural innovation as well as having large influence on the process of technological change.

A variety of African countries, such as Tanzania, still have powerful states controlling productive activities. However, the private sector now gains in importance in adapting existing knowledge, providing and applying it to new ranges (ADEOTI & OLUBAMIWA 2009: 18; JUMA 2011). This progress can also be seen in Tanzania, where the private sector increasingly invests in local agricultural value chains in rural areas. As JUMA (2011: 53) points out, " *[…] the* farm firm *is at the center of the agricultural innovation system framework, and the farmer as the innovator could be made less vulnerable to poverty when the system enables him to access returns from his innovative efforts*". The understanding of how individual and collective capabilities are strengthened, how these capabilities are applied to agriculture are requirements for the AIS framework (JUMA 2011: 53) and allocates the potential to transform African agriculture. This can be achieved when strong structures are put in place in order to create and distribute critical best practices and technological breakthroughs. In many African countries, linkages between for instance farmers, firms and universities and training centers could even be much stronger. Similar groups being closer (physically, culturally and socially) are more likely to trust one another, share information and assets and enter into complex cooperative production, processing, financing, marketing, and export arrangements, the main activities in a value chain (JUMA 2011). Meanwhile sunflower oil is one of Tanzania's most important food staple in terms of low-cholesterol consumption and is widely acknowledged as a crop with great potential for addressing the challenges of food security and welfare improvement. A sectors like this changes over time. A lot of attention should be placed on their laws of motion, emergence, dynamics and transformation. That's why it is important to clarify the role of technology and research in the innovation system.

4.1.2 Role of Technology and Knowledge in Innovation Processes

Often innovations in agriculture and other disciplines arise in response to the potential for added value in a value chain. This is often associated with niche, social, environmental or more traditional opportunities in order to add monetary value (e.g. fair-trade, organic food, increasing quantity and quality of procedure). But these opportunities can be addressed easily by good agricultural research in technology and advisory/extension services in the innovation process (RAJALAHTI et al. 2008), which is in terms of technological change *"a very slow process"* (HEKKERT et al. 2007: 415) and cannot be influenced easily. In Tanzania, local government authorities (LGA) and agricultural research institutes (ARI) are determined for such purposes. Research and technology development are definitely required for innovation but constitute only a part of the innovation process. Key challenges for successful innovations

rather refer to adaption and usage of existing knowledge and technology in terms of specific problems or e.g. market demand. Small-scale farmers often are not able to deal with research outcomes. The AIS can be particularly successful in addressing issues related to commodities as well as market development, but it must also deal with issues of natural resource management, subsistence farming and as a whole development and employment in rural areas. In addressing this set of agricultural and rural matters, the role of smallholders and other rural people as the engine of innovation is essential to enhance (RAJALAHTI et al. 2008:13-14). This can be done by a number of issues like organizing and empowering these rural stakeholders and implies incentives, partnerships and coordination within the innovation process.

Some scientists suggest that knowledge is „personalized information" which covers interpretations, studies, observations, facts, concepts, ideas and procedures. Knowledge cannot exist outside of an agent (smallholder). Hence individual needs of the agent have certain impacts on it and its initial stock of knowledge. In this cognitive process knowledge in the mind of the agent is the outcome of information-transformation, while knowledge is translated into information when externalized by the agent. This process increases the agents' capacity for effective action.

4.1.3 The Importance of Incentives, Partnerships and Coordination

Participation can be seen as a key factor in innovation systems and can affect a countries' performance in economic and social matters. As AIS engages knowledge to be used effectively, partnerships among the actors within the innovation process are crucial. If a market for instance is not sufficiently developed to provide incentives to form a network in order to add value, coordination mechanisms or organizations/research institutes for creating those can be very helpful to overcome market constraints. As MARQUES et al. (2005) & RAJALAHTI et al. (2008) argue:

"it is essential to have […] local and multi-sectoral networks. Local networks are well suited to most agricultural contexts due to the physical proximity of network members. This proximity facilitates the exchange of knowledge rooted in individuals. Common practices and shared culture, norms, and values foster communication processes. Because rural issues go well beyond agriculture and commodity development issues, however, most rural settings and development paradigms require a multi-sectoral approach. Although multi-sectoral networks are challenging to establish and maintain, participants benefit from collaborating across disciplines and perspectives as well as from an important creative potential"

It is clear that e.g. subsistence smallholders in rural and marginalized areas need to have incentives in order to join or form a network or collaboration. However, increasing income and added value of the produced commodities are obvious reasons, but often something is missing. In AIS empowering smallholders or engaging the private sector could rather be good opportunities to win them for participation. Several key principles for stakeholder partnerships in agricultural production and innovation processes exist. These would be:

- Identifying common ground for innovation by negotiating on values and goals
- Building devices necessary for meaningful interaction among partners
- Dealing with asymmetries among partners
- Understanding the implications for research partners (RAJALAHTI et al. 2008: 24-25).

Though the concept of AIS offers a holistic way of strengthening the capacity to create, diffuse and use knowledge, primarily in the industrial sector, it is hardly tested in the agricultural sector. The [sectoral] AIS often consider only economic issues and largely ignore ecological and social aims. That's the reason why in this study another grounded Theory, the actor-network-theory, was used and combined with the AIS approach.

4.2 Actor-Network-Theory as Perspective

"[…][T]he actor-network approach [is] not a theory in the strict sense. Theories usually try to explain why something happens. The actor-network theory, however, raises rather to describe a claim than to explain (LAW 2011: 22).

4.2.1 Central Assumptions of ANT

Actor-network-theory is rooted in Studies of Science and Technology (STS), especially in ethnographic studies on laboratories that focus on how science is created. It has its origin in the late 1970s and early 1980s and was developed by the sociologists Bruno Latour, Michel Callon and John Law in particular. ANT has evolved in ways that make it relevant to a number of subject areas and can mainly be seen as a response to the theoretical limitations in sociology considering interactions between science, technology and society. ANT was primarily employed as a theoretical and methodological frame for untangling relationships between the hard sciences and their social embeddedness (CALLON 1980, 1986b; CALLON & LATOUR 1981; LATOUR 1987, 1988). Subsequently, it has increasingly been used to analyze institutional behavior, the sociotechnical nature of "projects" parented by organizations and the non-

human objects and technologies which mediate group functioning (CALLON 1991; LATOUR 2004, 2005). Often misunderstood or simplified as another framework for analyzing "social networks" and "agency" (LATOUR 1997), ANT can actually be described as a non-framework, which favors a methodological toolkit to stickle the heterogeneity of actors[6] (CALLON 1986a: 19). It acknowledges uncertainty about selection and constant dislocation rather than static states (cf. CALLON 1986a: 27-28; LATOUR 2005: 11-12, 59-60). As such ANT offers a lens that "[…] focuses particularly on describing how networks emerge and interactions among the actors in the innovation process take shape", and thus could help with the concluded challenges in research methodology, because it is not a static description of nodes and hubs (VOETEN et al. 2013: 7). ANT is a heterogeneous network of approaches (or family of theories) and non-approaches having changed and translated during the last decade. This is why it is almost impossible to define ANT in a single manner. It is a constructivist approach which requires hard empirical evidence and according to LATOUR (1987) it is an action theory in which innovation has to be studied in action. The focus must also be on dynamics rather than on stability of structures. The actors are not defined and analyzed in a stable set of relationships (CORDELLA 2006) but rather in a dynamic and meta-textual context.

"ANT examines the complex composition of networks in the modern world and seeks to understand how the networks gain their strength and how they achieve their scope" (MURDOCH 2000: 410).

As such defined "actor-networks" symbolize the circulating interactions between human "actors" and non-human "intermediaries", which have an equal status within ANT. In terms of ontology, technology and society can be seen as fundamentally equal entities (LATOUR 1987). Actors or actants (people, objects, innovations etc.) are always changing with regard to the other actors that appear within a network. Innovation here is the result of a dynamic formation of alliances in which material things also play a role. In accordance to VOETEN et al. (2013) "networks are actually based on and framed by non-human objects, material innovations, observations, technology, scientific evidence as well as subjective perceptions and opinions of the community members, attitudes, mental models, cultural patterns and informal institutions (semiotic context)". Some ANT authors argue that chain or network activities can only be totally comprehended by taking into account the full range of entities (natural, social, techno-

[6] The term „actant" is frequently used in literature

logical) found therein. In this context CALLON (1991: 133) defines a network as "a coordinated set of heterogeneous actors which interact more or less successfully to develop, produce, distribute and diffuse methods for generating goods and services". This is often called "hybridity" and appears to accord better with Goodman's concern for the new "ecology" of food (MORGAN et al. 2006).

WHATMORE & THORNE (1997) propose that multiple forms of agency can be given more consideration when the establishment of food commodity chains is described. Especially, food networks have to be conceptualized as composites of the various actors that go into their making. They see networks as complex objects due to their arising from interactions among varying types of entities: these entities coalesce, exchange properties, and stabilize their joint actions in line with overall network requirements (LATOUR, 1999). The accentuation of heterogeneity in this case means that, as CALLON (1991: 139) points it out, "impurity is the rule". WHATMORE & THORNE (1997: 291–292) euphemize this point:

"to be sure, people in particular guises and contexts act as important go-betweens, mobile agents weaving connections between distant points in the network [...] But, [as ANT] insists, there are a wealth of other agents, technological and "natural", mobilized in the performance of social networks whose significance increases the longer and more intricate the network becomes […] such as money, telephones, computers, or gene banks; objects which encode and stabilize particular socio-technological capacities and sustain patterns of connection that allow us to pass with continuity not only from the local to the global, but also from the human to the non-human".

To simplify, networks and value chains necessarily mobilize a plurality of actors whether being social, technical or natural. That means "[…] the longer the networks and chains, the greater the mobilization is likely to be" (MORGAN et al. 2006:18). This emphasis of the heterogeneous quality of network relationships does not necessarily imply that each chain (or network) is unique. Because networks are rarely performed in elementary new or innovative ways, rather stepwise changes lead to new transformations on "old issues" (MORGAN et al. 2006: 18).

Despite the importance of ANT within Humanitics, and in spite of the contribution of ANT in understanding cases of countries in the global south and in understanding processes and institutions that are central to (international) and rural development, ANT has hardly been used within development studies. Yet using ANT holds great potential describing the emergence of

networks of food value chains in rural areas.

4.2.2 Actor-Networks and Development

Rural areas can be constructed as an actor-network, in which the "local" actor can be connected to the regional, national and the global through the connectivity of human actors. This can include individuals, farms, agencies, institutions, cooperatives and (local) government departments or authorities (ROBINSON 2004: 35). But non-human actants, like technologies can also establish connectivity. These actors (human or non-human) can comprise formal and informal networks, connecting through space to link the local with the global (BRYANT 2002, ROBINSON 2004). By means of such a network, local events can be influenced by actors not in close proximity. That means, an actor, e.g. a politician or civil servant develops a policy within the WTO that takes form as a regulation (intermediary) and in turn affects the way of farming in a particular locality (ROBINSON 2004). The basic argument that is advanced here is that development can be better understood as an outcome of negotiations among heterogeneous actors, as they attempt to extend networks – which include people, things and language – to further their interests in any way. The relationship between humans and other entities is under constant renegotiation. For example, when Tanzanian small-scale farmers attempt to grow their old sunflower seed varieties in the central zone of Tanzania, their varieties are useless due to the almost arid weather conditions of the region. Nature has to be negotiated with first. Only after introducing and developing new seed varieties it should be possible to improve yields. In short, in order to understand development processes non-humans must be included to produce a more comprehensive narrative.

ANT looks to the specific networks into which actors are inserted in order to understand particular distributive outcomes. The concept of enrollment – in which some actors enroll others in order to advance their own interests – has become critical in ANT studies in this quest (more on this later).

4.2.3 Black Boxes

Important in ANT as written before is the formation of the network. However, another essential issue in ANT is how a network becomes a so-called "black-box". This implies that all the underlying human and non-human interactions are taken for granted and common understandings of every actants' role is reached (VOETEN et al. 2013). The human actors feel represented by the network and agree with the terms of cooperation. The relationships among the actors

appear stable (BELLIGER & KRIEGER 2006). For successful innovation it is necessary that all actors join the innovation effort and agree on the ways to collaborate. The complexity of a network can thereby be reduced and black-boxing is a prerequisite for successful innovation in the strict economic sense. The process of black-boxing is also relevant for innovation that includes social and environmental issues. In ANT this process described via the term translation – introduced by CALLON (1986).

4.2.4 Translation

Central to the understanding of ANT is the concept of "translation", in which actors create a central network. Translation is a manner of imposed collaboration by which actors enroll others into, or maintain their presence in, an "actor-world". Actor-worlds, which are often merged with "social networks", are operational spaces within which actors continually renegotiate their roles and redefine their functionality. Aggregate acts of translation maintain the coherence of the actor-world and recruit new support. This is done in a number of ways. CALLON (2006) distinguishes four stages of translation in his classical study about scallops in the bay of St. Brieuc: interessement, problematization, enrolment and mobilization of allies. In the authors view, these "moments" can be transferred onto the innovation processes in the Tanzanian sunflower value chain development.

The first moment, *problematization* means that the principal actors try to make themselves indispensable to the other actors by defining the nature of the problem those actors face in achieving their goals and by identifying a single way forward. This is also described as an obligatory point of passage (OPP) (VOETEN et al. 201:7). *Interessement* is the act of using enrolment to interest an actor by engaging in indirect incentivizing. The focal actor tries to convince other actors to accept its means. Another form of translation, *enrolment,* is the strategy of rendering involvement in the actor-world indispensable by creating a "geography of obligatory passage points" (CALLON 1986a: 26-27), through which recruits traverse without necessarily comprehending their contribution to the overall functioning of the actor-world. This agreement could be formal or informal. The form of *enrolment* relates to the previous named *problematization.* At the same time it gives the impression of being critical to the ultimate (re)solution of the larger "problem". The last moment of translation is the *mobilization of allies,* where all actants are aligned and have their interests represented in the network (VOETEN et al. 2013: 8). It is also a set of roles and activities that keeps those members "busy" that tend to breed new activities which distance the actor from the implications of the

"matter of concern". Mobilization of allies or Displacement is similar to the idea of institutionalization commonly found in organizational ethnography literature.

The result of aggregate translation is to maintain the coherence of an actor-world. An *actor-network*, in contrast, is not an object, but a concept used to describe collective translation (LATOUR 2005: 131). It is useful to compare actor-networks to social movements – both involve sprawling actor-worlds and actors performing day-to-day activities that contribute to the identity and functionality of the social movement. The main differences are that there is a tendency to reify social movements (e.g., the human rights movement, the environmental movement) and crystallize their goals, whereas actor-networks are processual and conceptual. In this study, agriculture and rural development are conceptual spaces maintained by actor-networking, "under" which actor-worlds such as development NGOs, agricultural techniques, government and village-based organizations are engaged in a self-reinforcing process of translation. Throughout this thesis, the author will italicise words related to actor-network theory if the reference is ambiguous. This approach also tends to see networks as sets of power relations but here power lies not within the macro actors themselves but in the links that bind the actors and entities together (LATOUR 1986).

CHAPTER FIVE

5 AIS & ANT as Methodology

The methodological procedure of the thesis should be based on a comparative case study approach. The study was located in Dodoma region, which is chosen as the project area by Trans-SEC and another comparable region, Singida, which was finally defined on site. Thereby the analysis focuses on an existing modern FVC, where small-scale farmers are already linked (horizontal and/or vertical) to modern costumers (e.g. hotels, supermarkets, and exporter) and a "traditional" FVC. Thus scientific knowledge should be drawn for the project region. Subsequently (and in advance) the institutional requirements and circumstances in the project area should be analyzed in order to classify the findings of the analysis of the comparable region and to develop possible scenarios.

5.1 Qualitative Research

The purpose of the qualitative research does not reflect the need to quantify extensive numerical data but rather to explore the range of human decisions and their results, thus acquiring a subjective understanding of social realities which are bound to subjective intentions (FLICK 2006). The awareness of the pluralization and the ongoing individualization of livelihoods, emphasizes the need to access empirical information in a more sensitive way. The theoretical perspective evolved from the post-modernist approach to interpret the meaning of social relations and their everyday realities within a chosen system considering locally, temporal and situational constraints (LIMB/DWYER 2001; FLICK 2006). Qualitative research focuses more on inductive research approaches instead of testing hypotheses or theories (deductive research approach). The objective is to generate empirical generalizations or theoretical frameworks on the basis of empirical data and consider knowledge and capabilities as local features (FLICK 2006: 12-13). This research approach is known as *"grounded theory"* (STRAUSS/CORBIN 1990: 24; GLASER/STRAUSS 1998: 15). The intention is no longer to have a hypothesis in mind from the beginning of a research project (PUNCH 2005), but to circular proceed in a status of *"permanent reflection"* during the whole research process (FLICK 2006: 127).

Research Design

The research design contains the appropriate measures to gather the empirical data for the research questions. Moreover, it concludes the method of analyzing the data set. To empirical-

ly gain insight into the different realities of socio-economic systems the research design is based on a mixed use of research methods. The process of combining different perspectives and approaches when investigating a subject is called triangulation (FLICK 2007). The aim of this process is to combine triangulation sources that have different biases and strengths, so they can complement each other (ibid. 2007).

The relevant data has been gathered using a combination of extensive documentary analysis, focus group discussions as well as semi- structured interviews with individuals (smallholder, trader, processor), and so called "expert"- individuals from relevant institutions, like SNV, ARI or a Principal Agri-Business Officer. The secondary data is collected from the documents and reports, which might contain some quantitative data.

5.2 Qualitative Interviews

Qualitative interviews are considered to be a very popular methodological approach of qualitative research and evaluation (FLICK 2006). In contrast to quantitative surveys or questionnaires, which are characterized by a structured schedule and close-ended questions, the qualitative interviews are interactive conversations through which the researcher can extract a wide range of perception, experiences and interpretations in the form of narratives or stories (SMITH 2001).

Different qualitative interview styles can be applied in the field of empirical research. The distinctions between those interview types are the specific interview techniques, the number of participants, as well as the level of structure of the questionnaire and therefore they vary with respect to the degree of control the interviewer has (FLICK, 2006). The common idea of all qualitative interview approaches is the rather openness of formulation and the qualitative analysis of the data (MAYRING 2000: 67).

Semi-structured Interviews

Semi-structured interviews are useful for inductive and exploratory investigations of new ideas and topics. The general idea is to enable a conversation along a logical structure of questions - a so called *"interview guide"*, which allows open answers and flexible adaptations of the interview process according to the specific interview situation (BAUER & GASKELL 2000). Hence, this interview type is conducted with an outline of questions, mostly open questions, representing a predefined structure.

For my research a series of semi-structured interviews were conducted with small-scale farmer, members of the local associations including chairmen, village executive officers (VEO) etc. as well as members of institutional organizations and nongovernmental organizations who are related to agricultural development.

The interview guideline contains six different sections. For every different actor involved in the FVC an individual guideline with semi-structured questions was constructed. But during the interviews the interviewer was relatively flexible in posing the questions. Thus, the interview transcripts might differ. Some questions included answer possibilities (just for the interviewer), which were introduced after conducting the first interviews. The answer possibilities made it easier for the translator/interviewer as well as the interviewee to understand the intention of the questions. Following topics are covered within this interview guide:

(1) Traditional (or modern) cultivation methods,

(2) Benefits and constraints in cultivation,

(3) Changes in cultivation,

(4) Relationships, interactions and innovations within the sunflower value chain (formation of networks),

(5) Effectivity and level of trust in governmental as well as non- governmental organizations and local committees,

(6) (in some cases) Gender issues and vulnerability/changes in livelihoods.

Focus Group Discussion

Focus group interviews are an exploratory research tool - a *"structured group process"* to explore people's thoughts and feelings through group interaction and exchange (KELLY, 2003). According to FLICK'S (2006: 198) definition of a focus group interview, a "*focus group discussion is a non-standardized form of an oral interview within a group in which theoretical moderator has a leading position*". With this methodological approach the participants have the opportunity to clarify and modify their ideas through discussions with other participants and to generate diverging ideas (FLICK 2006). Furthermore, the group interaction as such generates data and insight into societal processes and ways of decision-making in the community or village. "*Group interviews may reveal how opinions are created and above all changed, asserted or suppressed in social exchange*"(FLICK 2006: 196).

Focus group discussions are according to PATTON (2002: 386) highly efficient qualitative data collection techniques, that offer a certain quality control "participants tend to provide checks and balances on each other which weeds out false or extreme views. The extent to which there is a relatively consistent shared view can be quickly assessed." The interviewer therefore is able to tease out the strength of participants' beliefs and subtleties about the topic that might have been missed in individual interviews.

Figure 7: Focus group discussion with female farmers in Mondo village (own picture)

For this study five focus group discussions have been conducted within the area of the three case study sites Chololo village, Mondo Village and Mtipa village. In Chololo village one mixed and one female focus group discussion, in Mondo village two focus group discussions, with a female and a male group, were held. In Mtipa village it was just held one male focus group discussion. The discussions should have been organized in gender-based groups to avoid socio-cultural influences and create a comfortable climate for conversation and discussion. For each focus group discussion more than 20 people were invited, but many of this interview sessions were attended by only three up to 10 people. Despite the unexpected low number of participants the interviews were conducted in a regular order. Most interview sessions were dominated by single persons who felt responsible to speak. These effects could hardly be minimized. In total only 25 participants were involved in the group interview sessions.

NetMapping

"*In order to share information, knowledge, trust and commitment in development projects, participation is very important in any decision-making process for development*" (SERVAES 1996: 75). For the purpose of gathering information about the actors involved their linkages, interactions and power relations in the sunflower oil value chain the survey furthermore was based on a participatory approach. This concept favors an active participation of the attendees so different perceptions respectively problems and solution strategies could be determined by a common group process. This process is not only a gain of knowledge for the researcher, it also inspires the participants to get in action or become aware of solution strategies developed within the group (KUMAR 2002: 23-27). The multiple actors in these FVCs are linked by formal and informal structures wherefore it might be difficult to understand the complexity of these "social" networks. *"In intercultural research contexts, the probability of misunderstandings is high, even more so, if the questions asked are predefined, closed ended, and do not leave room to explore whether the words and concepts used carry the same meaning for everyone involved*" (SCHIFFER & HAUCK 2010: 234). Net-Mapping should therefore serve as a flexible tool in order to underline the previous information about processes, linkages or relations received and might correct them. Though it has been originally developed for analyzing multiple stakeholders in a network, the survey could only be conducted with three individual smallholders (one male, two female) after the focus group discussion. As a starting point the farmer should communicate all stakeholders involved in the sunflower value chain and position them. Afterwards they were instructed to draw the linkages between those and visualize the frequency of interaction. As third step the farmers tried to highlight the actors with most of the power and to whom the farmers have the most trust-based relation. The final step was their expectations and aspirations about the actors they are in contact with the most.

Figure 8: Netmapping with a female and male farmer in Mondo & Chololo (own picture)

5.3 Data Analysis

The researcher gets the empirical data for the analysis by producing texts, which represent the knowledge basis for qualitative research (FLICK 2007: 107). Therefore, the interview records and summaries have been used to categorize the gathered material. In order to identify relevant information "codes" had been assigned to specific sections to abstract and classify the findings. A concept for analyzing data developed by STRAUSS & CORBIN (1990) has been served and adopted in order to identify the following relations:

(1) Patterns and common themes that emerged in responses dealing with specific items and how those patterns assisted to illuminate the broader research questions;

(2) Any possible deviations from these patterns which were examined for any factors that might explain these atypical responses;

(3) Interesting stories that emerged from the responses and how the stories could help to illuminate the research questions; and

(4) whether the patterns that emerged confirmed the findings of any corresponding qualitative analyses that have been conducted.

Quality of Research Material

There are always some issues that may have effect on the results of a research; one of them is working in a different cultural environment. Collecting qualitative data in this environment comes with unique logistic and analytic challenges:

One challenge during the research has been the exchange with the local people of Tanzania. One major group interviewed are small-scale farmer or landowner without a higher educational background, and thus having a different way of understanding, telling and describing processes and factors. Sometimes the answers to the questions posed were very unexpected and difficult to allocate. A lot of attention has been paid in advance to design understandable and simple questions, but nevertheless a question like e.g. how sunflower is traditionally cultivated, could result into general needs and problems of the village. It can be assumed that some of these people sensed a chance to get financial support from Trans-SEC the researcher has been collaborating with and did not consider him as an independent researcher.

Rural areas in Tanzania are challenged by complex environmental, social, economic and political preconditions and therefore especially the interviews with political actors of the Prime Minister's Office or the chairman of TEOSA have been reflecting a lot of personal interest. A lot of contrary outcomes have been collected which might be traced back to the unstable relationship between political actors and the local agencies or residents. On the one hand, a lot of mistrust amongst the local people (farmers, traders, processors) considering the government may lead to misinterpretation and on the other hand factors like omnipresent corruption and partly instability, as well as self-interest of political actors may paint a different picture of their socially constructed reality.

Critical Reflection

Retrospectively, the outcomes of research have not been that satisfying. Although the focus group discussions generated a deep insight into a variety of factors and processes of the local farmers' adaption of innovation, their interactions and relationships within the FVC, and their livelihoods, however, the results of the individual interviews revealed either an insight into a multi-angle perspective on the understanding of the FVCs' relations or the exact opposite people have mentioned beforehand.

By using a method that is based on individual key information, it is important to keep in mind that the results are subjective. The information depends on the informant's perspectives and opinion, i.e. a smallholders' opinion often differs from that a retailer or middleman has. While gaining these subjective statements, recollections and perceptions are the objective of the research, it draws certain limitations to the generalizability of the findings. Moreover, it is important to keep in mind that the interviewer as a subjective participant in the qualitative research process is influencing the interpretations and understanding on the findings.

The focus group discussions themselves could have been improved by a stronger influence of the facilitator or translator in order to motivate and consider all members of the group and encourage more or less quiet participants to contribute. As FLICK (2006: 198) points out, "the interviewer's main task is to prevent single participants or groups from dominating the interview and to encourage reserved members to get involved". These interview effects could probably be reduced through an improved interviewer training. Another limitation of the focus group interviews is the very work-intense and complex preparation of the data. Due to the fact that the recording of results is only acoustical, it has been a great challenge to identify everything that has been said.

Along with this concern, the language barrier is another factor which might influence the quality of data. Most of the interviewees (farmer, trader, processor, and wholesaler) have only been able to speak their mother language Swahili and the researcher was dependent of the translator. This could also have huge effects on the quality of the results. Interpretation of meaning is the core of qualitative research and as translation is also an interpretative act, meaning may get lost in the translation process (see VAN NES et al. 2010). Although the translator tried to repeat the responses as correct as possible, it can be assumed that some relevant information has been overseen during the process of discussion and translation, which can be seen in some transcripts listed in annex. Another last barrier could also have been the misunderstandings between the researcher and the translator at the beginning, as it took some time to clarify the research objectives. Thus, the results of the participatory method Netmapping are not very satisfying. On the one hand, the translator had to conduct these with the smallholders due to language barriers and therefore the researcher could not intervene immediately and on the other hand, the objective of this method was not clearly illustrated that the participants could easily understand it. The method had to be restructured on-site. But this process and the method per se created new ideas and knowledge which might be missing beforehand.

CHAPTER SIX

6 Empirical Field Findings

In this chapter the key findings of the survey in the central zone of Tanzania are presented. The results have been generated in respect to the developed research instruments and the presentation of these findings was guided by the theoretical framework, main research objective and the research questions.

The following chapter contains three sections, which derived from the specific research questions. The first part is an investigation of vertical connection in the sunflower FVC concerning the linkages between several actors of the chain focusing the "modern" sunflower value chain. Part two is centered on the idea of horizontal connection among smallholders and processors in the FVC. Within this section the linkages in terms of formation of farmer groups and networks in the three villages, Chololo, Mondo and Mtipa, in the two regions as well as networks of processors are presented. As a final part of this chapter the existence of a social change related to innovation diffusion and adoption will be illustrated.

6.1 Vertical Action in the Sunflower Value Chain

Vertical coordination in FVCs was widely distributed and controlled by states. Thus, every single step in the production of a commodity from production to consumption was guided by central planning authorities. After market liberations and privatization of firms or companies during the last decades this system has changed a lot. State-controlled vertical coordination is more and more replaced by the private sector which contains private traders, retailers, food processing companies and agribusinesses and so on (SWINNEN & MAERTENS 2007). Hence, this study focuses on the private sector getting involved in sunflower oil production in Tanzania. The main focus is on the actors which are food processing enterprises and how these influence the agricultural innovation system.

6.1.1 The Private Sector and the Sunflower Value Chain

In contrast to poverty, a substantial cause of food insecurity, access to food is explored from the perspective of purchasing power, established by prices and incomes. A key component of food security for urban citizens is the level of income and additionally the food prices paid. In this regard, *"the lower the price for a given quality of food, the easier is access to food"* (ARDA 2007: 322). For the rural population, however, it is a more complex situation. Rural small-

holders who serve urban markets often have better incomes and better means to purchase the food items. There is no exclusive production for the own consumption, when obtaining higher prices for their products (ARDA 2007: 322-323). In the global south food systems are changing technologically and institutionally and show remarkable trends. Initially, food systems are led more privately. The government has a less important role compared to a broader one for market forces. Further on these systems are more integrated. One company now is cooperating with several actors (farmer, trader, processor, and consumer); away from decentralization in terms of marketing. This trend is also combined with the third one, that food systems are becoming more global. Foreign investment leads to new techniques and access to global markets. Farmers in the global south are faced with globalization every day (TIMMER 2008: 739). Appearing supermarkets, which help understanding these changes, might be a new element in the "conflict" of interest between urban consumers and rural food producers like small-scale farmers in Tanzania. As ARDA (2007: 323) mentions *"large parts of the rural population are net food purchasers* [and producers] *and their access to food and food security is also heavily affected by the prices of food they purchase"* or produce. Smallholders from all three villages mentioned exactly this problem: Having produced and harvested a good quality and quantity of sunflower seeds, but they experience a lack of market access and also differing individual prices offered by middlemen or processors knocking day-to-day on their doors in order to buy cheap sunflower seeds.

As farming is the foundation of production and a FVC, it should be promoted in many ways. The private sector and particularly supermarkets are becoming increasingly important in East African countries as evidenced in Kenya, where supermarkets have a share of 20-30% of food sales (SALAMI et al. 2010:34). In Tanzania supermarkets are on the rise, mostly in urban agglomerations, but still do not have such an impact on production processes above all in rural areas cooperating with small-scale farmers. Small-scale farmers are obviously a major point of concern. Supermarkets have great potential for these accessing global markets. However, at first, small-scale farmers in the rural areas of Dodoma and Singida region need to be linked lastingly to domestic markets. Smallholder farmers, who are often undercapitalized and often without higher educational background struggle to meet the requirements supermarkets or other private companies have. These challenges are easily severable with good extension services, vertical or horizontal connection, or agricultural innovations, as exemplified by many projects in countries of the global south (SALAMI et al. 2010).

The entering global supermarket chains into the global south have been an important factor

behind the expansion of the supermarket network as well as the increasing appearance of supermarkets in food markets (ARDA 2007). These networks are still under construction in Tanzania and do not have massive impacts on the major part of the country yet. However, in Dodoma Urban Municipally the small-scale processor "JM Mdundo Oil Mills Enterprises" is generally producing crude sunflower oil for local customers in Dodoma region as well as Iringa region. During the interview the chairman of JM Mdundo Oil Mills Enterprises stated that from October 2014 on he is starting to produce and distribute small amounts of double refined sunflower oil to a supermarket in Dar es Salaam. This oil has a better quality, is only determined for the supermarkets' urban customers and has therefore a higher retail price. He explained that the end-user cannot differentiate between the two types of oil. The processor does not stay in direct contact with the supermarket; all the communication and transaction is managed by an independent middleman. He orders, collects and transports the sunflower oil. As he also mentioned *"small-scale processors actually are not producing for big companies, because they are not able to meet the quality standards for a large quantity required"*. This is not exclusively his opinion, many small-scale farmers as well as processors and large-scale processors are faced with that concern. This procedure shows the complexity of a local food production system like this one, though

> *"[l]arge-scale food manufacturers have also increased their importance in the food system driven by similar factors as supermarkets, and have "similar and indeed related impacts "upstream" in the food system"* (REARDON & BERDEGUÉ 2002: 372).

Literature shows that the private sector undertakes major efforts expanding their production processes all over the world and affects many actors of the whole food system. This includes likewise consumers and producers and can also concern their food security. For consumers for instance the impact on them is the price in the supermarkets compared to those in a traditional market, because *"as supermarkets help reduce food prices, they contribute to improving food security for those who have access to them"* (ARDA 2007:326), for those who do not, it is still a controversial matter to discuss. Most of the consumers of supermarkets live in urban areas. Whether they have the possibility of buying their commodities in a supermarket, people here have access to food. Marginalized people living in low-income areas (e.g. rural areas) are often confronted with a lack of supermarkets. However, supermarkets affect "*the quality and safety of the food bought"* and "*as progress is achieved in this realm, food security can be considered to have improved"* (ARDA 2007: 327). This is due to requirements like uniform quality, minimum quantities, consistency, and high standard of hygiene and timeliness of

supply. Otherwise this is difficult to meet for smallholder farmers in the study region (HAZELL & DIAO, 2005). Smallholders are obviously the weak part of a FVC and often are getting exploited from more powerful actors who are in a hierarchical position above them. Still, an important issue is the matter of policy and how the farmers can be supported without raising costs of transportation, input or certification processes. Innovations are required. Besides these innovations farmers need to be encouraged forming associations, collaborating horizontally in terms of knowledge sharing or conducting extension and training activities.

"*The main change that takes place in procurement practices that has considerable impact on suppliers [or smallholders], is the replacement of traditional wholesale markets with alternative specialized channels and more direct contacts between supermarkets, food processors and producers*" (ARDA 2007: 332).As a matter of fact supermarkets exist in Tanzania.

However, the field research shows that private companies have no incentives investing in the sunflower oil sub-sector with regard to smallholder cooperation yet. With current knowledge, the financial preconditions, the varying climatic conditions and many others factors, smallholders in the rural areas of Dodoma and Singida region have no other choice but to be more proactive in building up linkages and networks. As GUO et al. (2007) claim,

> *"*[…]*contract farming provides a means to manage complex production processes with greater precision [which] can result in higher quality, safer food with lower production and marketing costs […] contracting can overcome imperfections in input and output markets or institutional deficiencies by providing credit, seeds, machinery services, human capital and market access to farmers"*

From this point of view the next section is about contract farming in the global south in general and about the smallholder experiences in the studied regions.

6.1.2 Contract Farming as Innovation

The constraints smallholders are facing make it difficult to increase yields as well as reach the more profitable markets (urban, regional etc.). Diseconomies of scale which prevent the accumulation of satisfactory quality and quantity of sunflower seeds to profit from access to these markets can lead to a surplus of sunflower seeds at the local markets. As a consequence retail prices are decreasing (RÜSCH et al. 2013). Thus farmers are storing their produce at home waiting for higher prices offered by processors or middlemen as farmers stated during the discussions. This could last for months and farmers do not have any income until the seed

bags are sold. In order to counteract this interference innovations and linkages among actors in the sunflower value chain are required.

Contract farming is an attractive option for both smallholders and agribusiness. According to the definition of EATON & SHEPHERD (2001: 2) it is "*an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices*". This kind of system (often promoted by policy maker or development agencies) contains either formal or informal agreements between the contract partners and establishes conditions for production and marketing produces. On the one hand the smallholders guarantee specific quantities of the produces and on the other hand the buyer ensures stable pricing conditions. Additionally, these agribusinesses provide reliable farm inputs, technical extension advice as well as eliminate financial market failures (BARRETT et al. 2012). From AIS perspective it can be seen as an innovative element of agricultural systems and should integrate more than the two main stakeholders - smallholder and agribusiness. The Three Sisters Company, a small-scale sunflower processor based in Dodoma Urban Municipally, introduced contract farming to smallholders in Mondo village. Amina Majengo, the director of the enterprise said:

"Formally we had a problem on getting the seeds but we introduced contract farming and now we doing well as we can access good seeds from different areas hence increase the production of sunflower. The problem comes is shortage of rainfall that leads to drought and causes production to be poor, example last growing season."

The Three Sisters came to Mondo in order to find smallholders who are willing to produce exclusively for the company. This has taken place by collaborating with the village executive officer. At first the VEO has encouraged the farmers to form the farmer group KIWAMBEMO[7] and secondly to enter into this contract arrangement. The smallholders enthusiastically agreed to the processors' offer due to the geographic, biophysical as well as institutional constraints they were faced with. In addition to this, the Three Sisters Company has also offered an even higher price for the produced seeds compared to the common retail prices. All the actors involved in this process aimed in improving their or the farmers' competitiveness in terms of production and marketing. The low-quality seeds often could not meet the demanding quality at that time. Thus, the Three Sisters Company, which received training and support from RLDC in advance, have provided technical extension advices as well as new varie-

[7] Abbreviation for "Kikundi Cha Wazaliskaji Mbegu Mondo (Group of seed producers in Mondo)

ties of seeds with higher quality. Higher yields can be expected. However, the farmers have been instructed to use these seeds for cultivation. Without these new seed variety the required quality standards could not be guaranteed. Through this contractual arrangement the KIWAMBEMO farmer group was able to establish a so-called demonstration plot. On this plot, with a size of about two acres, the farmers are cultivating several crops including sunflower. It serves for further development of efficient cultivation techniques and also for training purposes (Figure nine). Until the survey was conducted more than 60 farmers mainly from other villages of bordering wards came to Mondo and participated in trainings organized by the members of KIWAMBEMO. The plot also acts as an actor and is bound up in a socio-material network rather than being a passive intermediary. It reshapes the village's life and ties the farmers form Mondo with other farmers in order to spread innovations. This plot also serves as a revolutionary role model presented by and for development agencies in this rural area.

Figure 9: Demonstration plot Mondo village (own picture)

By cooperating, the farmers of Mondo, the Three Sisters Company, the extension officer, the demonstration plot, technological advices, policies, quality standards and all actors involved in the innovation system are constructing a heterogeneous network, which includes human as well as non-human entities. The process of translation as CALLON (2006) distinguished makes action possible through aligning interests and leads to the emergence of an actor. As contract farming is a form of vertical connection it seems that the actors in this network are not fundamentally equal entities. The smallholders in Mondo have guaranteed producing sunflower seeds in a specific quantity at a specific time, but during the interviews the farmer group stat-

ed that they are still waiting for the Three Sisters Company collecting and retailing these for months. Thus, their interests are not well represented in the network. That is the reason why the farmers collectively somehow ignore the contract arrangement and are forced to do side-selling to different middlemen and processors which often implicates lower prices. This is a matter of concern and shows in this case the negative aspects of this production system.

Whether a certain connection is made or not made is obviously related to power. The way power is used here can be explained by the ANT where LATOUR describes the power of associations. He argues that power can be explained by the actions of others who obey an order instead of some virtue possessed by the leader who gives the order. So the power exercised by a leader does not depend on the amount of power he "possesses" but on the amount of other actors that take action. In other words, power is viewed as a relational or associational phenomenon. These actors will translate the order, they may let it drop, modify it, betray it, complement to it etc. Also among these receiving actors there is difference in power to be able to reshape the orders or wisdom received. The order will change constantly when it goes from hand to hand (LATOUR, 1986).

Nevertheless, this leads to a need of specific guidelines and legal frameworks that enable the contract partners to establish and maintain a good relationship to discourage a deterioration of the farming operation through opportunistic behavior or other unfair practices. Such a win-win situation can only be achieved if the contract promotes agricultural production and guarantees a secure market for the produce. Removing all elements of mistrust and establishing trustworthy relationships are important measures for successful cooperation (FAO 2012). This seems to be a vicious circle in agricultural systems in Tanzania, because on the one hand farmers claimed being exploited from purchaser and on the other hand some processors being interviewed mentioned that after entering into contracts with smallholders, these were trying to betray them by doing side-selling. Producers are underprivileged by a high level of manipulation of the contractual arrangement (KIRSTEN & SARTORIUS 2002). Therefore there is a need of clear and transparent defined responsibilities stated in contracts. While purchasers have to be strictly adhering to the concluded agreements and a fair and transparent procedure of assessing the quality of the products, the farmers must agree to produce the commodities as stated in the contract. Moreover, fairness of delivering input supply and proper use must be transparently provided by both the buyer and farmers. When farmer interests are not well represented in contract negotiations cooperatives or farmer groups like KIWAMBEMO could play a key role in possible renegotiations of the contracts. In case of disagreements over the

contractual arrangement, a neutral third party as LGAs, ARIs, NGOs etc. should be involved to mitigate between both sides.

In view of the changing nature of agricultural systems and food markets and the resulting need for vertical coordination along agricultural FVCs the role of contract farming as an institution to ensure the continued participation of small-scale producers in the global south in the markets for high-value products. This perspective shows how contract farming as institutional arrangement can manage input market failures and asymmetric information problems in the output market. Though the smallholders in Mondo village are still confronted with a number of constraints, however, this type of system entails certain linkages between agricultural productivity and poverty alleviation. An increased seed production with a greater seed quality followed by a certain raise of income and labor force in Mondo village has led to certain degree of empowerment and independence. This growth also stimulates the generation of social capital accumulation, which can be explained by the still increasing interactions between the farmers of KIWAMBEMO, other farmers, further agents in the sunflower sub-sector, and also related sectors. Contract arrangements are often used to overcome market access failures, but not here in Mondo as have been argued, that:

"market as market we don't have, most of the villagers selling their crops to the small processors and middlemen coming to our houses every day. People are coming with money, distribute money to all farmers with problems and during the harvest they come to collect their crops." (Focus Group Discussion Mondo Village 2014)

The farmer group is selling the local seeds to these middlemen with whom they do not have an arrangement. The improved sunflower seeds are getting stored in their houses until the Three Sisters Company will collect these. The major problems these small-scale farmers experience are naturally induced such as diseases and drought. In terms of competition among smallholders these have stated that this is not a considerable concern.

Otherwise small- and medium-scale agribusinesses like Three Sisters Company, Nyemo Investment Co Ltd., or JM Mdundo Oil Mill Enterprises suffer a number of problems. Thus, especially in Dodoma harsh competition among sunflower oil processors are on agenda. This will be explained more in detail in chapter 6.6.2. Nevertheless Nyemo Investment Co Ltd. and JM Mdundo Oil Mill Enterprises are thinking contract farming is not best practice improving

and increasing production without changing farmers' opportunistic behavior. Both interviewees have argued that the main problem is caused by small-scale farmers. These are not reliable and trustful cooperation partners due to ignoring contract responsibilities declared beforehand. During harvest season famers do side-selling maybe because of higher prices offered by different middlemen or traders as one mentioned. In addition, Rashid Mamu, the managing director of Nyemo Investment Co Ltd., explained he was starting contract farming in 2008 (supported by RLDC) by offering seasonally written contracts to smallholders from Chamwino district. After having signed the contracts the small-scale farmers maintained the integrity of the system for the sake of auditing, they violated the contract side-selling. The contracts depended on market prices for sunflower seeds but the farmers could expect higher income due to increasing prices during the season. Hence, the arrangement was canceled. Now Rashid Mamu states that the:

"most important problem is contract farming with smallholders, because it is not sustainable."

In the context of future failure prevention, research into contract enforcement mechanisms, principle-agent problems, governance of FVCs and farmer cooperatives could provide valuable information to secure an important role for contract farming linking smallholders and agribusiness firms in the high-value markets (KIRSTEN & SARTORIUS 2002). These cooperatives can also be part of an agricultural innovation system. The role of horizontal connection within the sunflower value chain will be explained and transmitted in the following.

6.2 Horizontal Action in the Sunflower Value Chain

As written in previous sections of this thesis, sunflower oil production in Tanzania is dominated by small-scale subsistence farming structures, but also small- and medium processing enterprises. These are confronted with numerous obstacles, as lack of competition, efficiency and market access. In order to manage these constraints, horizontal coordination, which aims in addressing "*shared constraints, interests and entry barriers associated with scale*" could assist (COLE & MITCHELL 2011: 143). The increasing demand of edible oil in Tanzania and market forces lead smallholders to the necessity of changing their practice. This could result in technical, social and institutional innovations as well as the formation in associations and

groups.

6.2.1 Farming as Innovation Networks

Influenced by external forces such as markets, input supply and knowledge, farmers have organized in less informal groups, either as specific farmer groups or as associations with a broader range (HEEMSKERK & WENNINK 2004). During the field study it turned out, that on the one hand smallholders in Mondo and Chololo and on the other hand one large-scale farmer from Singida have formed such collaborations. This interworking in both cases can be seen as part of an agricultural innovation system. This could contain technical, institutional or organizational innovations and implies several challenges to empower the farmers in the innovation system. Social capital must be strengthened in order to further development. Farmer groups on village level must be empowered into wider networks as well as farmers' knowledge scaling up into larger innovations systems (HEEMSKERK & WENNINK 2004). Social capital[8] is differentiated from other social interactions within a network by its productive quality. It should be perceived as a source that helps linking actors and thus acting in their own collective interests (BARHAM 2007). This is often done from the outside. For instance this means that agricultural research institutes or extension services encouraged groups of farmers to participate in the innovation system. This is exactly what happened in Mondo and Chololo villages where agricultural extension officers encouraged the farmers for such collaborations. These seem to be "identical" groups, formed for the same reasons acting in similar environmental and social relationships. As a consequence the farmer groups expect certain positive outcome as scaling up production and income and above all to safeguard their livelihoods. However, the groups differ in many matters. As already written in the previous chapter the farmer group KIWAMBEMO of Mondo is linked vertically, but also horizontally. This means the farmers are interacting with farmers within the group, with other groups as well as individual farmers who are not members of such associations. Within the innovation system, they spread new technologies introduced to them or share costs for transportation with other farmers. As mentioned during the discussions the farmers meet their extension officer weekly in order to get trained and advised. But according to HEEMSKERK & WENNINK (2004: 90) "*the need for connectedness between [farmer groups] and organizations into more powerful networks"* is crucial for empowering the farmer group. This heterogeneous network should be-

[8] Social capital is a characteristic of communities and contains nodes and trust that enables common action. These institutions, relationships, behavior and values guides interactions among people and contribute to economic and social development (GROOTAERT & BASTELAER 2002).

come more cohesive, organized and representative for the community. To promote innovations in such an actor-network, the public sector, which also acts within this network, should further support interactions and collective actions (JUMA 2011). At this community farmer level trust and shared norms and values, cognitive forms of social capital, are crucial for successful interaction in this network.

In contrast, the farmers were also not able to meet the market requirements without external assistance provided by ARI or development organizations, which was displayed by almost every participating small-scale farmer in Chololo during the interviews. The main problem for them chiefly was the missing access to markets with fair retail prices. Additionally the farmers mentioned:

"The only problem is there price very low. Last year one processor (Uncle Milo) come here and ordered to buy our sunflower at 5000tsh per bucket, but at the harvest season he gave the money to his agents here in the village, the agents paid only 3000 per bucket. When the Uncle Milo came again to distribute more seeds to the farmers we refused to take the seeds, and we told him that his price was very low, he told us that he paid 5000tshs the problem is with the agents. Within the village is difficult for a foreign person to work without partnership with resident of this village, otherwise he will get lose. Even we don't have contact to Uncle Milo."

(Female Farmer in Focus Group Discussion Chololo Village 2014)

The farmers established a farmer group. However, it seems that the farmers in Chololo just formed this farmer group on behalf of one innovative farmer, namely Amon Mada, and the extension officer. The group was recently formed but after almost half a year the first farmers already left the group. The group is only embedded to a certain extent in the innovation system since they are only in contact with the extension officer sporadically and once with an NGO. Once the cooperation with a medium-scale processor of Dodoma, Uncle Milo Sunflower Oil, was intended, but negotiations failed. The provided price per seed bag was in their opinion not reasonable, thus the farmers refused the offer. Obviously, the main problem here was the middlemen who offered less than he was supposed to do. Consequently, the farmers are selling to middlemen and traders again. Sales prices are often below common market prices. From an economic perspective the farmers missed the opportunity to gain access to secure markets. Market economies, which are characterized by high levels of trust, are more promising than without trust. Trust has broad impact on how the cooperating actors participate in economic activity. In bargaining about exchanging produce, knowledge, information or service trust is fundamental (FROMM 2007).

Compared with the findings of Mondo and Chololo, the situation in Singida region shows another type of networking. Thus, in Mtipa village 30 households and families are cultivating an area of about 10.000 hectares. The major crop is sunflower. They experienced similar problems as missing tools, diseases, decreasing rainfall during rainy season; however, the families are not united in any kind of relationship, group or association, and are providing their seeds individually. According to the interviewed farmers, they did not know about the existence of farmer groups or other cooperation possibilities in Tanzania. The Interviewer introduced this to them. Though the main purchaser for sunflower seeds in this region is the large-scale factory of Sundrop[9] the interviewees explained to have up to 50 processors and middlemen including Sundrop. An interesting fact here, is the common absence of extension officers in Singida Urban Municipally, who are not providing training or service to farmers of Mtipa and the negative attitude of the government. The term mistrust is not less essential here and acknowledges the poor performance of LGAs in rural Tanzania. For improvements in this sub-sector

"it is important to establish partnerships among various institutions to support and develop joint programs. These partnerships should pursue horizontal relationships and open networking to generate more synergy and collaboration, [which] can be done through regional exchanges that involve the sharing of research facilities and other infrastructure (JUMA 2011: 138).

Sunflower cultivation is greatly wide-spread in Singida region and besides Dodoma region the main area for sunflower oil production. As it is a push factor for large-scale processors like Sundrop outsourcing manufacturing also attracts large-scale farming. Mr. Peter[10], the owner of a large farm in rural Singida region, is one of eight members of Mduguju Green hope AmCos Ltd. This farmer cooperative was created for better representation and marketing of their produced seeds several years ago. The cooperative usually is selling the seeds to Mount Meru Millers Ltd., based in Arusha, Tanzania, but has no contractual arrangement any more. These are not confronted with missing market access. Operating totally independently and receiving no support neither from LGAs nor other external institutions the cooperative is not embedded in a certain network. This could lead to *"exclusion [which] can take place at different levels"*. Because as stated out some cooperative members are supporting the opposi-

[9] Second brand of Murzah Oil Mills Ltd. located in Dar es Salaam.

[10] Mr. Peter assumed name (pseudonym)

tion party in Tanzania and to a certain extent are criticizing actions of LGAs and other public institutions in Tanzania (COLE & MITCHELL 2011: 152). This and other constraints affect his possibilities of upgrading in production in order to have economies of scale. Innovations seem to be not very important, because he mentioned to have tried several but quit using them. Innovations as written before imply more using than new technological methods in agricultural innovation systems.

6.2.2 Processing as Innovation Networks

Small- and medium-scale processing in Dodoma and Singida region is not in the same manner as small-scale farming but in similar ways faced with diverse constraints. Fluctuating market prices, harsh competition, lack of infrastructure and finance, and often unreliable seed quality and supply have often led to stagnation of economies of scale. Thus, most of processors were not able to meet the increasing demand the country registered the last few years.

> *"Actually within the country, the oils which are pressed by these processors are not enough to meet the demand. The major problem they had is level of quality."* (Interview SNV 2014)

Though a huge number of farmers are cultivating sunflower and therefore could provide the processors with large amounts of input these are still experiencing problems. Mr. Mkojera, an employee of SNV further explained what kind of problem this subsector is facing:

> *"The problem is the processors were not that much organized by that time. But the processors were not producing quality oils that can compete with very highly refined oil in the market. So with this kind of limitations you find that processors were just processing some of the seeds."* (Interview SNV 2014)

To refer back to his statement processors individually manufactured sunflower oil for a long time, but as the demand for edible oil is steadily increasing they struggled meeting this. The absence of organization among each other has widened this gap. The processes had to be adjusted and still have to. At that moment informal and formal networks already exist in the central corridor of Tanzania as have been mentioned by several interviewees. Thus, one asso-

ciation, CEZOSOPA, already integrates numbers of small- and medium-scale processors in Dodoma region in order to increase and sustain production. It is democratically structured and every member has the chance to contribute as they are equally treated. As sunflower oil is produced all over the country, and the large number of processors existing require more of such associations. The chairman of CEZOSOPA, Mr. Ringo, mentioned that many processors, especially in Dodoma, are located in residential areas, wherefore sunflower processor clusters in industrial areas shall be established. As a consequence, through such clusters a new way of collaboration among processors is expected.

However, these clusters will probably be insufficient to sustain production with improved quality sunflower oil. The construction of further networks is an essential issue. Vertical coordination, which was explained beforehand, is one possibility, but is dependent on reliability of quality and quantity. Thus, processing in the subsector is part of a larger actor-network in agricultural system; actors at the same level could provide assistance. Here as well *"[t]rust seems to be found retrospectively [and is] never created intentionally"* (PERROW 1993). It can be encouraged by a deliberately created structure or context. A number of social welfare benefits with what he refers to as small firm networks, can be acknowledged. PERROW (1993) further argues that compared to a larger and bureaucratic form of organization, a small firm networks could provide individuals with broader independence, and would lead to less inequality in the distribution of wealth. A sense of community would be fostered (ibid.). The statement in Interview with SNV amplifies this:

> *"But the good news is that I heard from last two month is that in Dodoma, processors have come together, they have now invested a very big refinery, factory, where all the processors with their locally refined products will bring them there for refining and then becomes, have the international quality. So with that one we are very sure now."* (Interview SNV 2014)

Another processor of Dodoma confirmed this statement but partly whilst explaining that the construction of a Dodoma cluster is planned until now. This should contain a newly constructed refinery, where processors would be able to take their seeds and produce sunflower oil exclusively for export. Horizontal coordination as this *"can form platforms for setting, implementing and upgrading industry standards. This is explained by codes of conduct that can give a shared sense of responsibility and cohesion that promote effective self-regulation,*

improving […] and increasing income" (COLES & MITCHELL 2011: 148). Trustiness and all participating actors have to be taken for granted. Thus, all of them need to act in concert for the successful innovation in this cluster. *"[This] "black-boxing" cluster is a prerequisite for successful innovation in the strict economic sense"* (VOETEN et al. 2013: 7). Otherwise, the already existing competition among the processors and farmers could be strengthened to some extent. This could be overcome by linking all actors of the sunflower value chain and is part of the next section.

6.3 Linkages in the Sunflower Value Chains

In the innovation process, smallholders, agribusinesses and all further internal and external actors get involved in networks through linkages and affected in decision-making, creation, distribution and utilization of knowledge and technology. In order to manage and support these progressions the actors are appropriate for (MPAGALILE et al. 2009: 136; OPONDO et al. 2009: 59). Networks submit a number of features that establish their role as efficient instruments for the organization of innovation actions and help to understand the linkages between the different actors in the sunflower FVC found out during the field study. At first the linkages within the sunflower FVC and their implied incomes and outcomes will be presented. As a second part the sunflower network in the Central Corridor of Tanzania as a whole will be regarded.

6.3.1 Action & Relationships within the Sunflower Value Chain

FVCs are characterized through complex structures. Here this AIS emphasis on bringing all relevant players together in the process. After organizing these presumably supplement each other's knowledge and capacities, align their interests and commit to joint objectives (OPONDO et al. 2009: 57). In this study, all actors who are directly involved in the sunflower oil production as well as LGAs, ARI, agricultural extension services and development agencies like SNV or RLDC should be brought together in order to complement their knowledge to improving the local edible oil production. Because at the time the survey was conducted, rural smallholders and small- and medium-scale processors were just producing crude sunflower oil. A small number of people were able to produce double refined sunflower oil. This actor-network contains the direct involvement of creation, diffusion and use of knowledge and technology. Thus, these actors are confronted with several problems, whether these are institutional, environmental, political or economic, the effects of agricultural output growth are

substantial here. The upstream and downstream outputs generated by linkages are highlighted.

Agricultural growth is important for diversifying agricultural processes, which is influenced by either backward or forward linkages. In a network like this FVC smallholders who are at the one side can purchase goods such as fertilizers, chemicals or implements (backward linkage) by cooperating with processors. The processors in turn are receiving raw material for further processing (forward linkage). Are these actors linked through e.g. contractual agreements as in Mondo village, a number of other benefits can be expected. At first farmers received training in terms of cultivation methods and also received new varieties of seeds. After harvesting yields increase and the Three Sisters Company could expect a larger quantity of seeds as well as improved quality. This should be a win-win situation for both; farmers' knowledge increased though they were able to provide training for other farmers. As a consequence welfare increased as mentioned during the interview. The Three Sisters Company offered the best price they could achieve. This and increased production creates demand for products and services both upstream e.g. inputs, knowledge, services for agriculture and downstream, which contains processing, storage or transport. It also generates links of consumption as farmers and farm laborers spend increased incomes on goods and services. The degree of these multiplier effects contingent on several factors containing the extent of rural infrastructure, population density, technological change in farming and the tradability of goods and services both produced and demanded by agricultural communities (SCHNEIDER & GUGERTY 2011).

The other two villages, Mtipa and Chololo experienced completely the contrary. Farmers of Mtipa mentioned they neither got trained nor provided extension services. They are still cultivating their crops as they ever have. In Chololo farmers rarely have contact to extension services or employees of ARI as they mentioned. The refused offer of Nyemo Investment Co Ltd. The relationship to other actors in the sunflower production is therefore based on mistrust. Trust affects the ways people and enterprises engaging in economic activity. Market economies which show high degrees of trust seem to perform in a better way than those where no trust or low levels of it is given. "A lack of trust may thus impose prohibitively high transaction costs on contracting parties, thereby limiting mutually beneficial transactions. Ideally, the value chain could create relationships were all the participants benefit through the establishment or expansion of secure markets. Thus trust is one of the biggest issues" (FROMM 2007: 13). According to KAPLINSKY & MORRIS (2001), it is possible to identify a number of data points which supports in assessing whether the links in the chain are rooted in a high-

trust or a low-trust environment. For instance, this is demonstrated in the experience of the farmers in Chololo with the processor Uncle Milo Sunflower Oil. On the hand he offered a good retail price, but as the seeds should be sold to him, the middlemen tried to pay less to the farmers. On the other hand the manager of Uncle Milo wasn't willing to meet the farmers he was in a contract arrangement after finishing the interview.

Technological change can also have ambiguous effects on the distribution of income. If only technological changes are regarded, non-adopting farmers will face lower returns. This is due to the fact, that reducing poverty is connected to other innovations as for instance knowledge generation or improved infrastructure (THIRTLE et al. 2001). Different actors of the innovation system are required. Public institutions like RLDC or SNV are essential actors in sunflower oil production in Tanzania what was found in the interviews. RLDC strengthened the competitiveness of at least two processors in Dodoma but also show smallholders how to improve their cultivation methods. In contrast to this, as was mentioned from Mr. Peter or smallholder from Mtipa, the extension officer in Singida is not very well trained in cooperating and guiding smallholders. ASENSO-OKYERE & DAVIS (2009) say that "agricultural extension is an important player that can bring together research, farmers, and other players in the innovation system. Extension is defined as the services that support people engaged in agricultural production to help them solve problems and obtain knowledge, information, skills, and technologies to improve their livelihoods and well-being".

The case of the farmers of Mtipa village indicates how complex such an innovation system is. Not only diffusion or adoption of innovation, as often stated, must be taken into account. Interactions and relationships among the different actors and how they behave, act or react within the sunflower oil production are of major concern. It seems small-scale farmers in Mtipa village are totally excluded from the improvements in production processes. Though the area of arable land they are cultivating is large compared to all other farmers visited. It is almost implausible that they are facing so many constraints. They should be able to produce a very large amount of sunflower seeds. But as it was mentioned that on the one hand extension officers do not exist for sunflower in Singida region and on the other hand the fact that the interviewed persons never heard about farmer groups or newly improved seeds. These marginalized farmers have a lack of almost everything they need to be competitive and above all food secure. Searching for the reasons goes too far in this study and any other explanation would be speculative. In Singida, a large-scale factory for sunflower oil production is based but for these farmers it is harsh competition selling their seeds constantly. Traders and mid-

dlemen hardly engage or participate in any interaction or communication except business relations.

Most of the interaction taking place within the sunflower subsector are not showing stringent pattern and happen for two reasons: buying cheap, but high quality seeds and selling seeds and edible oil with high retail prices. The social interactions that occur in the production and dissemination of knowledge mainly emanate from actors or institutions being not directly involved in the production processes. After analyzing the interview transcripts it seems that only few actors trying to improve farmers' livelihood. Small enterprises or in this case small-scale farmers should be surrounded by a reliable infrastructure that is essential for their survival and for their economies of network scale. According to the Principal Agri-Business Officer in Dodoma, mistrust and ignorance is dominating the relationship between private and public sector. These should be more interested in sustaining this potential agricultural subsector.

6.3.2 The Sunflower Network in the Central Corridor of Tanzania

Based on own observations and after analyzing results of the study the sunflower value chain is presented here. The sunflower value chain is subdivided by backward and forward linkages. If the small-scale farmers are not in a contract arrangement, farmers are linked to other actors, such as agri-businesses, processors, middlemen, trader, transporter, input supplier, certification agencies. The farmer has a backward linkage e.g. with input suppliers for seeds, chemicals, and fertilizers. In Tanzania, agro mechanics services exist, but most of the smallholders are able to pay these costs. Thus they are tilling their fields by hand or livestock. After harvesting, the sunflower follows different routes to reach the processors. Therefore farmers are forward linked to other firms that are depending on small-scale farmers for services. Farmers often have a problem to access markets, so they may sell directly to the mills in villages (if there is one available; e.g. one farmer in Mondo village owns a mill until last year), or through the middlemen or traders who pass through the farms in order to buy seeds. These are offering the cheapest retail prices. At this stage, truckers transport the seeds to the mills in Dodoma or Singida Urban Municipallyand in some cases, the millers also own trucks. Sometimes they collect seeds in conjunction with the middlemen with whom they might have a certain arrangement (informal or formal). The millers also link with suppliers of machinery, spare parts, and packaging materials. However, this is hardly the case for farmers. For their own consumption they have own packages.

Marketing activities start after oil has been processed, filtered, and packaged. This activity also includes ware stock houses or wholesalers, transporters, distributors, and retailers. Small-scale operators are directly linked to consumers who come directly to buy oil from the millers. Another relationship within the value chain is among small oil mills, which depend on one relatively well-equipped mill when it comes to filtering the oil. A few oil millers are equipped with filtration units, which allow them to offer services to other millers at a cost

In an innovation system actors are cooperating among each other, the main resource that connects them is knowledge. This can occur in the form of scientific, technical, organizational or managerial manners of actors who are internal or external actants of the innovation process. Frequency and quality of interactions in a social actor-network plays a significant role in the inclusive importance of information sharing among actors involved in innovation process. Because of the relevance of interactions in the innovation process, the characteristics of the interactions are becoming an important consideration. An innovation that has been introduced into such a network can spread faster without a centralized power distribution among actors. In the network, members or actors who accumulate power in the network through their connectivity to other members can either control and promote or restrain information flow among other members skewing or distorting the adoption process. Based on the field studies results of the innovations process a framework should help understanding adoption of innovation. At first policies, both national and agricultural, economic and social capital, and shocks in the prevailing environment play an important role by shaping the type and intense of interactions. This will occur among innovations system actors such as development agencies, universities, ARI, LGA etc. As a second part it will regarded how interactive as well as information actors' flow among innovations system influence the smallholders' characteristics, infrastructure and availability of information regarding an introduced innovation. Finally, based on the utility receivable from the certain innovation, certain household effects, community infrastructure and information availability the farmer is faced a decision-making process about adoption. If adoption occurs, the degree of adoption is proceeded proceed to estimate the intensity of adoption

6.4 Diffusion & Adoption of Agricultural Innovations

Innovations in agricultural systems like the sunflower sub-sector in the Central Corridor of Tanzania are of crucial significance and have to get introduced to the main producers of sunflower seeds, the small-scale farmers. But at first one important issue is an adequate diffusion

of innovation in these areas. This should stimulate utilization of local raw materials and reduce its costs of transportation to process these mainly in Dodoma Urban District and Singida Municipal District in order to increase production. Secondly, the ability and willingness to adopt these innovations are not less important. Several factors should have a great effect on this.

However, the increase of sunflower oil production is little when compared to the nations' demand of oil. Besides the missing or extremely low import taxes in Tanzania is a fact which in turn has forced the country to import vegetable oil. In order to meet this high demand, Tanzania has imported and is still importing a large amount of crude edible oil, mostly palm oil from Southeast Asian countries, namely Malaysia and Indonesia. Having said this, the chairman of CEZOSOPA, also mentioned that

"maybe in 2-3 years we will be in the arrangement exporting to India a big amount of sunflower oil." (Mr. Ringo 2014)

Apparently, INSITA an organization based in India and supported by the UK Government is planning to invest in five East African countries in order to look for the possibility of importing sunflower oil and seed cakes. Based on this the sunflower subsector in Tanzania is facing good opportunities for increasing production and therefore meeting the populations' needs. Such investments should entail consistent market access combined with sustainable production processes for processors as well as small-scale farmers. Another challenging aspect for such cooperation is the formation of a stringent network among several actors involved in the production processes. If these should be managed by small-scale farmers and producers and not changing to a large-scale production, it would be necessary to cooperate on micro and meso level. This means on the one hand, that smallholders have to share their knowledge, technology and maybe the use of improved and resistant sunflower seeds and on the other hand small and medium scale processors also need to produce in collaboration in order to meet large quantities.

However, it has to be seen from a critical perspective because small-scale farmers united in farmer groups of not more than 15 farmers and households are not able to meet requirements (e.g. consistent quality and quantity of seeds) for such big amounts so far. The yields vary from year to year and are often followed by crop losses. Some farmers are not permanently confronted with these failures. For instance, Amon Mada, a primary school teacher and farmer in Chololo village (to be seen in figure eight), has early adopted the introduced agri-

cultural innovations, and can therefore be seen as a farming pioneer in his village. This innovator[11] is curious about new ways of cultivation, which "*leads [him] out of a local circle of peer networks and into more cosmopolite social relationships"* (ROGERS 2003: 282). After having received training and experience the quantity of produced seeds has increased. Initially, he was producing a maximum of two bags per acre, but now his family is able to produce six to eight bags during harvest season. But after interacting with agricultural extension officers in the village he changed production and is now using a new variety of sunflower seeds. He has "*the ability to understand and apply complex technical knowledge*", but the problem here is, the seeds need to be changed every two years, and thus, he would have to buy new ones (ROGERS 2003: 282).

As ROGERS (ibid.) also mentions, [Amon Mada] "*must be able to cope with the high degree of uncertainty about an innovation at the time that* [he] *adopts"*. He takes the risk of using new and sustainable methods for the cultivation and plays a crucial role for the diffusion and adoption of these innovations in the social system[12] he is within. The other farmers of Chololo could agree to try these new innovations. The diffusion of innovations explains social change and it is one of the most fundamental human processes. As in near distance of Chololo no market is easily accessible though the "pioneer" and other farmers in the village are marketing their sunflower seeds by themselves. He has still not experienced great changes in terms of income generation or improved market access. All the farmers in Chololo are facing the same problems and are depending on the local context. Therefore they have decided (in cooperation with the extension officer) to form a farmer group. At first, all of them have actively chosen to be a member (actor) of such a network. They have expected positive outcomes. But after some time, several farmers have not adopted innovations other farmers were using. Thus, they quit the "membership" due to the feeling of not being well represented by the innovative farmers as well as the extension officers. HEEMSKERK & WENNINK (2004) mention in this case, that *"[t]he selection of group members is crucial to the effective functioning of the group*". This effectiveness can only be ensured on the one hand by pursuing the same goals in collaboration and on the other hand by a consistent integration of the group in the innovation

[11] cf. ROGERS (2003), who categorized five ideal types of adopters: innovators, early adopters, early majority, late majority and laggards. These adopt in the chronological order innovations in the innovation-decision process.

[12] Different definitions on social systems exist, but here it is defined *"as a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. The members or units of a social system may be individuals, informal groups, organizations, and/or subsystems*" (ROGERS 2003: 23)

system.

In contrast, farmers from Mondo village gained after founding the farmer group KIWAM-BEMO a lot of knowledge in sunflower seed cultivation. Knowledge influences adoption. Farmers who have adequate knowledge of technology use are likely to adopt it.The latter idea emphasizes the importance of the human practices involved as well as the context within which innovation takes place (RIJN et al. 2012:113).

In this case, the adoption of an innovation comes as a consequence of the actions of everyone in the chain of actors who has anything to do with it. Furthermore, each of these actors shapes the innovation to their own ends, but if no one takes up the innovation then its movement simply stops (LATOUR 1986).

CHAPTER EIGHT

7 Conclusion

Small-scale farmers in both districts, Dodoma and Singida, faced similar constraints in adopting innovations. This included environmental changes, labor, finances, access to transportation and markets. In both areas, farmers viewed the adoption of new varieties and practices as a means of addressing these challenges. In Mondo village farmers had the opportunity getting into a contract arrangement. They were vertically connected with a processor. Until now they have hardly experienced benefits from this cooperation. However after introducing these innovations, most of the farmers have experienced new cultivation methods, have started sharing these innovations with others by providing training in cultivation. The farmers were able to establish a so-called demonstration plot, which serves as a test facility. As a result the main resource that connects them with other actors is knowledge. Here the farmers innovated technically, but in the process of innovation adoption, these can occur in institutional, scientific or also managerial manners of actors. It is not important whether these are internal or external actors of the innovation process. Frequency and quality of the interactions between the farmers and e.g. the extension officer play a significant role. The farmers tried to use their social networks extensively in order to gain more innovations to adopt. However, the farmers failed. This not only happened because of their opportunistic behavior doing side-selling. This mainly happened because of the missing interaction and the mistrust having experienced. Trust plays a crucial role in the sunflower production system. There is evidence that, through various forms of horizontal coordination, as farmer groups, cooperatives or processor associations, small-scale producers can improve the efficiency of their production. This may involve reaping economies of scale in terms of input costs or making infrastructure investments that improve the competitiveness of production. Sunflower as a cash crop can be an additional contribution to increase household income and food security, and thus raising the standard of living of rural people. This can happen when promotional activities are encouraged. The crop on its own will probably not overcome the complex challenges Tanzania's population could face with in the next decades. Actor-network theory can be useful for studies of information systems in situations where interactions of the social, technological and political matter are regarded as particularly important. There are also examples of horizontal coordination encouraging the transmission of innovation in the production process which in turn can improve product quality and productivity. Furthermore, during the study both, vertical and horizontal

coordination could be monitored; especially farmers have hardly been linked with one actor within the sunflower oil production. And as a consequence the results presented that neither production nor welfare have gained long-term improvements. This leads due to personal experiences into a vicious circle. Sustainable and profitable value chains can emerge, when the state invests in rural structures, like enhancing the transport- and financial structures. The incomes of farmers and wageworkers rise and through this the whole rural economy is strengthened. Until today achievements in the struggle against hunger have been disappointing to a certain degree, although successful solutions are known. Politics are afraid to act and finally realize the human right to food Up to now the famine situation is mostly a result of political failure.

References

ABASS, A. B., NDUNGURU, G., MAMIRO, P., ALENKHE, B., MLINGI, N. & M. BEKUNDA (2014): Post-harvest food losses in a maize-based farming system of semi-arid savannah area in Tanzania. In: *Journal of Stored Products Research* 57, 49–57.

ADEOTI, J. O. & O. OLUBAMIWA (2009): Towards an innovation system in the traditional sector: the case of the Nigerian cocoa industry. In: *Science and Public Policy* 36(1), 15–31.

ALSTON, J. M. (2010): The Benefits from Agricultural Research and Development, Innovation, and Productivity Growth. OECD Food, Agriculture and Fisheries Papers No. 31. OECD Publishing.

ARDA, M. (2007): Food Retailing, Supermarkets, and Food Security: Highlights from Latin America. In: *GUHA-KHASNOBIS, B., ACHARYA, S. S. & B. DAVIS* (eds.): Food Security: Indicators, Measurement, and the Impact of Trade Openness. UNU-WIDER Studies in Development Economics. Oxford University Press: Oxford/New York. 322–343.

ASENSO-OKYERE, K. & K. DAVIS (2009): Knowledge and innovation for agricultural development. IFPRI Policy Brief 11. IFPRI (International Food Policy Research Institute): Washington DC.

ASSEFA, A., WATERS-BAYER, A., FINCHAM, R. & M. MUDAHARA (2009): Comparison of Frameworks for Studying Grassroots Innovation: Agricultural Innovation Systems and Agricultural Knowledge and Information Systems. In: *SANGINGA, P. C., WATERS-BAYER, A., KAARIA, S., NJUKI, J. & C. WETTASINHA* (eds.): Innovation Africa – Enriching Farmers' Livelihoods. Earthscan: London/Sterling. 35–56.

AYELE, S., DUNCAN, A., LARBI, A. & T. T. KHANH (2012): Enhancing innovation in livestock value chains through networks: Lessons from fodder innovation case studies in developing countries. In: *Science and Public Policy* 39, 333–346.

BAKER, D. (2006): Agriculture value chains: overview of concepts and value chain approach. Presentation prepared for the FAO LDED Regional Workshop for Asia, Bangkok.

BARHAM, J. & C. CHITEMI (2009): Collective Action initiatives to improve marketing performance: Lessons from farmer groups in Tanzania. In: *Food Policy* 34, 53–59.

BARHAM, J. G. (2007): Linking farmers to markets: Assessing planned change initiatives to improve the marketing performance of smallholder farmer groups in northern Tanzania.

University of Florida: Gainesville.

BARRETT, C. B., BACHKE, M. E., BELLEMARE, M. F., MICHELSON, H. C., NARAYANAN, S. & T. F. WALKER (2012): Smallholder Participation in Contract Farming: Comparative Evidence from Five Countries. In: *World Development* 40(4), 715–730.

BAUER, M. W. & G. GASKELL (2000): Qualitative researching with text, image and sound. A practical handbook. Sage: London.

BELLIGER, A. & D. J. KRIEGER (2006): Einführung in die Akteur-Netzwerk-Theorie. In: *BELLIGER, A. & D. J. KRIEGER* (eds.): ANThology. Ein einführendes Handbuch zur Akteur-Netzwerk-Theorie. Transcript: Bielefeld. 13–50.

BERDEGUÉ, J. A., BIÉNABE, E. & L. PEPPELENBOS (2008): Keys to inclusion of small-scale producers in dynamic markets – Innovative practice in connecting small-scale producers with dynamic markets. Regoverning Markets Innovative Practice series. IIED: London.

BRYANT, C.R. (2002): Urban and rural interactions and rural community renewal. In: *BOWLER I.R., BRYANT, C.R. &C. COOKLIN* (eds.): The sustainability of rural systems: geographical interpretations. Kluwer: Dordrecht. 247–270.

CALLON, M. (1980): Struggles and Negotiations to Define What is Problematic and What is Not: the Socio-logic of Translation. In: *KNORR, K. D., KROHN, R. & R. D. WHITLEY* (eds.): The Social Process of Scientific Investigations: Sociology of the Sciences Yearbook 4. Reidel: Boston. 197–219.

CALLON, M. (1986a): The Sociology of an Actor-Network: The Case of the Electric Vehicle. In: *CALLON, M., LAW, J. & A. RIP* (eds.): Mapping the Dynamics of Science and Technology. Macmillan: London. 19–34.

CALLON, M. (1986b): Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay. In: *LAW, J.* (ed.): Power, Action and Belief: A New Sociology of Knowledge. Routledge: London. 196–223.

CALLON, M. (1991): Techno-economic Networks and Irreversibility. In: *LAW, J.* (ed.): A Sociology of Monsters? Essays on Power, Technology and Domination. Routledge: London. 132–161.

CALLON, M. & B. LATOUR (1981): Unscrewing the big Leviathan: how actors macro-structure reality and how sociologists help them to do so. In: *KNORR, K. D. & A. CICOUREL* (eds.): Advances in Social Theory and Methodology: Toward an Integration of Micro and Macro So-

ciologies. Routledge: London. 277–303.

COLE, C. & J. MITCHELL (2011): Working Together – Horizontal Coordination as an Upgrading Strategy. In: *MITCHELL, J. & C. COLE* (eds.): Markets and Rural Poverty: Upgrading in Value Chains. Overseas Development Institute and International Development Research Centre. Earthscan: London/Washington DC. 143–162.

CORDELLA, A. & M. SHAIKH (2006): From Epistemology to Ontology: Challenging the Constructed "truth" of ANT. Department of Information Systems. London School of Economics and Political Science. Working Paper Series 143. London.

CRESPI, G. & P. ZUNIGA (2012): Innovation and Productivity: Evidence from Six Latin American Countries. In: *World Development* 40(2), 273–290.

DEVANNEY, M. (2006): The Benefits of Agri-Food Value Chains. URL: http://novascotia.ca/agri/documents/business-research/Valuechains.pdf. (accessed on 20.12.2014).

DOLAN, C. & J. HUMPHREY (2000): Governance and Trade in Fresh Vegetables: The Impact of UK Supermarkets on the African Horticulture Industry. In: *Journal of Development Studies* 37(2), 147–176.

EATON, C. & A. W. SHEPHERD (2001): Contract Farming: Partnerships for Growth. FAO Agricultural Services Bulletin No. 145. FAO (Food and Agriculture Organization of the United Nations): Rome.

FAO (FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS) (2006): Food security. Policy Brief 2. FAO: Rome.

FAO (FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS) (2012): Guiding principles for responsible contract farming operations. URL: http://www.fao.org/docrep/016/i2858e/i2858e.pdf. (accessed on 20.01.2015).

FAO, IFAD & WFP (2014): The State of Food Insecurity in the World 2014. Strengthening the enabling environment for food security and nutrition. FAO: Rome.

FLICK, U. (2006): An Introduction to Qualitative Research. Third edition. Sage: London/Thousand Oaks, CA/New Dehli.

FLICK, U. (2007): Qualitative Sozialforschung. Eine Einführung. Rowohlt: Reinbek.

FROMM, I. (2007): Upgrading in Agricultural Value Chains: The Case of Small Producers in

Honduras. GIGA (German Institute of Global and Area Studies) Working Paper No. 64. GIGA: Hamburg.

GAYI, S. K. (2007): Does the WTO Agreement on Agriculture Endanger Food Security in Sub-Saharan Africa? In: *GUHA-KHASNOBIS, B., ACHARYA, S. S. & B. DAVIS* (eds.): Food Security: Indicators, Measurement, and the Impact of Trade Openness. UNU-WIDER Studies in Development Economics. Oxford University Press: Oxford/New York. 284–321.

GELLYNCK, X., KÜHNE, B. & R. D. WEAVER (2011): Innovation capacity of food chains: a novel approach. In: *International Journal of Innovation and Regional Development* 3(2), 99–12.

GEREFFI, G. & M. KORZENIEWICZ (1994): Commodity chains and global capitalism. Greenwood Press/Praeger: Westport.

GEREFFI, G., HUMPHREY, J. & T. STURGEON (2005): The governance of global value chains. In: *Review of International Political Economy* 12(1), 78–104.

GIBBON, P. & S. PONTE (2005) Trading Down: Africa, Value Chains and the Global Economy. Temple University Press: Philadelphia.

GIUNCHIGLIA, F., DUTTA, B., MALTESE, V. & F. FARAZI (2012): A Facet-Based Methodology for the Construction of a Large-Scale Geospatial Ontology. In: *Journal on Data Semantics* 1(1), 57–73.

GLASER, B. G. & A. L. STRAUSS (1998): Grounded Theory: Strategien qualitativer Forschung. Huber: Bern.

GROOTAERT, C. & T. VAN BASTELAER (2002): The Role of Social Capital in Development: An Empirical Assessment. Cambridge University Press: Cambridge.

GUO, H., JOLLY, R.W. & J. ZHU (2007): Contract Farming in China: Perspectives of Farm Households and Agribusiness Firms. In: *Comparative Economic Studies* 49(2), 285–312.

HALL, A., SULAIMAN, R., CLARK, N. & B. YOGANAND (2003): From measuring impact to learning institutional lessons: an innovation systems perspective on improving the management of international agricultural research. In: *Agricultural Systems* 78(2): 213–241.

HAZELL, P. & X. DIAO (2005): The Role of Agriculture and Small Farms in Economic Development. In: *IFPRI (INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE); ODI (OVERSEAS DEVELOPMENT INSTITUTE* (eds.): The Future of small farms: Proceedings of a research work-

shop. Wye, UK. June 26-29, 2005. Washington D.C. 23–36.

HEEMSKERK, W. & B. WENNINK (2004): Building social capital for agricultural innovation – Experiences with farmer groups in Sub-Saharan Africa. The Royal Tropical Institute (KIT): Amsterdam.

HEKKERT, M. P., SUURS, R. A. A, NEGRO, S. O., KUHLMANN, S. & R. E. H. M. SMITS (2007): Functions of innovation systems: A new approach for analysing technological change. In: *Technological Forecasting & Social Change* 74, 413–432.

HOLMÉN, H. & G. HYDÉN (2011): African Agriculture: from Crisis to Development? In: *DJURFELDT, G., ARYEETEY, E. & A. C. ISINIKA* (eds.): African Smallholders: Food Crops, Markets and Policy. CABI: Wallingford, UK/Cambridge, USA. 23–44.

HOPKINS, T. K. & I. WALLERSTEIN (1986): Commodity Chains in the World-Economy Prior to 1800. In: *Review* 1, 157–170.

HUMPHREY, J. (2005): Shaping Value Chains for Development: Global Value Chains in Agribusiness. GTZ: Eschborn.

HUMPHREY, J. & O. MEMEDOVIC (2006): Global Value Chains in the Agrifood Sector. Working Paper. UNIDO (United Nations Industrial Development Organization): Vienna.

HUMPHREY, J. & H. SCHMITZ (2002): How Does Insertion in Global Value Chains Affect Upgrading in Industrial Clusters? In: *Regional Studies* 36(9), 1017–1027.

IFAD (INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT) (2014): Investing in rural people in the United Republic of Tanzania. Rural Poverty in the United Republic of Tanzania. IFAD: Rom.

JUMA, C. (2011): The New Harvest – Agricultural Innovation in Africa. Oxford University Press: New York.

KAPLINSKY, R. & M. MORRIS (2001): A Handbook for Value Chain Research. International Development Research Centre. URL: http://www.ids.ac.uk/ids/global/pdfs/VchNov01.pdf. (accessed on 04.02.2015).

KELLY, B. T. (2003): Focus group interviews. In: *STAGE, F. K. & K. MANNING* (eds.): Research in the college contest: approaches and methods. Brunner-Routledge: New York. 49–62.

KIRSTEN, J. & K. SARTORIUS (2002): Linking agribusiness and small-scale farmers in developing countries: Is there a new role for contract farming? In: *Development Southern Africa*

19(4), 503–529.

KUMAR, S. (2002): Methods for Community Participation. A complete guide for practitioners. ITDG Publishing: London.

LARSEN, K., KIM, R. & F. THEUS (2009): Introduction and Main Messages. In: *LARSEN, K., KIM, R. & F. THEUS* (eds.): Agribusiness and Innovation Systems in Africa. Institute of Agriculture and Rural Development. World Bank: Washington DC.

LATOUR, B. (1986): The powers of association. In: *LAW, J.* (ed.): Power, Action, Belief: A New Sociology of Knowledge? Routledge and Kegan Paul: London.

LATOUR, B. (1987): Science in Action: How to Follow Scientists and Engineers Through Society. Open University Press: Milton Keynes.

LATOUR, B. (1988): The Pasteurization of France. Harvard University Press: Cambridge.

LATOUR, B. (1997): On Actor Network Theory: A few clarifications. URL: http://www.nettime.org/Lists-Archives/nettime-l-9801/msg00019.html. (accessed on 16.12.2014).

LATOUR, B. (2004): The Politics of Nature: How to Bring the Sciences into Democracy. Harvard University Press: Cambridge.

LATOUR, B. (2005): Reassembling the Social: An Introduction to Actor-Network-Theory. Blackwell: Oxford.

LAW, J. (2011): Akteur-Netzwerk-Theorie und materiale Semiotik. In: *CONRADI, T., DERWANZ, H. & F. MUHLE* (eds.): Strukturentstehung durch Verflechtung. Akteur-Netzwerk-Theorie(n) und Automatismen. Wilhelm Fink: Paderborn. 21–48.

LEMA, M. A. & A. E. MAJULE (2009): Impacts of climate change, variability and adaptation strategies on agriculture in semi arid areas of Tanzania: The case of Manyoni District in Singida Region, Tanzania. In: *African Journal of Environmental Science and Technology* 3(8), 206–218.

LIMB, M. & C. DWYER (2001): Qualitative Methodologies for Geographers. Issues and Debates. Arnold: London/New York.

LIVERMAN, D. & K. KAPADIA (2010): Food Systems and the Global Environment: An Overview. In: *INGRAM, J., ERICKSEN, P. & D. LIVERMAN* (eds.): Food Security and Global Environmental Change. Earthscan: London. 3–24.

LIWENGA, E. T. (2008): Adaptive livelihood strategies for coping with water scarcity in the drylands of central Tanzania. In: *Physics and Chemistry of the Earth* 33, 775–779.

LOTZE-CAMPEN, H., POPP, A., BERINGER, T., MÜLLER, C., BONDEAU, A., ROST, S. & W. LUCHT (2010): Scenarios of global bioenergy production: The trade-offs between agricultural expansion, intensification and trade. In: *Ecological Modelling* 221, 2188–2196.

LYNAM, J. & F. THEUS (2009): Value Chains, Innovation, and Public Policies in African Agriculture: A Synthesis of Four Country Studies. In: *LARSEN, K., KIM, R. & F. THEUS* (eds.): Agribusiness and Innovation Systems in Africa. Institute of Agriculture and Rural Development. World Bank: Washington DC.

MADULU, N. F. (2001): Reserved Migration Trends in the Kondoa Eroded Area: Lessons for Future Conservation Activities in the Hado Project Areas, Tanzania. Social Science Research Report Series No. 20. OSSREA (Organization for Social Science Research in Eastern and Southern Africa): Addis Abeba.

MARQUES, M. J., DE CARVALHO ALVES, J. & I. A. SAUR (2005): Creating and Sustaining Successful Innovation Networks. Presented at the DRUID 10th Anniversary Summer Conference on Dynamics of Industry and Innovation: Organizations, Networks, and Systems. Copenhagen. June 27–29, 2005. URL: http://www.druid.dk/conferences/Summer2005/Papers/Marques.pdf. (accessed on 10.01.2015)

MAXWELL, D. & M. FITZPATRICK (2012): The 2011 Somalia famine: Context, causes, and complications. In: *Global Food Security* 1, 5–12.

MAYRING, P. (2000): Qualitative Inhaltsanalyse. Grundlagen und Techniken . 7th edition. Deutscher Studien Verlag: Weinheim.

MILLER, C. & L. JONES (2010): Agricultural value Chain Finance: Tools and Lessons. FAO (Food and Agriculture Organization of the United Nations)/Practical Action Publishing: Rome.

MITCHELL, J., KEANE, J. & C. COLES (2009): Trading Up: How a Value Chain Approach Can Benefit the Rural Poor. COPLA Global: Overseas Development Institute (ODI): London.

MORGAN, K., MARSDEN, T. & J. MURDOCH (2006): Worlds of Food: Place, Power, and Provenance in the Food Chain. Oxford Geographical and Environmental Studies. Oxford University Press: New York.

MPAGALILE, J., ISHENGOMA, R. & P. GILLAH (2009): Tanzania: Sunflower, Cassava, and Dairy. In: *LARSEN, K., KIM, R. & F. THEUS* (eds.): Agribusiness and Innovation Systems in Africa. Institute of Agriculture and Rural Development. World Bank: Washington DC. 135–162.

MÜLLER, C. (2011): Harvesting from uncertainties. In: *Nature Climate Change* 1(5), 253–254.

MURDOCH, J. (2000): Networks – a new paradigm of rural development? In: *Journal of Rural Studies* 16, 407–419.

NJAU F. B., FARRELLY, M. & I. MASUMBUKO (2014): Climate Vulnerability and Capacity Analysis in Dodoma Region of Tanzania. In: *Research Desk* 3(1), 374–391.

OPONDO, C., ALMEKINDERS, C., MOWO, J., KANZIKWERA, R., BIRGUNGI, P., ALUM, W. & M. BARWOGEZA (2009): Applying the Innovation Systems Concept in the Field: Experiences of a Research Team in Uganda. In: *SANGINGA, P. C., WATERS-BAYER, A., KAARIA, S., NJUKI, J. & C. WETTASINHA* (eds.): Innovation Africa – Enriching Farmers' Livelihoods. Earthscan: London/Sterling. 57–71.

PATTON, M. O. (2002): Qualitative evaluation and research methods. Sage: Newbury Park, CA.

PERROW, C. (1993). Small Firm Networks. In: *SWEDBERG, R.* (ed.): Explorations in Economic Sociology. Russel Sage Foundation: New York. 277–402.

PIETROBELLI, C. (2008): Global value chains in the least developed countries of the world: threats and opportunities for local producers. In: *International Journal of Technological Learning, Innovation and Development* 1(4), 459–481.

PIETROBELLI, C. & R. RABELLPTTI (2010): Global Value Chains Meet Innovation Systems: Are There Learning Opportunities for Developing Countries? In: *World Development* 39(7), 1261–1269.

PORTER, M. E. (1985): Competitive Advantage: Creating and Sustaining Superior Performance. The Free Press: New York.

PUNCH, K. F. (2005): Introduction to Social Research – Quantitative & Qualitative Approaches. Sage: London.

RAJALAHTI, R., JANSSEN, W. & E. PEHU (2008): Agricultural Innovation Systems: From Diag-

nostics toward Operational Practices. Agriculture and Rural Development (ARD) Discussion Paper 38. World Bank: New York.

REARDON, T. & J. BERDEGUÉ (2002): The Rapid Rise of Supermarkets in Latin America: Challenges and Opportunities for Development. In: *Development Policy Review*, 20(4), 371–388.

REJI, E. M. (2013): Value Chains and Small Enterprise Development: Theory and Praxis. In: *American Journal of Industrial and Business Management* 3, 28–35.

RIISGAARD, L., BOLWIG, S., PONTE, S., DU TOIT, A., HALBERG, N. & F. MATOSE (2010): Integrating poverty and environmental concerns into value-chain analysis: A strategic framework and practical guide. In: *Development policy review* 28(2), 195–216.

RLDC (RURAL LIVELIHOOD DEVELOPMENT COMPANY) (2008): Sunflower Sector – Market Development Strategy. URL: http://www.rldp.org/downloads/sunflower_strategy.pdf. (accessed on 10.01.2015).

ROBINSON, G. (2004): Geographies of agriculture: globalization, restructuring, and sustainability. Pearson: Essex.

ROGERS, E. M. (2003): Diffusion of innovations. 5th edition. Free Press: New York.

RÜSCH, A., OHLDE, G. W. & M. RANKIN (2013): Contract farming to access lucrative markets: Small-scale vegetable producers in the United Republic of Tanzania. In: *DA SILVA, C. A. & M. RANKIN* (eds.): Contract farming for inclusive market access. FAO: Rome.

SALAMI, A., KAMARA A. B. & Z. BRIXIOVA (2010): Smallholder Agriculture in East Africa: Trends, Constraints and Opportunities. Working Paper Series No. 105. African Development Bank: Tunis.

SCHIFFER, E. & J. HAUCK (2010): Net-Map: Collecting Social Network Data and Facilitating Network Learning through Participatory Influence Network Mapping. In: *Field Methods* 22(3), 231–249.

SCHNEIDER, K. & M.K. GUGERTY (2011): Agricultural Productivity and Poverty Reduction: Linkages and Pathways. In: *The Evans School Review* 1(1), 56–74.

SERVAES, P. J. (1996): Participatory Communication (Research) from a Freirean Perspective. In: *African Council of Communication and Education* 10(1), 73–91.

SHAW, J. (2007): World Food Security: A History since 1945. Palgrave Macmillan: New

York.

SHEPHERD, A. (2007): Approaches to linking producers to markets, a review of experiences to date. FAO: Rome.

SMITH, S. J. (2001): Doing Qualitative Research: From Interpretation to Action. In: *LIMB, M. & C. DWYER* (eds.) Qualitative Methodologies for Geographers: Issues and Debates. Hodder Arnold Publication. Routledge: London/New York.

SPIELMAN, D. J. & R. BIRNER (2008): How Innovative Is Your Agriculture. Using Innovation Indicators and Benchmarks to Strengthen National Agricultural Innovation Systems. Agriculture and Rural Development Discussion Paper 41. Agriculture & Rural Development Department (ARD). World Bank: Washington DC.

SPIELMAN, D. J., EKBOIR, J. & K. DAVIS (2009): The art and science of innovation systems inquiry: Applications to Sub-Saharan African agriculture. In: *Technology in Society* 31, 399–405.

STELYUS, L. M. & I. C. MJEMAH (2011): Influence of Meteorology on Ambient Air Quality in Morogoro, Tanzania. In: *International Journal of Environmental Sciences* 1(6), 1107–1115.

STRAUSS, A. L. & J. M. CORBIN (1990): Basics of qualitative research: Grounded theory procedures and techniques. Sage: Newbury Park, CA.

SWAI, O. W., MBWAMBO, J. S. & F. T. MAGAYANE (2012): Gender and perception on climate change in Bahi and Kondoa Districts, Dodoma Region, Tanzania. In: *Journal of African Studies and Development* 4(9), 218–231.

SWINNEN, J. F. M. & M. MAERTENS (2007): Globalization, privatization, and vertical coordination in food value chains in developing and transition countries. In: *Agricultural Economics* 37(s1), 89–102.

THIRTLE, C., IRZ, X., LIN, L., MCKENZIE-HILL, V. & S. WIGGINS (2001): Relationship between changes in agricultural productivity and the incidence of poverty in developing countries (Report No. 7946). Department for International Development: London.

TIMMER, C.P. (2008): The Impact of Supermarkets on Farmers, Consumes, and Food Security in Developing Countries. In: *SEMBA, R.D. & M.W. BLOEM* (eds.): Nutrition and Helath in Developing Countries. Second Edition. Humana Press: Totowa. 739–751.

TSCHIRLEY, D., AYIEKO, M., MATHENGE, M. & M. WEBER (2004): Where Do Consumers in

Nairobi Purchase their Food and Why Does This Matter? The Need for Investment to Improve Kenya's "Traditional" Food Marketing System. Policy Brief No. 3. URL: http://www.ifpri.org/sites/default/files/p15Summarydomestichorticulture.pdf (accessed on 23.01.2015).

UNCTAD (UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT) (2013): The Least Developed Countries Report 2013: Growth with employment for inclusive and sustainable development. United Nations: Geneva.

URT (UNITED REPUBLIC OF TANZANIA) (2006): National Sample Census of Agriculture 2002/ 2003 Volume VIII-a: Regional Report: Dodoma Region. National Bureau of Statistics, Ministry of Agriculture and Food Security, Ministry of Water and Livestock Development, Ministry of Cooperatives and Marketing, Presidents Office, Regional Administration and Local Government, Ministry of Finance and Economic Affairs – Zanzibar. URL: http://www.nbs.go.tz/takwimu/Agriculture/DODOMA%20REGION%20REPORT.pdf. (accessed on 15.11.2014).

URT (UNITED REPUBLIC OF TANZANIA) (2012a): National Sample Census of Agriculture 2007/ 2008 Volume V-a: Regional Report: Dodoma Region. National Bureau of Statistics, Ministry of Agriculture and Food Security, Ministry of Water and Livestock Development, Ministry of Cooperatives and Marketing, Presidents Office, Regional Administration and Local Government, Ministry of Finance and Economic Affairs – Zanzibar.

URT (UNITED REPUBLIC OF TANZANIA) (2012b): National Sample Census of Agriculture 2007/ 2008 Volume V-m: Regional Report: Singida Region. National Bureau of Statistics, Ministry of Agriculture and Food Security, Ministry of Water and Livestock Development, Ministry of Cooperatives and Marketing, Presidents Office, Regional Administration and Local Government, Ministry of Finance and Economic Affairs – Zanzibar.

URT (UNITED REPUBLIC OF TANZANIA) (2012c): Risk, Vulnerability and Capacity Assessment Report for Chamwino District, Dodoma. Prime Minister's Offfice, Regional Administration and Local Government. Chamwino District Council.

URT (UNITED REPUBLIC OF TANZANIA) (2013a): 2012 Population and housing census – Population Distribution by Administrative Areas. National Bureau of Statistics, Ministry of Finance Dar es Salaam. Office of Chief Government Statistician, President's Office, Finance, Economy and Development Planning. Zanzibar. URL: http://www.meac.go.tz/sites/default/files/Statistics/Tanzania%20Population%20Census%20

2012.pdf. (accessed on 15.11.2014).

URT (UNITED REPUBLIC OF TANZANIA) (2013b): Tanzania in figures 2012. National Bureau of Statistics, Ministry of Finance Dar es Salaam. URL: http://www.nbs.go.tz/takwimu/references/Tanzania_in_figures2012.pdf. (accessed on 15.11.2014).

URT (UNITED REPUBLIC OF TANZANIA) (2014): Basic Demographic and Socio-Economic Profile. National Bureau of Statistics, Ministry of Finance. Dar es Salaam; Office of Chief Government Statistician Ministry of State, President's Office, State House and Good Governance. Zanzibar.

USAID (2008): Preliminary rural livelihood zoning: Tanzania; A special report by the famine early warning system network (FEWS NET).

VAN NES, F., ABMA, T., JONSSON, H. & D. J. H. DEEG (2010): Language differences in qualitative research: is meaning lost in translation? In: *European Journal of Ageing* 7, 313–316.

VOETEN, J., DE GROOT, G., DE HAAN, J. & N. ROOME (2013): Understanding Responsible Innovation in Small Producers' Clusters in Vietnam through Actor Network Theory (ANT). Working Paper 6. Centre for Development Informatics. Institute for Development Policy and Management. SED: Manchester.

WHATMORE, S. J. & L. B. THORNE (1997): Nourishing networks: alternative geographies of food. In: *GOODMAN, D. & M. WATTS* (eds.): *Globalising food. Agrarian questions and global restructuring.* Routledge: London/New York. 287–304.

WICKRAMASINGHE, U. & K. WEINBERGER (2013): Smallholder Market Participation and Production Specialization. CAPSA Working Paper No. 107. CAPSA-ESCAP: Bogor.

WOLF, S. (2007): Encouraging Innovation for Productivity Growth in Africa. UNECA ATPC Work in Progress Series 54. African Trade Policy Centre (ATPC): Addis Ababa.

WOLTER, D. (2008): Tanzania: The Challenge of Moving from Subsitence to Profit. Business for Development. Organisation for Economic Cooperation and Development (OECD. URL: http://www.oecd.org/countries/tanzania/40534097.pdf. (accessed on 23.01.2015).

WORLD BANK (2006): Enhancing Agricultural Innovation: How to Go Beyond Strengthening Research Systems. Washington DC.

WORLD BANK (2012): Agricultural Innovation Systems: an investment sourcebook. Agricul-

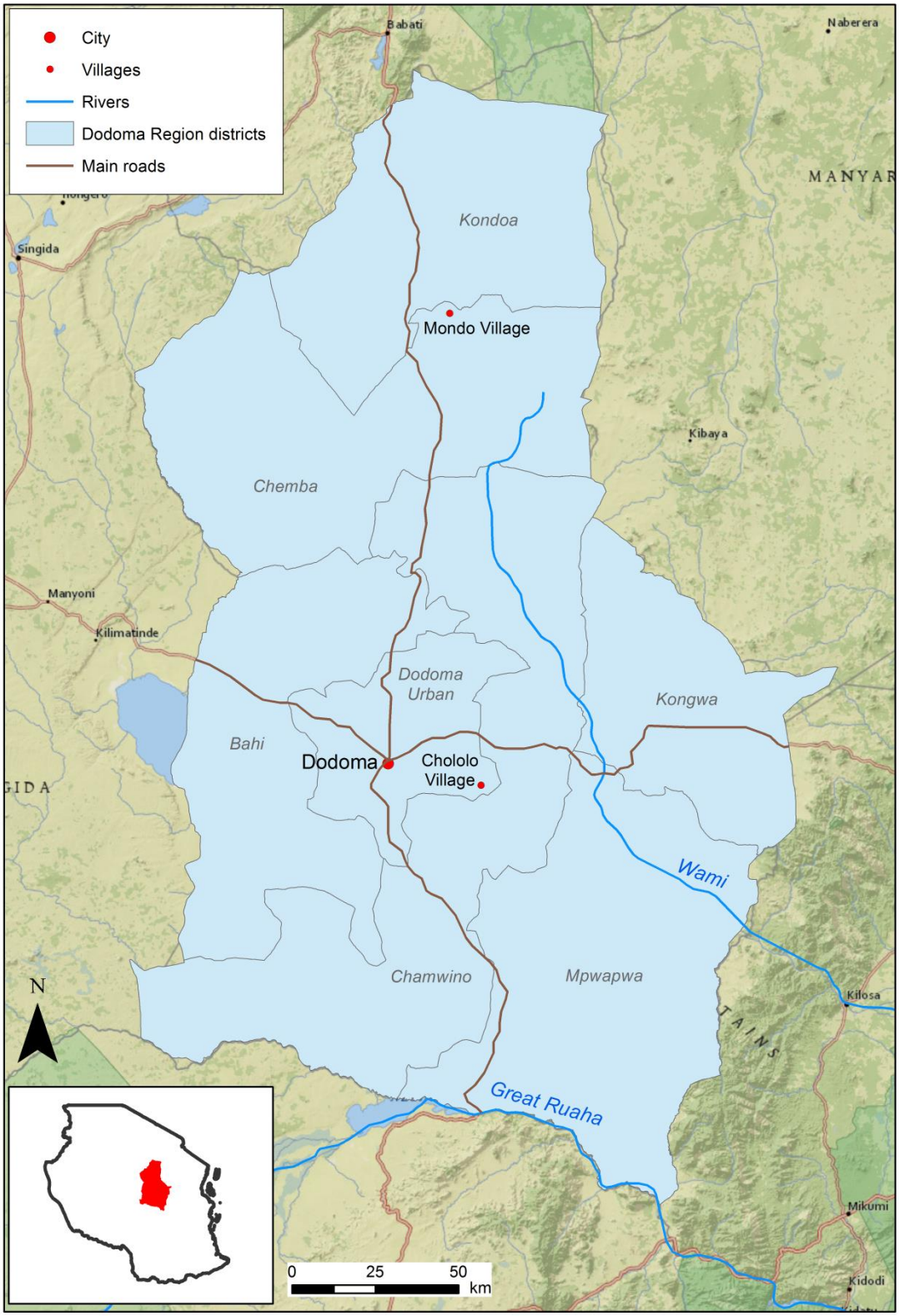
ture and Rural Development Series. Washington DC.

WORLD BANK (2014): Poverty headcount ratio at rural poverty line (% of rural population) URL: http://data.worldbank.org/indicator/SI.POV.RUHC/countries/TZ?display=graph (accessed on 15.06.2014).

WORLD FOOD SUMMIT (1996): Rome Declaration on World Food Security.

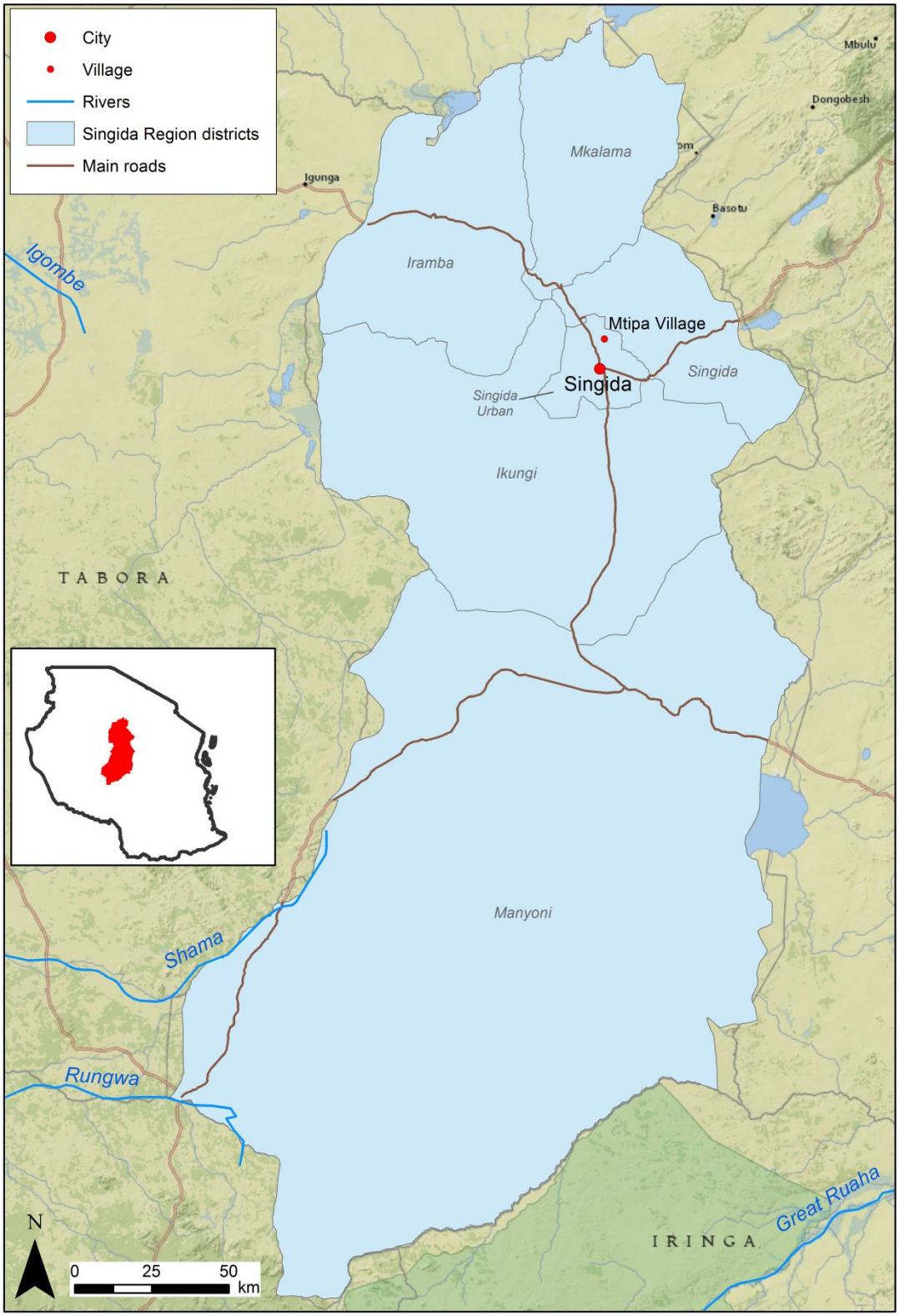
Appendix A

Map (1) Dodoma region



Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp. Made with Natural Earth. DIVA-GIS.NBS

Map (2) Singida region



Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp. Made with Natural Earth. DIVA-GIS.NBS

Appendix B

Interview guidelines (CD)

Interview transcripts (CD)

Declaration of authorship / Eidesstattliche Erklärung

I declare that I have authored this thesis independently, that I have not used other than the declared sources / resources, and that I have explicitly marked all material which has been quoted either literally or by content from the used sources.

Ich versichere, dass ich die Arbeit selbstständig verfasst habe, dass ich keine anderen Quellen und Hilfsmittel als die angegebenen benutzt und die Stellen der Arbeit, die anderen Werken dem Wortlaut oder dem Sinn nach entnommen sind, in jedem Fall als Entlehnung kenntlich gemacht habe.

Bonn, 24.02.2015 _____

Maximilian Schmid