Development through Business

A case study of Tamale Metropolitan District, Ghana

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Acknowledgement

After successfully graduating from my first academic study, my interest for human behaviour and spatial development as well as my passion to travel and discover the world have encouraged me to start another one. It brought me to Ghana. A country that I would have never considered to visit but which gave me an unexpectedly beautiful raw and valuable experience. I wish to dedicate the thesis to this country.

During the research I have met with many people. Not only the research assistants who helped me with the interviews of all respondents, but also all who were part of the food system in Tamale. Each of them has made a contribution to the success of this thesis, for which I would like to thank them.

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Executive Summary

The Northern region of Ghana has a disadvantaged position compared to other regions in Ghana. It is falling behind in economic growth, poverty alleviation and literacy levels. Its main economic sector is agriculture. Hence, the government of Ghana, civil society and the private sector are keen on modernising this sector to raise economic growth. This wish for new investments in the agricultural sector also reflects the current discourse on food security in Sub-Sahara Africa in the Netherlands. But, little is known about the current state of affairs in these regions. Especially for urban districts, where intra-urban inequality could expand fast if economies change and where there is little practice for agriculture, food insecurity could become penile. An assessment of Tamale Metropolitan District's urbanisation and food system could reveal current states of food safekeeping and will give more insights in future directions and possibilities for innovation. It is with these thoughts in mind that the following research question has been formulated for the Tamale Metropolitan District (Tamale Municipal), the only urban district in Ghana's Northern region.

In what socio-spatial way is the fresh fruit and vegetable sector in Tamale Metropolitan District organised and could this organisation be enhanced by clustering food chains?

Theoretical framework

The theoretical framework briefly discusses three debates. The first one studies the development of urban centres and the advantages and disadvantages of monocentric regions, the second one studies the forming of clusters for economic growth and the third one investigate the value chains of products. All three debates have been chosen with the thoughts in mind to perform a study which could be useful for development of the area.

The main analysis that gives structure to this research is the display of Tamale's food system. I chose to perform a value chain analysis to display this system. This model is often used in business economics to manage costs more effectively. Since I have been more interested in the balanced management of a system instead of cost reduction, I adjusted the analysis for the research purpose. I extended it with an extra phase, the post-consumption phase, to emphasise the circular course of food, since food does not stop after consumption but continues in other forms. And I tried to focus on the relations between the chains. Therewith I tried to approach the food system from an ecological approach in which the interspatial interconnectivity of produced socio-spatial interaction becomes part of a larger whole.

Research setting

Existing notions of place in Ghana, in terms of regions and districts, have been used for this investigation. The research is conducted in the Tamale Metropolitan District. It is the only district in the Northern region that is considered to be urban. The networks discussed are the agro-trade networks and other linkages between stakeholders in the fresh fruit and vegetable

sector. Still little is known about these networks, since both the University of Development Studies and the government of Ghana have focussed on intensifying and innovating the production process in agriculture and paid little attention to the whole system. This research will therefore be a first attempted to explore the existing networks and analyse their relation with the Northern region and the Tamale Metropolitan District.

The research is based on a combination of quantitative and qualitative data collection between November 2012 and February 2013. During the first phase of the research in-depth interviews were held with several stakeholders in the food system. The second phase has been reserved for a survey among 120 citizens of Tamale city. The respondent resided out of three different income groups. The citizens were targeted by profession on several pre-selected places. In the targeting process gender differences were considered. Lastly, the third phase aimed at developing some recommendation for improvements in the fresh fruit and vegetable sector and explore the business environment on possible cluster initiatives. The last phase has been supported with theories on spatial development and economic growth that are discussed in the first chapter.

Main findings

The Tamale Metropolitan District is a monocentric area with one core centre surrounded by several smaller centres. It has grown fast the last century. The cause of its growth can be found in its function as an administrative city during colonial times, its geographical location along an important trade road from the inlands of Africa to the coast, and severe migration from rural areas as well as migration of high skilled labourers of other urban districts. Urban planning has failed to keep up with this rapid urbanisation which has resulted in squatter settlements with open sewerages, no paved roads or aisles and bad water, power and sanitation facilities. Also, waste management is still a challenge in the district. Currently there is a slight reduction in Tamale's population growth compared to the population growth in the Northern region. The population in the Northern region increased with 36.2% up to 2,479,461 while Tamale's population has increased with 26% up to 371,351 persons (PHC, 2000 at ghanadistrict.com; GSS, 2012). The same development is visible when one examines the difference in population density which has dropt with 0.5.

As in most urban areas the land used for agriculture is limited and pressured by real estate. Therefore the city depends upon its trade network for food supply. This food network is predominantly regional. With rice, cereals and meat coming from the three Northern regions, fish distributed from the Volta River and fresh fruit and vegetables from the Upper East or Brong-Ahahafo region. A small part of the network is involved in international and even intercontinental trade. In 2011 Ghana imported tomatoes from Burkina Faso, fish from Mauritania, Morocco and Senegal and rice from Thailand and the United States. Some of these products have been observed in the markets of Tamale Metropolitan District.

Agro-economic organisation in Tamale Metropolitan District and its surrounding areas includes several phases. Namely that of production, distribution, processing, retailing, consumption and post-consumption. Key stakeholders in this process are the farmers who manage their plots individually, farmer associations, sales women and men, consumers,

waste collection institutions and the government. The system is influenced by activities and programmes of NGOs, universities, the government of Ghana, the three supermarkets and international supply and demand mechanisms.

New information on consumer demand in the fresh fruits and vegetable sector is gathered. The survey reveals that the consumer market does not display large potential for agro-economic growth. A total of 75% of the respondents indicated that they will not spend an additional part of their income on fresh fruit and vegetables if this income would increase. Besides, the weekly expenditure of fresh fruit and vegetables is already quite high. 40% of the weekly expenditure on food is reserved for fresh fruit and vegetables. This is, however, 2% of one's monthly income.

Ghanaians prefer to eat their food at home. They consume fruit and vegetables on a daily basis, although they are concerned about the overuse of chemicals in the production process. The main commodities consumed are oranges, bananas, cabbages and tomatoes. In addition, supermarkets have already clientele among all income groups. Currently they are not yet engaged in the fresh fruit and vegetable trade but this could change in the near future and may affect the current system.

The following recommendations on the organisation of the fresh fruit and vegetable sector is appropriate. These contain:

1. the building of trust among farmers united in the same association in order to reorganise production activity
2. Revitalisation of the markets in the city centre and stakeholder collaboration between petty traders, wholesalers and governments on the future formalisation of the fresh fruit and vegetable trade
3. The stimulation of professionalization of processing plants, especially in hygienic processing;
4. Investments in storage facilities to reduce food spoil as well as stimulation of reuse of food packages in public discourse.

It is not certain that higher yield production will solve food insecurity in urban areas since its cause cannot solely be located in higher yields but also lays in unequal distribution of food. The clustering of food chains to raise yields in urban areas would therefore not be the only answer to food insecurity. However, if one decides to cluster food chains in Tamale Metropolitan District in the form of an high-tech agro-park, one should consider its business environment. An examination of this business environment has shown that several characteristics may be upgraded. The following actions have been mentioned:

1. Search for financial flows for investments
2. Sustainable management of natural resources to prevent water insecurity, (potential) fish deprivation
3. Innovation in sustainable energy and water supply and transparent land allocation strengthen the technological infrastructure and to make these more reliable and accessible for all citizens

4. Investments in agro-economic innovation in surrounding rural areas to support locally based rivals and create an agglomeration of competitive firms and related industries
5. Investments in knowledge centres to strengthen the knowledge infrastructure

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Introduction

Background

The International Food Policy Research Institute forecast that in the coming decade food security will be increasingly challenged due to demographic growth, unsustainable consumption of resources and climate changes (amongst others) (www.ifpri.org). Food prices will rise, thus affecting the poorest people on the planet first. Therefore government ministries, civil society and private sector are encouraged to pursue agro economic growth in a most environmental sustainably way and reduce unsustainable resource consumption. This policy calls for an assessment of the current state of food systems on a regional level.

The agricultural system of the Tamale Metropolitan District (or Tamale Municipal) and its surrounding districts has been object of study of the University of Development Studies since 1992. Their main field of study has been the production process. Improvements in the production process focussed on the improvements of agricultural techniques and extension for the pursue of agro-economic growth. Little attention has been paid to the trade network and consumer behaviour in Tamale Metropolitan District to develop agro-businesses. This study will try to fill that gap and provides in valuable information for the new established faculty of agribusiness. Simultaneously it provides new material for an on-going discussion in Dutch debate on international development cooperation.

In this discussion, food security functions as a consensus frame between international development policies and agricultural business support policies. Interest of Dutch government is especially directed to Sub Sahara Africa, which faces high rates of malnutrition figures and has an agricultural sector that hosts sufficient potential for innovation, expansion and thus for development. To invest properly in the agricultural sector of Sub Sahara Africa, detailed regional studies are necessary. Therefore four fields of research have been described by Hilderink (2012). These are:

1. land degradation and water scarcity
2. the production and distribution system (scale of production, markets, infrastructure, urbanization and agro-hubs)
3. the number of undernourished people
4. national government issues and policies regarding food supply

This study of the Tamale Metropolitan District aims to contribute to the second and fourth topic from a development perspective.

Study purpose

The academic purpose of this research is to investigate a food system via emerging networks in their relation to existing notions of place through space-time. Concretised, the food network and fresh fruit and vegetable system of Tamale Metropolitan District is viewed

against Tamale Metropolitan District's urbanisation. Therefore a baseline study of the Metropolitan district is made, after which an analysis has been done of the food network and the fresh fruit and vegetable system in particular. A last phase of the research recommends some investments for effective management of the system and examines the possibility to cluster food chains in the district by means of an agro-park. The results are based on qualitative and quantitative data collected in Ghana between November 2012 and February 2013. The study has been conducted to provide The University for Development Studies with some new perspectives on agro-economic growth of the Metropolitan District and its surroundings.

A second purpose of this research is the expansion of a classic value chain analysis. This has been done by adding an extra phase to the value chain, namely the post-consumption phase, and by emphasizing the relations between the stakeholders of the different phases/chains in the system.

Outline of the thesis

Chapter 1 of this thesis deals with the underlying theories that shape the research approach. It presents the conceptual framework. Chapter 2 discusses the research question, its sub-questions and the main objectives of the research. In addition, it discusses the methods used for the research. The host organisations are presented here a well. Chapter 3 provides a baseline study of the Tamale Metropolitan District's urbanisation based on morphological and functional characteristics and finishes with an assessment of its land, water and energy supply. In Chapter 4 a first attempted to map the food network is conducted and the fresh fruit and vegetable system in Tamale and surroundings is analysed. In Chapter 5 recommendations on the effectiveness of the fresh fruit and vegetable sector are provided and the district's business environment is discussed to end with recommendations towards the development of the district. The thesis is concluded with the key findings.

Ghana factsheet

National context

Ghana is situated in West Africa bordering the Gulf of Guinea to the south, Cote d'Ivoire to the west, Burkina Faso to the north and Togo to the east see map 1. In 2011 it had a population of some 25 million people, a GDP (US$) of 39,199,656,050 and an inflation of 7.8% (worldbank.org). Historically it is known for its slave fortress and Gold Coast.

Map 1 Map of Ghana (thecommonwealth.org)

In December 2012 Ghana's democratic credentials were put to the test. Two leading political parties, namely the National Democratic Congress (NDP) and the New Patriotic Party (NPP) competed in the elections of December 7th 2012. The NDP won with 50.7% of the votes against 47.75% for the NPP. Currently the NPP has gone to court to appeal against the results of the election. Generally, peace and security have prevailed during the elections.

In 2011 Ghana's economy grew with 14.4% because of its oil and cocoa export. Also, gold revenues increased due to the rising international prices of this commodity. The main drivers of this growth were private investment, but also increase in oil production and agricultural performance. In the Northern regions maize and rice production is growing fast. For 2012 a growth of 7.5% is expected for Ghana's economy, these figures are, however, not yet confirmed by the world bank (worldbank.org).

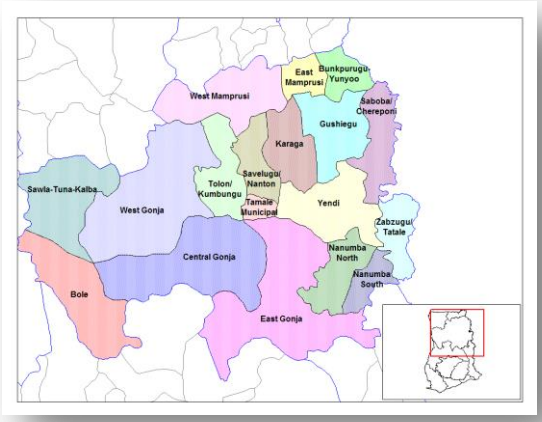
Ghana's financial reserves have been reduced in 2012 by the Central Bank of Ghana for redemption of foreign investors and stimulation of the trade sector. Food inflation was 4.3% by the end of 2011. It has been contained due to government policy intervention. The policy interventions focused on fertilizer subsidies, irrigation, buffer stock management, and seed improvements (worldbank.org).

Regional context

The Northern region is known for its disadvantaged position in Ghana, poverty and illiteracy rates are higher in this region and its infrastructure is less developed. Therefore the region has been the subject of political campaigns over the last years. The Savannah Accelerated Development Authority (SADA) resulted as a follow up to these campaigns. Its goal is to 'double the income of Northern Ghanaians and reduce the incidents of poverty in the Northern ecological belt to less than 20% within 20 years'. Currently they have embraced

public-private partnership with Asongtaba Cottage Industry Construction to re-afforest the North with 5 million trees in five years. Other partnerships involve a new rice mill on the road to Nyankpala, in the Tamale Metropolitan District.

The Tamale Metropolitan District is the only urban district in the region and is the area of this investigation. See map 2 for a map of the Northern region. The urban district is chosen to address that poverty is not only a rural phenomenon.



Map 2 Map of the Northern region of Ghana (Wikipedia.org)

1 Learning from theories

In this chapter relevant theories and studies will be discussed in order to arrive at a better understanding of Tamale Metropolitan District's food supply. A range of insights from urban economics and development geography have made interesting contributions to this topic, such as the understanding of regional urbanisation, clusters and the organisation of supply chains. An analysis of an urban food system is the main approach that gives structure to this research. This is done through defining socio-spatial organisation of the food system in the Metropolitan District. I will start with an introduction in the geographical research field and then discussion the relevant concepts used.

1.1 The research paradigm

Human geography concentrates on spatiality, social organisation and the way these interact. Roughly one can say that three different schools of geographical thoughts of space can be defined. These three paradigms of space have different views on the study of social organisation in space. The first school has used space in an absolute way, the second accounts for a relative notion of space and the third addresses a relational thinking of space (Jones, 2009). They underlie the objects through which socio-spatial organizations can be studied, such as territories, places, scales and networks (Jessop, Brenner& Jones, 2008).

The paradigm most present in current geographical debate at Radboud University is the relational thinking of space by post-structuralists (Doel, 2007). This relational thinking of space has frequently been used in studies attempting to unravel forms of social organisation (and thus practices) by emphasising interspatial interconnectivity (For example; Castells, 1996: Whatmore, 2002). The studies draw on the thoughts of contemporary philosophers as Latour and Deleuze, who are placing common sense and empirical structuring of realities in the centre of their epistemology.

Metaphor, The railroad model

Is the railroad global or local? Neither. It is local at all points, since you always find sleepers and railroad workers, and you have stations and automatic ticket machines scatter along the way. Yet it is global, since it takes you from Madrid to Berlin or from Brest to Vladivostok. However, it is not universal enough to take you just anywhere.

(Latour, 1993, p. 117)

Box 1 Metaphor, the railroad model

Bruno Latour's contribution to relational thinking of space has pushed the geographical debate beyond late-modern thinking in dichotomies by emphasising the symmetry within a dichotomy. His strategy was to engage in empirical anthropological research on dichotomies in order to deconstruct the underlying textual assumption of the contradiction (Beuger, 2009). For example, Latour investigated the opposites 'global' and 'local' by investigating the networks behind it and discovered a hybrid connection between the two words throughout space, see box 1 for a metaphor on this topic.

Gilles Deleuze's ontology of immanence and theory of assemblages also tries to go beyond late-modern thinking of dichotomies. However, contrary to Latour he approaches

the problem by engaging in environmental science, exploring the ontology of immanence; pure immanence is a thorough embedding of an entity in its functioning within, upon and of a larger system. Therefore an assemblage becomes a collection of heterogeneous entities that form contingent relations across time [and space] to produce an emergent whole (adapted from Sellar, 2009, p.69). In this case, power flows through the interspatial interconnectivity of entities in an assemblage which produce ecology, for the construction of social organisation can only exist through practice (De Landa, 2009).

New thoughts and ideas as well as new behaviour can be more easily adapted, when focussing on a process. This will create an open environment for change and development. However, researchers that perceive space in a relational way are often criticized because of their "flat" ontology that reduces the space-time dimension into a concise spatial component in geographical research (Jones, 2009: Jessop, Brenner & Jones 2008. The four dimensions of space, namely time, that has been mentioned to be neglected in the relational space thinking, should therefore be preserved in the research. It distinguishes human geography from other 'flat' social sciences; maintains the close connection with planning and organisational studies; and further explores the polymorph character of space.

1.1.1 The political economy of food security

One field in which human geographers are active is the political economy. This research field investigates the relation between politics and economies, and tries to visualise that these are interlinked. In this, one school of scientists use discourse analyses and deconstruction techniques to expose that the reasons and disregards of political decision making are for a substantial part dictated by economy. They demonstrate that policies are not always designed for sustainable development but argue that the maintenance of power, in which economies function as an important tool, are crucial in policymaking (Acemoglu, 2010).

In tradition of political economy thinking and since the topic of food security underlies this investigation it should be mentioned that after the 1980s food security has not been an important topic on the political agenda of urban planners and managers in Ghana. This is largely because structural adjustment programmes of the eighties limited food shortages and reduced the portion of population that was affected by rapid price changes (Maxwell, 1999). Following Maxwell, food insecurity in the nineties became mainly a problem of access to food for the poor and unequal distribution and has attracted little attention of Ghana's government ever since. From this perspective it becomes difficult to interpret the wish for development of the Northern region of Ghana in terms of food security. Even more, one may question if economic growth will be a suitable solution for this problem.

To me, this perspective calls for a need for more theory in framing political interventions to stress sustainable development. Therefore the focus of this chapter will be on theories in which the upgrading of regional processes, facilities and institutions are addressed to stimulate policies towards sustainable development. In this, poverty alleviation is encouraged through support and inclusion of small entrepreneurs and raising of awareness of consumers.

1.2 Objects for investigating socio-spatial organisation

Different perceptions of space generate different objects for investigating socio-spatial organisation (for an overview see Abler et al. (1992)). In this paragraph I will deepen the understanding of the objects place and networks. I consider these of importance for the study since they underlie the system of agro-economic organisation in Tamale Metropolitan District, which is the main object of investigation. Furthermore, they provide in a framework for the baseline study of the Metropolitan district and the suggestions for effective management.

1.2.1 Places; the Metropolitan District

Places are dynamic, with altering properties and fluid boundaries that are shaped by the interplay of environmental factors (for example the climate or human made decisions). They are at the same time sites of innovation and change and sites of resistance and conflict, and they are interdependent; tied into wider processes of change that are reflected in broader geographical patterns (Knox and Marston 2004). The place endlessly discussed in geographical research is the city (For example: Sassen 2001: Hubbard 2006: Bridge and Watson (ed), 2010).

A theory on city development is the central place theory of Christaller (1933). This theory analyses the relative size and geographic spacing of towns and cities as a function of consumer behaviour and seeks to explain the tendency for central places to be organised in hierarchical systems (Knox and Marston, 2004). The idea is that central places (settlements) exist to provide in services to its surrounding area. Therefore it is the preferences of human beings (in terms of willingness to travel, urgency, price etc.) that determine the territorial borders of a system. The system will include all centres in an area up till the point that all services needed are provided by settlements. Therefore central places in a system can be hierarchically organised on the broad variety of goods and specialized services, and thus (economic) agglomeration.

Current scientific debate on organisation of urban systems uses Christaller's perception of rank-ordered central places as departure point for their research on urban externalities of monocentric and polycentric areas (Hall & Pain, 2006: Burger & Meijers, 2012). This research thwarts Christaller's theory since polycentric urban areas seems to be characterized by more than one city of equal importance and size. Two approaches exist to measure the balance between several centres. One school tends to adopt a morphological approach in which size and territorial distribution are important, while others explore the function of the centres in which multidirectional relations are explored (Burger & Meijers, 2012).

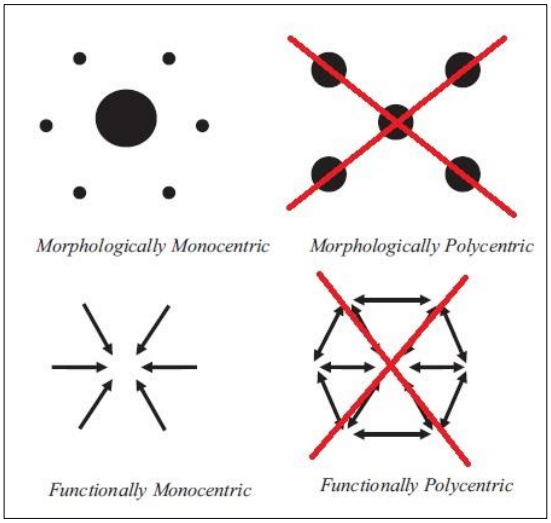


Figure 1 Monocentricity versus polycentricity (Beuger and Meijers, 2012)

The same group of researchers also investigates economic agglomeration in regional

urban-centres. On this subject, Burger & Meijers (2009) reckon that polycentric systems appear to be beneficial for Metropolitan areas with a small population size, because they tend to raise labour productivity, decrease diseconomies in urban centres and more easily attracts global attention of wholesalers and suppliers. To congeal this outcome and discover its reasons, more research is necessary on the strength and extend of functional linkages between cities in a Metropolitan area and their performance as a regional urban system. Also, studies on economic agglomeration in monocentric areas may be useful to study the differences between economic agglomeration in monocentric and polycentric Metropolitan areas.

This case study of Tamale Metropolitan District will provide this debate on scale advantage with more information on the economic organisation of a monocentric Metropolitan area. Tamale is a classic example of a monocentric Metropolitan area with morphological and functional characteristics, see figure 1 for an schematic overview. It has only one large centre in the urban area that is surrounded by several smaller central places and mainly attracts flows of goods to the core centre. Another significant characteristic is that it has a fresh fruits and vegetables market which has not yet been captured by international wholesalers and large foreign investors although there are some national and regional wholesalers (supermarkets) present in the urban centre. The study could be seen as the first part of a comparative study.

1.2.2 Networks; clustering for development

Networks are sets of interconnected entities. They are multiple, have open structures and are able to expand without limits thus integrating new entities. As such they are adaptable, flexible, ever changing (Castells, 1996). Interoperating codes and switches between nods in a networks are fundamental sources in shaping, guiding and misguiding the network. These switches are flows of capital, goods or information. People in urban district depend on these flows for their daily food supply, therefore it is important to keep the exchange of flows going and to prevent entities from switching to other networks. One way to influence this is by frequent and intensive interaction between entities.

The networks mostly discussed in human geography are the networks through which new economies become increasingly organised. These networks are able to cut across notions of places because of technological developments of the last decennia's. For example, the building of a national or intercontinental network of suppliers and buyers in Ghana has become much easier since the nineties due to the use of mobile phones. Wholesalers and

Porters conditions for establishing a cluster

A local environment that encourages appropriate forms of investment and sustained upgrading can be reached when:

1. There is local labour, capital and natural resources, physical, administrative, information and technological infrastructures; specialized inputs
2. There is a presence of capable locally based suppliers and competitive related industries
3. Vigorous competition among locally-based rivals, and one leading firm (in case of export)
4. Sophisticated and demanding local customers, specialized local demand, Customer needs that anticipate those elsewhere

(Martin and Sunley, 2003, p.8)

Box 2 Porters conditions for establishing a cluster

retailers of Tamale can now contact suppliers and retailers in Accra much easier thereby expanding their operation with new markets. The new networks are also increasingly shaped as clusters and cut across sectors and economic units. They are used as a medium to reach economic growth and include a wide variety of businesses, firms, (governmental) organisations and institutions. One scientist that has written about these clusters is Michael Porter (Porter, 1990, 1998).

According to Porter a successful economy starts with the creation of a strong local business environment established by local stakeholders that collaborate together to supports an agglomeration of firms in a certain area. The solid regional networks that will emerge out of this collaboration, will raise trust and cooperation in a supply chain which in turn will boost the sector's operational potential, is his philosophy. Thus, to attract new firms or investments to an area, regional government, knowledge centres and firms should collaborate together to adapt the natural environment to the needs of these potential firms. Porters theory has been widely adapted by policy makers around the world to boost economies, although there seems to be no universal causality between location-bound concentrated networks and regional economic growth (Martin & Sunley, 2003).

The beauty of Porters theory is the hypothesis that it is possible to create an enduring competitive business environment by investing in the natural surroundings of a firm. See box 2 for an overview of factors that a local environment must have to reach a good environment for business investments. In this, he mentions the firms responsibility for sustainable management of both societal and natural resources (Porter and Kramer, 2011). Porter thereby tries to combine environmental and liberal principles. When focusing on the corporeality, business ethics and business development, insights in the long-term effects of the clusters behaviour could perhaps alter business mentalities towards long-term thinking, thus evoking the willingness to invest in sustainable development.

Attention to local networks will be given during the system analysis in this thesis. In the last chapter Tamale's business environment will be discussed in relation to possible food clusters.

1.2.3 Food systems in Sub-Sahara Africa

The main approach of this research is the analysis of the food system of Tamale by defining socio-spatial relations. In this section actual insights on food systems will be discussed.

1.2.3.1 Research

Research on food systems in Africa usually analyse the dynamics between supply mechanisms and health and lifestyle of African people. It focuses on flows of goods and value to meet the needs of the poor (Drakakis-Smith, 1991) and, changes in trade and consumer behaviour due to the arrival of supermarkets, better infrastructure and urbanisation (Weatherspoon & Reardon, 2003: Satterthwaite, G. McGranhan & C. Tacoli, 2010; Maxwell & Slater, 2003). Important conclusion can be drawn from this research.

1. Domestic markets are highly underestimated in development literature, although they serve great potentiality for agricultural trade (Satterthwaite, G. McGranhan & C. Tacoli, 2010).

2. There has been a transformation of wholesale markets from local and fragmented to larger and more centralized, occurring most rapidly in South and East Africa and encouraging intercontinental trade (Weatherspoon & Reardon, 2003).
3. Small agricultural producers generally face a much more difficult trading environment as a result of higher standards and the scale, quality, traceability and timeliness requirements of rising commercial supply chains (Maxwell & Slater, 2003).
4. Challenges and opportunities of this retail transformation should be on the agenda of local governments to prevent small farmers and firms from exclusion of the commercial supply chains (Weatherspoon & Reardon, 2003).

On a more global scale, research on the effect of long-term capital flows and liberalization of markets in developing countries has been an important topic in scientific debate. Special attention to this phenomenon increased in the mid-eighties and early nineties, because of alterations in socio-spatial organisation through capitalistic restructuring of politics (Lefebvre, 1991: Smith & Harvey, 2008). With regards to this debate two general opinions can be determined. Pro-globalisers want to promote liberalisation of world trade. They point at the living standards of people in closed economies, which tend to be worse than open economies, while anti-globalizers are generally focused on the non-egalitarian organisation of international markets, of which developing countries tend to be the victim (Bardhan, 2005).

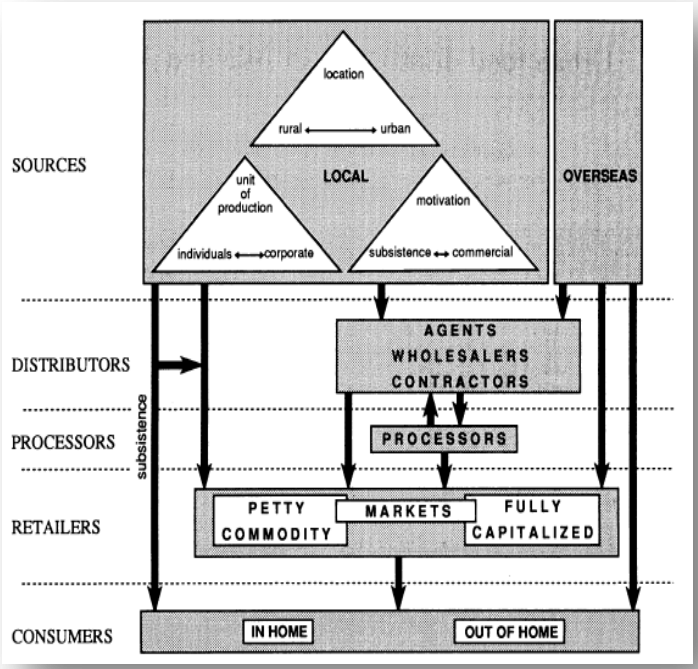


Figure 2 The Urban food system (Drakakis-Smith, 1991)

1.2.3.2 Exposing the system

To secure a sustainable food supply one should firstly display the whole food system. One way to expose this system is by focusing on supply chains, see figure 2. A supply chain involves all levels of the chain from the source of the food to its consumption; thus the production and its input, distribution, processing, retailing and consumption (Mayoux, 2003: Feller, Shunk & Callerman, 2006). Supply chains can differ greatly in the amount of stakeholders involved. Furthermore, they can be influenced by actors in and outside the chain. For example; a producer can decide to reduce cost by searching for other suppliers, or a national government can protect the national producers by import duties.

Originally, supply chains differ from value chains in one important aspect, namely the governance of the flows. In supply chains, flows of goods are studied from the source to the consumer, while in value chains the value that steer the flows of goods from the supplier is

studied (Feller, Shunk & Callerman, 2006). It seems that academic debate currently decided on the integration of both terms, since flows of goods and value influence each other and cannot be seen separately (Feller, Shunk & Callerman, 2006). However, the question of power and chain governance stays sincerely accurate since they govern the economy. For example, consumers buy raw products, eat in restaurants, or generate demand (communicate their preferences of commodities) and are therefore considered to steer food supply and distribution. But, consumers depend on the offer of sales persons and restaurants for their choice of food. One could argue that both restaurants and business offers are directed by the expected demand of the consumer, but this demand (real and expected) is in turn influenced by public discourse expressed in society. And this discourse, expressed through media, is governed by key players such as governments, universities, international business and development institutions which consists out of groups of individual consumers.

To reach a more ecological approach of a food system one can consider to add an additional phase in the supply chain theory, namely the phase of post-consumption (Quinn, 2010). During production and consumption, waste is produced that needs to be managed in order to secure the well-functioning of a system. Especially in urban areas where population density is high, waste should be effectively managed to prevent the rapid spread of diseases. In this matter, recycling of waste into compost material seems to be the most ideal solution. Waste management still is a major challenge in developing counties. It is expected that with the urbanisation of African cities the continents garbage and gas emission will both increase (Swilling et al., 2011).

1.2.3.3 Innovating food systems

With a broad understanding of the urban food system in place, focus could be laid on the innovation of it to secure food supply. Regarding the innovation of food production and supply two methods are currently dominating Dutch scientific debate. The first one focuses on the city as an agro-hub, while the other one tries to establish agricultural agglomeration in the urban area by means of an agro-park.

The term agro-hub refers to the (traditional) function of the city to attract food trade from its surrounding regions where food production is generally located (Dietz, 2012, Dietz et al. 2012). The hub in this concept is the city; a place which functions as a corridor for flows of goods, capital and knowledge and meanwhile has a high demand for food due the density of its population. Innovation of the cities food supply therefore would suggest national government engagement in the development of rural regions surrounding urban regions, and (competitive) business environment in urban centres to stimulate trading networks (agri-hubs).

An agro-park promotes intensive agriculture in Metropolitan areas, thus transferring traditional production processes of the hinterlands to the city. It focuses on sustainable production, processing and distribution of agricultural products through integration of production processes, thus promoting efficient use of resources due to intensive reuse of waste products. The park is designed with the intention to link-up with the challenges of globalisation, aka. growing cities, increase in food demand, deprivation of natural resources and rising fuel cost (Smeets, 2009).

1.3 The conceptual framework

This case study of Tamale Metropolitan District can be considered an attempt to provide insights in the governance of food industries, questioning the role of local actors and municipalities in fostering food supply and distribution. Especially in West Africa where urbanisation figures are less impressive and foreign retail investment is in its early stage, insights in these dynamics could be most valuable for municipalities to intervene in the regions food system. The case study is conducted with three research fields in mind, namely the debate on spatial structure of urban regions, the debate on regional economic growth and the organisation of food systems.

The conceptual framework, displayed in figure 3, is as followed. Current practices and socio-spatial developments in Tamale Metropolitan District are analysed according to theories on regional urban development, regional economic growth and the management of food systems in Sub-Sahara Africa. The theories are viewed from a post-structuralist perspective in which a relational thinking of space is common. A historical facet is added to the baseline study of the district and some prospective aspects are added to the recommendations for effective management and economic growth to prevent a flat ontology.

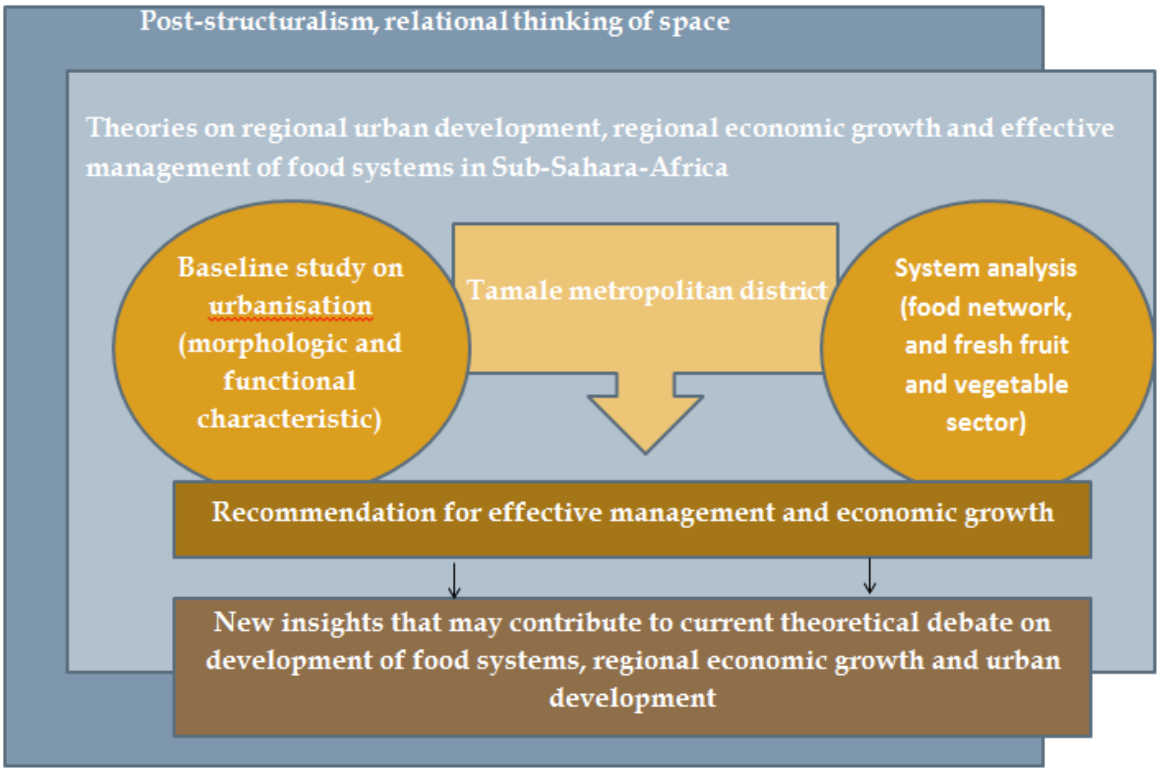


Figure 3 The conceptual framework

2 Research methodology

2.1 Research questions and objectives

The focus of this research will be on the socio-spatial organisation of the fresh fruit and vegetable sector in Tamale. The research ultimately aims to explore changes in the socio-spatial organisation of urban food systems and to discuss agro-economic developments in Tamale Metropolitan District and its surroundings. To contribute to these discussions the following research objective has been formulated:

Research objective: To gain insight in the socio-spatial organisation of the fresh fruit and vegetable sector in Tamale Metropolitan District in Ghana to identify possibilities to enhance or cluster food chains.

Sub-objectives:

1. Produce a baseline study on Tamale's Metropolitan District in order to assess the preliminary conditions for an intervention on food security
2. Produce a food system analysis to identify current patterns of social and spatial organisation of the fresh fruit and vegetables sector and map the food network
3. Provide recommendations on future development of the fresh fruit and vegetable sector in Tamale to enhance or cluster food chains

Main research question: In what socio-spatial way is the fresh fruit and vegetable sector in Tamale Metropolitan District organised and could this organisation be enhanced by clustering food chains?

2.1.1 Sub-questions

To understand the Metropolitan Districts socio-spatial structure and the socio-spatial organisation of the fresh fruit and vegetable sector in particular, the following sub-questions have been formulated.

Phase 1: Baseline study on Tamale's Metropolitan District

1. What are the externalities of Tamale's urbanisation?
2. What are Tamale's land, water and energy provision and are these bound to be sufficient to provide future needs of citizens?

Phase 2: System analysis

1. What are the main food sources of the city and how are relationships with these sources structured?
2. How is the fresh fruit and vegetable sector structured? Who are the actors involved and what is their influence on the system?
3. What are the governance structures within the sector and how is the value addition distributed?

Phase 3: Effective management of the food system

1. Are there constraints or opportunities for improvement in the system?
2. Are there possibilities to enhance the system and cluster chains in the fresh fruit and vegetable sector?
3. What may be the impact of these possibilities for socio-spatial organisation in Tamale Metropolitan District?

2.2 Operationalization

This study can be divided into three parts; preparation, research and the writing of this report. The preparation contains the writing of the research proposal and arrangement of the fieldwork. The research phase contains a baseline study of Tamale's Metropolitan District and a system analysis of its fresh fruit and vegetable sector as well as some recommendations for intervention. The report presents the data collected and also contributes to the debates mentioned in the conceptual framework.

The research consist of three consecutive phases. First, in order to understand the situation of food security in Tamale, one must determine the current status of urbanisation of the Metropolitan District. And second, in order to arrive at the point where some conclusions can be drawn from the augmentation of the food system one must do a system analysis. When both phases are finished a third phase can begin in which all the data collected will be analysed in order to develop some recommendations. Going into further detail, the terms, concepts and variables that will be used to analyse the data will be explained in the following section.

2.2.1 Phase one; baseline study

The baseline study on the current state of Tamale's Metropolitan District provides in an overview of Tamale's urban expansion from the twenties century up till today. The externalities of the urbanisation process will be discussed through space-time from a morphological and functional perspective, although the functional linkages will be litlle emphasised in this chapter. Tamale's spatial structure has been formed by the city, smaller living centres, centres of economic agglomeration, the surrounding rural area, rivers and woods, it's infrastructure, airports and regional, national and international linkages.

In addition, a section on land, water and energy availability in the urban district is added. This has been done because these natural resources are preliminary conditions for agro-economic innovation. If these supply systems have only a limited capacity, supply to the districts citizens could become under pressure when high-tech private investments in the agro-economic sector are made. For this section, figure 4 is used as a guide. In the figure an overview of indicators is given that benefit sustainable food security if they interact together. The figure displays the conditions of water, land and energy availability that would be most favourable to reach sustainable food security, the collaboration of governmental bodies to coordinate their policies and the mentality that is required to reach food security. The figure has been formulated with the assumption in mind that food security could be reached by agro-economic development. Little attention is given to unequal distribution and food spoil that may cause food insecurity.

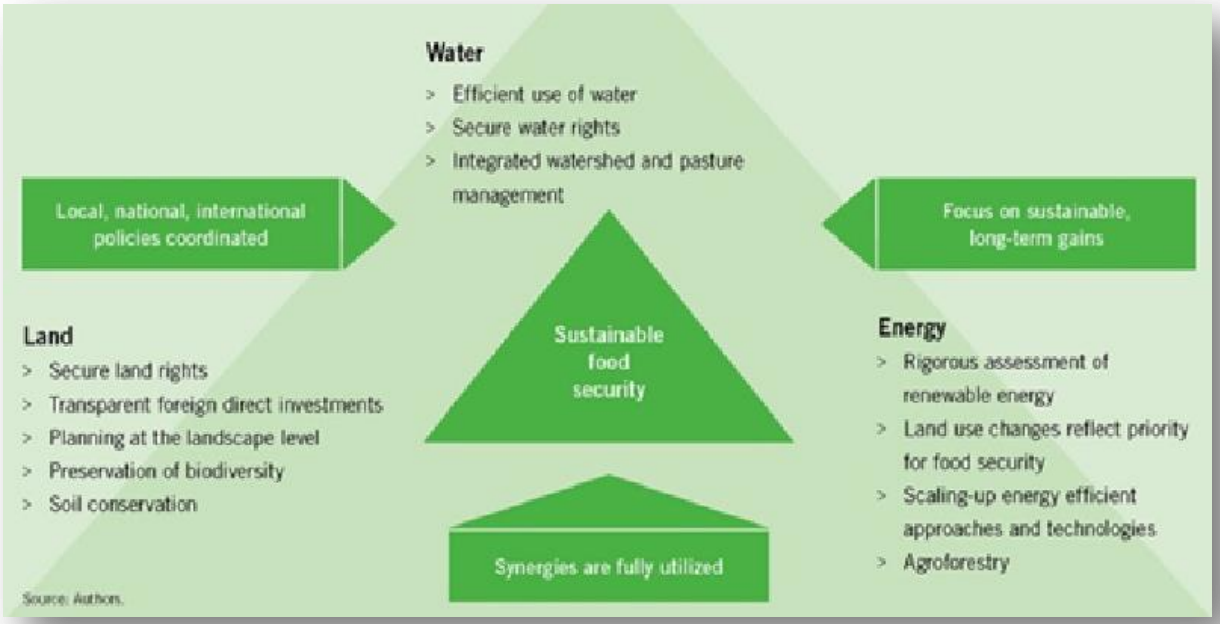


Figure 4 Using land water and energy synergies for sustainable food security (ifpri.org)

2.2.2 Phase two; system analysis

The analyses of the system is done in two phases. First a general overview of Tamale's food network is given to map the origin of the food. The network is based on interviews held during fieldwork and data collected from trademap.org (based on import to and export from Ghana, only some of the products were found during participating research). Second, a detailed study on the fresh fruit and vegetable sector of Tamale is added to provide a more in-depth view of the system's operation. The sector is chosen because discussion in the literature on this sector in Tamale have been showing different opinions on its development potentiality. In 2005 the sector has been described as one with potential but in need of more in-depth investigation (Odi & CEPA, 2005), while in 2009 it was said not to be profitable. (Abankwa et al., 2009). This implies that in-between a detailed study may be conducted that has proven the unprofitability, but during preparation no in-depth study of this sector has been found and therefore this sector was chosen. In addition, another reason to study the fresh fruit and vegetable sector in detail is that horticulture could easily be practised on small plots which makes it particularly suitable to practise in urban areas. This could be an asset for securing food supply both for citizens and governments to stimulate.

In accordance with the approach of value chain analysis, as discussed in the theoretical chapter, the fresh fruit and vegetables sector will be examined through linkages between several levels in the value chain. An additional level in the value chain is added to reach a more ecological approach of the system analysis. Special attention will be paid to consumer demand, since the University of Development Studies agrees that there is a knowledge gap on this part of the system (interview Abubakari, 4-12-2012). Furthermore, a start has been made with the determination of the added value in the chain for one type of vegetable,

namely carrot. A price accumulation throughout the chain, albeit roughly calculated, will be presented.

2.2.3 Phase three; development of recommendations for effective management

The study on Tamale Metropolitan District's fresh fruit and vegetable sector will be used as a basis for developing recommendations for improvements in the system in the area. In addition, information of the baseline study of the district, the food network and the analysis of the fresh fruit and vegetable sector will be used to explore some preliminary conditions in the business environment that may be upgraded to cluster the fresh fruit and vegetable sector with other food chains.

2.3 Research methods

2.3.1 Research area

The research has been conducted in the Tamale Metropolitan District. The district is located in the Northern region of Ghana. It is surrounded by Tolon Kumubungu and Savelugu Nanton situated northeast and northwest of Tamale.

2.3.2 Data collection

To achieve the objectives of this research both qualitative and quantitative research methods have been combined during a fieldwork trip of two months; the fieldwork was conducted between November 28th of 2012 and January 26th of 2013. In addition, secondary research has been done by means of a literature study on topics related to spatial theories and concepts, value chains and food security in Africa. These theories have been used to provide the basis for the conceptual framework from which the current research methodology has resulted. Going into further detail, this section will elaborate on the techniques with which the data has been collected during the two month fieldwork.

The first month a baseline study on Tamale's Metropolitan District and food sources has been carried out by means of semi-structured interviews with local NGOs, international development organisations, civil servants of the department of Town and Country Planning of Tamale, officers of the district office of the Ministry of Agriculture and lecturers of the University for Development Studies (UDS) in Tamale. I intended to record the interviews so I could analyse them through coding mechanisms; however the situation on the field has not allowed such accurate principles. Although I made pre-fixed appointments people were often in a hurry, and not eager to talk, plus there was often a lot of background noise. Therefore I decided not to record them, see annex 1 for a list of interviewees and visits. In addition, participating research has been done in assistance to the Urban Agricultural Network (UrbaNet) and the Foundation of Resource centres on Urban Agriculture and Food security (RUAF FOUNDATION). With their help, I have had the change to visit production sites, market places, local (open) stores, supermarkets, processing plants and co-composting sites. During these visits I have talked to farmers, petty traders and store managers.

The second month evolved around the mapping of the fresh fruit and vegetable sector. Since one of the conclusions of first month's research was that there was a lack of knowledge on fresh fruit and vegetables consumption, a sample of 120 citizens of Tamale on their demand and behaviour has been taken. The questionnaire was made in collaboration with Abdul Halim Abubakari, UDS lecturer Environmental Horticulture of the Faculty of Agriculture. Mister Gandaa, lecturer in engineering at UDS, for the questionnaire has functioned as a respondent during the pre-test before its distribution, see annex 2. Three levels of income for Tamale were targeted in this survey. These classes were selected by using profession as a proxy, since it is not considered polite to ask ones income in Ghana. Although this method has been used before by lecturers of the University for Development Studies, the categorization is not fully accurate due to the multiple professions a person usually holds in Ghana. However, the categorized professions will be labelled as income groups in this research. An similar number of persons in each of the three income groups were approached, namely 40 per group. And, we strived for gender equality in the targeted groups. The questionnaires have been conducted by four research assistants and myself. The research assistants followed a three hour training discussing in-depth the content and meaning of the questionnaire before they started the fieldwork. They were assigned certain locations to select their respondents. The locations were chosen in consultation with misters Abubakari and Gandaa. Out of the 120 respondents, a total of 22, mostly originating from higher income classes, declined to be interviewed.

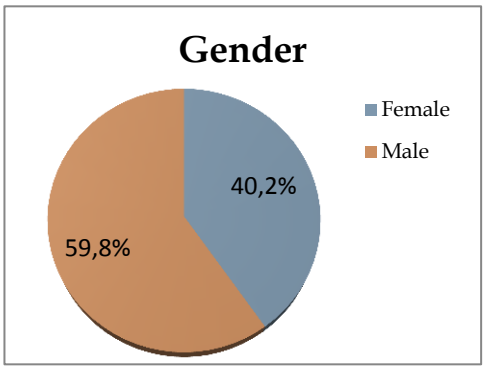


Chart 1 Gender of respondents (N=97)

The data collected during group and individual meetings in the first month of the fieldwork has been summarized and processed at the end of that day while in Ghana. The questionnaires have been filled-in and returned in hard copy. The data analysis of both sources was done upon return in the Netherlands. The interviews and information gathered during the meetings was analysed using discourse analysis by cross checking the given information through other sources. The questionnaires have been analysed with both describing (frequency analyses, crosstab etc.) and examining analysis (Chi-square, Pearson row). The outcomes of the questionnaire will be discussed under the section 'consumption' in chapter 4.

Out of the 120 targeted persons, 98 questionnaires were suitable for analysis, 22 refused to cooperate due to time and motivation issues. Unfortunately there was insufficient time to replace the 22 that refused to cooperate. From these 98 respondents, 40.2% was female and

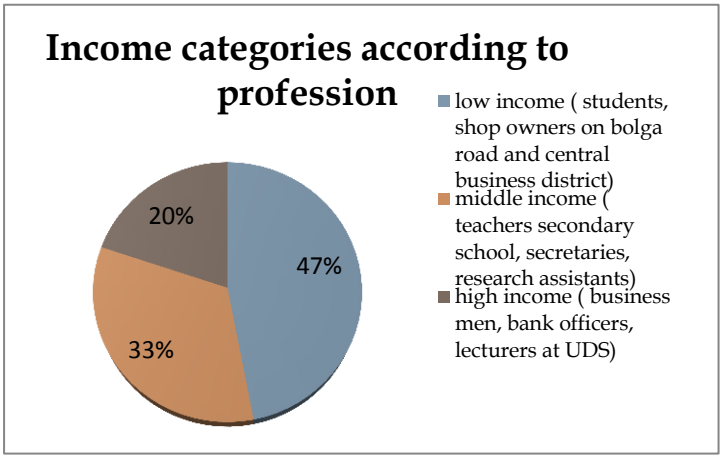


Chart 2 Income categories according to profession of respondents (N=96

59.8% was male, see chart 1. Furthermore, out of the 98 respondents, 46.9% (N=45) had a low income, 33.3% (N=32) had a middle income and 19.8% (N=19) was considered to have a high income, see charts 2. The three income groups have been determined using the following categories; low (0-500 NGC), middle (501-1000 NGC) and high (above 1001- up to 4000 NGC) per month. In addition, the age range of the respondents is between 18 and 56, with an average of 30.5(6) years (N=95, SD 8.3, Sk 1,3, Ku 1.3). The years in school differed between 1 and 27 with an average of 14.2 while most respondents schooled for more than 14 years (N= 89, SD 5.3, Sk - .45, Ku 0.41); and lastly, the size of the family varied from 1 to 15 with an average of 5 (N=85, SD 2.7, SK .95, Ku 1.58). The spread of this set of observations seems to be high, however concluding one can say that the questioned population is moderately young and, at least, educated in primary and secondary school. The size of the family is about 5 members. The household size and age distribution are in accordance with the Ghana Living Standards Statistic Survey 5 (2008) which concludes up on a family size of 5.5 persons and a population distribution in which 66.4% has an age between 0 and 29 years for the Northern region.

2.4 Limitations and risks

There were several limitations hampering this research and data collection. First of all, as a foreigner not able to speak the local language, it was difficult to communicate with farmers and petty traders in the localities. An assistant or interpreter could overcome this problem to some extent; however, since one could not communicate directly with the respondents, intentions and meanings could be lost in translation or communicated in another way. Besides, there were many occasions for misunderstandings of answers, due to cultural differences. On my own account, I had troubles understanding the indirect suggestions or implicit concealment of information during interviews. Sometimes I could not find the reason for this behaviour.

Another limitation was the timeframe in which the fieldwork had to be conducted. The timeframe was set in two months during December and January. Two months allowed only for a basic understanding of the situation and rapid research method to gather some results. These rapid methods do not suit the Ghanaian culture in which networks, long-time relationships and trust are one of the key principle to gather quality information. Nor does it give the researcher time to check the information profoundly before return. Furthermore, as the research was mainly focused on the demand level of the value chain, less time was given to gather quantitative data on the other levels in the chain. Within the available time it was attempted to visit as many actors as possible.

A third limitation could be found in doing research with several research assistants. Although the assistants have had a training on the questionnaire and they have been monitored during research, the outcome will depend partly on their willingness to perform. This limitation has been reduced by working with experienced research assistants suggested by Mr Ganaa.

2.5 The host organizations

The fieldwork has been conducted in collaboration with two institutes in Tamale. Both contacts are presented to me by the Foundation of Resource centres on Urban Agriculture and Food security (RUAF FOUNDATION). I have been invited by the department of International Affairs of the University for Development Studies to conduct the research in Ghana. The Urban Agricultural Network (UrbaNet) of Tamale has offered its assistance during these two months.

2.5.1 University for Development Studies

The University for Development Studies was established in May 1992 by PNDC law 279 to blend the academic world with that of communities in order to collectively develop Ghana, and in particular the Northern part of it. Accordingly the University for Development Studies strives to ensure that there are intellectual and pragmatic inputs into the development processes of the poor, disadvantaged and marginalized areas in Ghana. Therefore two out of the four campuses are located in the Northern region; Tamale campus and Nyankpala campus. Tamale campus, situated in Tamale, hosts the School of Medicine and Health Science. Nyankpala campus is situated close to Tamale and has a faculty of Agriculture and Renewable Natural Resources. Recently a third faculty, the faculty of Agribusiness, is established; it is uncertain if the faculty is formalized yet.

2.5.2 UrbaNet

The Urban Agriculture Network of Northern Ghana evolved out of a working group of stakeholders on Tamale's Urban Agriculture in 2003. Since then it has tried to unite different farmer groups and associations in the city, to collaborate in the promotion and practice of urban agriculture. By the end of 2007 it broadened its scope and got involved in agricultural programming (education and extension) to ensure linkages between urban, peri-urban and rural farmer groups. In addition it adopted a microcredit scheme for small entrepreneurship in collaboration with ActionAid. Over the last few years, efforts have been made to increase smallholder farmer's access to land in the wake of urbanization in the Tamale metropolis. About 178 hectares of agriculture land was zoned for protection to facilitate farming in 2008.

3 Tamale Metropolitan District

In this chapter the results of the baseline study on Tamale Metropolitan District will be presented. The factors discussed are its urban externalities and water, land and energy supply.

3.1 Urban development through space-time

3.1.1 Urban growth

Tamale city started as a small settlement of 1,435 inhabitants, but saw a fast rise in numbers during British colonial rule.. Two developments have sincerely contributed to this expansion. One, Tamale became the administrative headquarter of the Northern region in 1907; and two, an important new road running through Tamale since 1920 connected the coast of Ghana with its hinterlands, and paved the way for efficient trade with Burkina Faso and Niger. Both developments attracted people and businesses to the area. Consequently, Tamale was officially formed an urban area during British rule. The exact date is not known, but under colonial rule in Ghana settlement of 5,000 or more people was considered an urban area and Tamale exceeded this amount during colonial times. The likely date will be sometime in the second or third decade of the 20th century. At the end of the colonial period (1948) Tamale counted up to 17,187 residents (McNulty, 1969).

In the post-colonial period (1948 to 1960), the quality of life in urban areas of the Northern region was much better than that of rural areas; 42.7% against 13% according to the physical quality of life index of UNICEF (1969) (Songsore, 2009). Therefore, migration from rural areas caused about 98% of Ghana's urban growth during these days. In the Northern region migration concentrated mainly on Tamale. In 20 years its population rate doubled up to 40,443 (McNulty, 1969). The effects of this migration are still noticeable in Tamale; 80.2% of the survey respondents indicated that they are originally from smaller villages as Savelugu or Yendi, see chart 3.

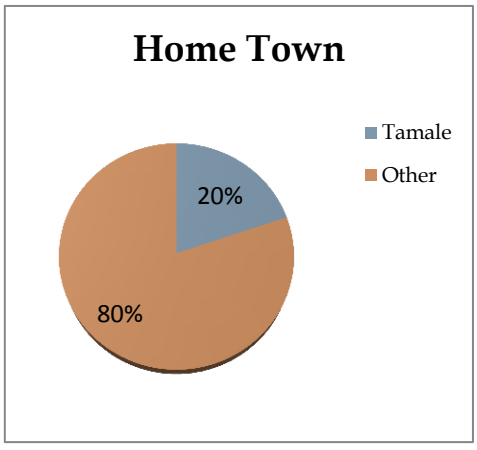


Chart 3 Home Town of respondents (N=97)

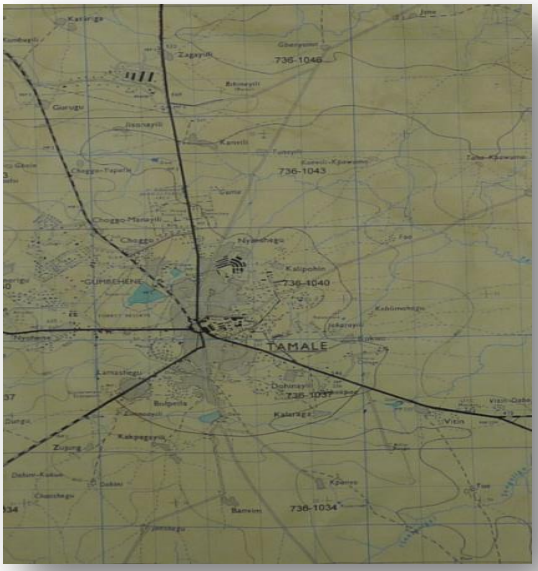
In the late 1970s the Northern region, of which Tamale is a district, was one of the few regions which kept experiencing a positive net migration (16.4%) during economic stagnation (Songsore, 2009). Thus, the number of urban residents kept on growing fast due to Tamale's corridor function for agricultural production in the Northern and Upper regions. Especially the large-scale rice cultivation had a major effect on Tamale's growth in these days, partly because this sector was subsidized by government. The industry slightly declined after liberalization politics during the 1980s. A reduction in state expenditure caused the elimination of agricultural input and fertilizer subsidies, while market liberalization opened the Ghanaian market for imported rice, thus making rice

production and processing more competitive. This discouraged domestic production. However, in 2000 an average rice production of 80,000 tonnes has been measured for the whole Northern region, while in 1960 this was 32,000 (Abdualai & Huffman, 2000).

Tamale is currently the fourth in rank of largest cities in Ghana. It stood at third position in the past, but was surpassed by Takoradi in the year 2000. Most likely Takoradi grew very fast due to massive oil discoveries in this region during the 1990s which attracted a lot of people to the eastern region. A second migration wave may, however, be mentioned since Tamale is still growing with an average growth rate of 3.5% (GSS, 2012: Abankwa et al, 2009). Highly skilled labourers from Accra, Kumasi, Wa or foreign cities are moving to Tamale. They are provided with jobs in banks, governmental departments, international business, international development organisations and the University. Besides, the city has attracted many students due to the initiation of two campuses of the University of Development Studies in Nyankpala and Tamale in 1993. It has been said that the more wealthy citizens seek housing at the borders of the city centre, where more space is left in between houses and infrastructure is better taken care of.

3.1.2 Spatial development

Tamale Metropolitan District currently covers a large area of about 922 square kilometres in which Tamale city and some 30 surrounding villages are situated. Other sizeable towns situated in nearby regions are Yendi in the Northern region (population = 199,592) and Bolgatanga in the Upper East region (population = 131,550). Its spatial development is planned and coordinated at the Tamale Metropolitan Assembly in collaboration with the department for Town and Country planning, and supervised by the ministry of local government and rural development. Over the years these legislative bodies had a difficult job planning the development of the district and the city in particular (Yeboah & Obeng-Odoom, 2010). This section will draw-up some important benchmarks in Tamale's history of spatial development.



Map 3 Tamale Metropolitan area main infrastructure (department of Town and Country Planning)

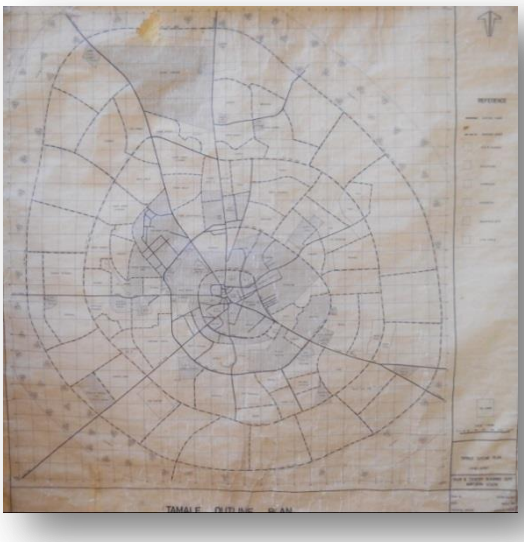
Tamale's urban development has benefited significantly from British colonial rule. The British laid the foundation for Tamale's transport system and urban spatial framework, thus introducing urban planning, building standards and architectural designs, see map 3 for the transport system. In addition, due to its pre-colonial and post-colonial development Tamale has a lot of Ghanaian imprints as well. The indigenous population are still living in the city centre as was the case in the pre-colonial time, the British concepts of housings and infrastructure are adjusted to the current living patterns of Tamale citizens, while ethnic and

Map 4 Tamale Metropolitan area center widening of the roads (department of Town and Country Planning)

religious enclaves, built after the departure of the British are still present throughout the city .

After Ghana's independence in 1962 the city's development fell behind the rapid population growth of these days. Several neighbourhoods in Tamale were built on illegally occupied land, without good roads, basic water supply and sewerage systems. Consequently, the urban environment deteriorated. Congestion laid to chronic traffic problems and illegal tapping of water and electricity lines (Asamoah, 2010). Government authorities had little capacity to intervene in the deteriorating urban environment. Internal disputes by the Gulkpe-Na and Dakpema ethnic groups prevented an effective legal and fiscal authority (Soeters, 2012). However, during the1980s some spatial changes were made to avoid further down-fall.

In the 1980s the roads in the city centre of Tamale were broadened to solve the traffic jams, while bicycle paths were established for save cycling, see map 4. The adjustments were made in the lines of national policy that encouraged the expansion of transport and communication networks for industrial development. In that same decennia a green belt policy was implemented. The policy was intended to control urban spreading of Tamale. The green belt could be used for agriculture, forestry and outdoor leisure by the citizens of Tamale and surrounding rural areas, see map 5. This policy has proven to be ineffective, the belt has been invaded by squatter settlements.



Map 5 Tamale Metropolitan area green belt policy (department of Town and Country Planning)

Nowadays Tamale is defined to consist out of an urban and peri-urban area; its urban area extends up to 10 km from the city centre, while its peri-urban area extends in average up to 40 km along its major roads (Abubakari & Mahunu, 2006). The city is expending in south-west and north-west directions, along the road to Techiman, Kumbungu and Savelugu. Parts of the city centre have been occupied by banks and businesses at the expense of housing, while some businesses have besieged the pre-colonial indigenous settlements in the city centre. Dwellings, water supply, neighbourhood

infrastructure and domestic toilet provisions are still not sufficient to cater for the citizens' needs. And, traffic jams haves become a problem again due to the current change of bicycles to motors as the prime means of transport, a growth in numbers of cars on the road and a fast growing population.

Tamale, though, also has one of the most impressive football stadiums of the country; build in 2008 by a Chinese construction group it hosted matches during the 2008 and 2012 African Cup of Nations, see picture 1.

Picture 1 Tamale football stadium (cedipost.com)

3.1.3 Demographic characteristics

The figures presented in this section originate from the Ghana Living Standard Survey 5 (GLSS) (2008) and the 2000 and 2010 reports of the Ghana Population and Housing Census (PHC, 2000 at ghanadistrict.com and GSS, 2012). The GLSS 6 held in 2011 has not yet been published. Some of the results in these reports are given for the whole Northern region and not for Tamale Metropolitan District in specific; therefore it is possible that the percentages differ for the Metropolitan area. When differences are expected or known it has been mentioned. Table 1 gives an overview of the measurements.

Tamale Metropolitan District		
Measure	**2000**	**2010**
population	293,881	371,351
growth rate	-	3.5
density	318.6 /km2	402.76 / km2
Labour force (between 15 and 65) (whole Northern region)	-	51% of total population
Education (whole Northern region)	-	67% (of population older than 6) had no formal education. For Tamale Metropolitan District this percentage is expected to be lower

Table 1 Urbanisation externalities

With an urban population of 74% and a rural population of 26% Tamale is still the only district in the region which is predominantly urban. Its population is 15% of the total population share in the Northern region and 1.5% of the whole population of Ghana (GSS, 2012). Its inhabitants are quite diverse in terms of religion, ethnicity and nationality.

Tamale Metropolitan inhabitants seems to have grown less than the whole population in the Northern region in the last ten years. The population in the Northern region increased with 36.2% up to 247,9461, while

Tamale's population has increased with 26% up to 37,1351 persons (PHC 2000; GSS, 2012). However, when looking at growth rates the opposite can be observed. The annual intercensal growth rate for the Northern region has been put at 2.9%, while the growth rate of Tamale has been indicated to be 3.5% (PHC, 2000; UN-Habitat profile, 2010). The difference between population density of the Northern region and Tamale Metropolitan district indicates a small reduction in the expansion of Tamale Metropolitan or a small increase in population growth in the Northern region. The population density of almost 403 persons per square kilometre for the Metropolis is about 11.5 times higher than the average density of slightly over 35 persons per square kilometre established in the rest of the Northern region. In 2000 a density of 319 persons per square kilometre for the Metropolis and 25.9 for the rest of the region was found, which is 12 times higher (PHC, 2000). This is a reduction of 0.5. In any case , all figures indicate that within 28 years the population of both the Northern region and Tamale is expected to double.

A majority of 51% of the Northern population is of working age, which means that the region hosts a good potential labour force. Of these 51% (above 15 and beneath 65 years of age), 75% are economically active of which 94% is employed. Self-employment without any employees is the most common working method (59%), only 1% has adopted domestic tasks (housekeeping) as an income and around 7% indicated to work as an employee in service of a larger organisation or business. This last number will be a little higher for Tamale Metropolis, since most service institutes in the Northern region are sited in the city, and so are their employees.

Although, there is a good potential labour force, its educational level is still under-developed compared to other parts of Ghana. 67% of the current population (above 6 years old) has had no chance to attend formal education, while in other regions numbers have been measured of less than 31%. A positive trend is, however, visible with state, parents and teachers encouraging school attendance.

3.1.4 The urban economy

The most important economic activities of the Northern region are agriculture, forestry & fishing, wholesale & retailing, accommodation and food service activities, and education (GSS, 2012). It is expected that these sectors will only slightly differ from important economic activities in Tamale's Metropolitan District, since its access to natural resources is the same. Tamale's urban character, however, will leave less space for agricultural practices and more possibilities for wholesale and retailing, accommodation and food services, education and other service activities.

The main driver of Tamale's economy is the service sector. It is characterized by petty trade based on imported manufactured products that are made available through external loans and grants (Songsore, 2009). Upcoming markets in the service industry are the banks and the tourism sector. In the last decennia around fifteen new banks have been established in Tamale, providing the privileged class of tamale with saving services, insurances and loan possibilities. The tourism sector in Tamale focusses on meetings, conferences and volunteers. In ten years the number of hotels and restaurants more than doubled, from 37 hotels and 15

restaurants in 2001 to 94 hotels and guesthouses and 34 restaurants in 2011 (Abubakari & Mahunu, 2007; Ziem, 2011). In addition to these industries all kinds of small manufacturing activities are spread over the city. The most prospered ones seems to be the tailoring and weaving places, since there is still a vivid market in Ghana for national tailored cloths. Another vibrating manufacturing sector which employs a lot of people is carpeting. Carpeting is practiced on request and mainly during the afternoon, when farming activities as watering plants or sowing has finished. It is a suitable profession for additional income, just like bicycle or motor car repairing.

The Agricultural sector of Ghana contributed 34.5% to the Gross Domestic Products of Ghana in 2009 (SRID, 2010). In this sector, Tamale started to function as a gateway for products from and towards the three Northern regions which are particularly known for their production of cereals, roots and tuber as well as livestock. Especially its newly established airport, the increased frequency of air traffic and renewed roads towards Kumasi indicate this development. In addition, Tamale's industrial district is of small but consists almost exclusively out processing plants for agro-products. An exploratory trip to the district identified the following factories; a meet processing plant called Gee's, an edible oils manufacturing plant, a rice mill and processing plant, a cotton plant and finally a cocoa plant.

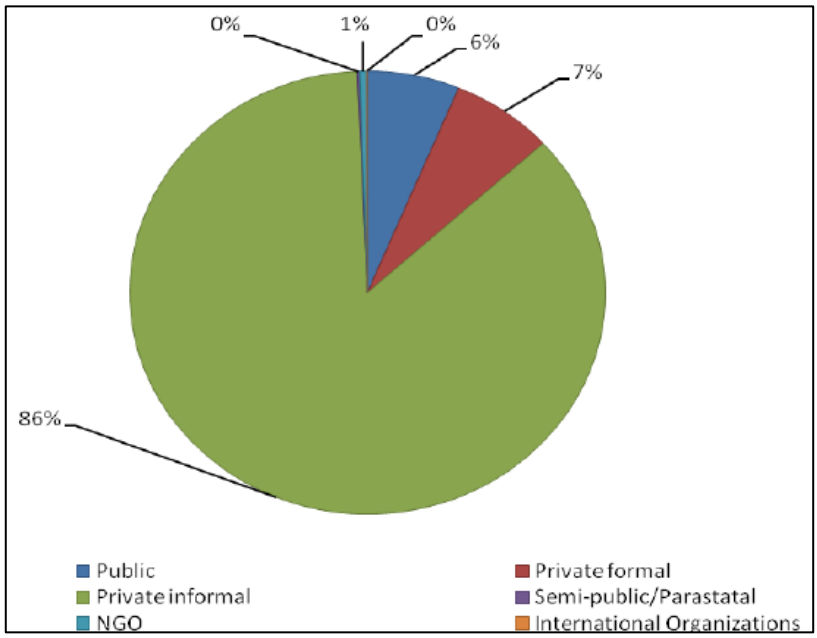


Chart 4 Economic organisation Northern region (GSS, 2012)

International business development is starting in Tamale. For example, a newly build rice mill on the road to Nyankpala. In Tamale the word is spread that it has Indian owners. Furthermore, the production of sheanuts has gained major importance over the past years. From the four companies in the North that are benefiting from tax free zones for exporting, two of them are involved in the processing of sheanuts into butter. Besides, at least two international development organizations namely SNV and UN-WFP and one local NGO (UrbaNet) from Tamale are involved in the production and processing of sheanuts via capacity building projects in communities.

Relationships that are established during wholesale & retailing and accommodation and food services are largely established on an informal basis, see chart 4. Flows of goods, capital and knowledge are therefore hard to trace, since the transactions are often not formally established.

3.1.5 Natural resources

3.1.5.1 Land

Land is still a challenge in and around Tamale city, since both state legislation and community rights are supposed to be incorporated in the allocation process. Therefore it takes time and a lot of convincing techniques to legally pursue land. Currently, conflicts exist between community chiefs and ordinary citizens upon land ownership. Community chiefs try to change land destined for agriculture into land for real estate purposes, thus reducing the arable land in the city (Yeboah & Shaw, 2013). Increased sales prices of land in the urban and peri-urban area, makes it attractive to sell or lease the land. The department of Town and Country Planning and the Metropolitan Assembly are concerned with the spatial development of the city and merely serve as a mediator for these kinds of disputes.

The soil research institute located in Kumasi and Accra conducted a soil fertility survey for the farmlands of the Northern region and concluded that the soils around Tamale are not suitable for crop production since they are very shallow and gravelly. The research institute suggested that these terrains should be reserved for forestry, wildlife and watershed protection (SRID, 2010). Following this advice it seems that the Savannah Accelerated Development authority is currently afforesting the Northern, Upper East, Upper West, Volta and some of the Brong Ahafo regions to protect the areas from desertification and meanwhile provide jobs in forestry.

In an attempt to improve soils for agricultural production, the University of Development Studies in collaboration with RUAF Foundations, experiments with co-composting in which several waste components are processed together into fertilizers. Recently, some urban farmers have expressed their interest in the compost, since it tends to be less expensive than imported fertilizers.

3.1.5.2 Water

Water is provisioned by pipes, wells, rivers and dams in the urban and peri-urban areas, or sold in big containers and small water sachets. The Nawuni river (White Volta) and the Volta are the main water bodies in the area that provide the metropolis with water. At the moment, only 54% of the Tamale residents have access to piped water supply, the other people depend on wells, boreholes and streams (correspondence prof. Kranjac-Berisavljevic, 30-11-2012).

On a more alarming state of affairs, fears have been expressed for water insecurity in the upcoming decades. Projected climate patterns for the years 2020 and 2050 are likely to aggravate the water situation due to an increase in temperature, a reduction in rainfall during dry season and an increase of rainfall in the rainy season in the guinea savannah where Tamale is located (correspondence prof. Kranjac-Berisavljevic, 30-11-2012). The Water Research Institute of the Netherlands Climate Assistance Programme and the Centre for Development Research at the University of Bonn affirm these conclusions in a policy brief of the GLOWA volta project (Laube, Leemhuis & Amisigo, 2008).

Even more, water shortage has already had its effects on horticulture in Tamale District. Since water is generally scarce during the dry season, farming has been practiced along waste water drains of the military barracks, near self-constructed dams with small reservoirs,

broken sewers or dugouts, to profit from the little water available. The use of this polluted water is blamed for high levels of microbiological contamination of vegetables. Samples of fresh products purchased in Tamale for one study had faecal coliform levels that exceeded international recommended limits, and 70 per cent carried parasitic worm eggs (Swilling et al., 2011).

3.1.5.2 Energy

Electricity and kerosene are the sources most frequently used for lighting in Tamale Metropolitan District. In Ghana's urban areas, they account for 99% of the total sources for lighting, with electricity being 74% and kerosene being 25%. It is however expected that these percentages will differ in Tamale metropolis with Kerosene being the first source and electricity the second one. For cooking, gas, charcoal and wood are the ones most frequently used (GSS, 2008). The use of wood has resulted in some deforested parts that is currently used for real estate.

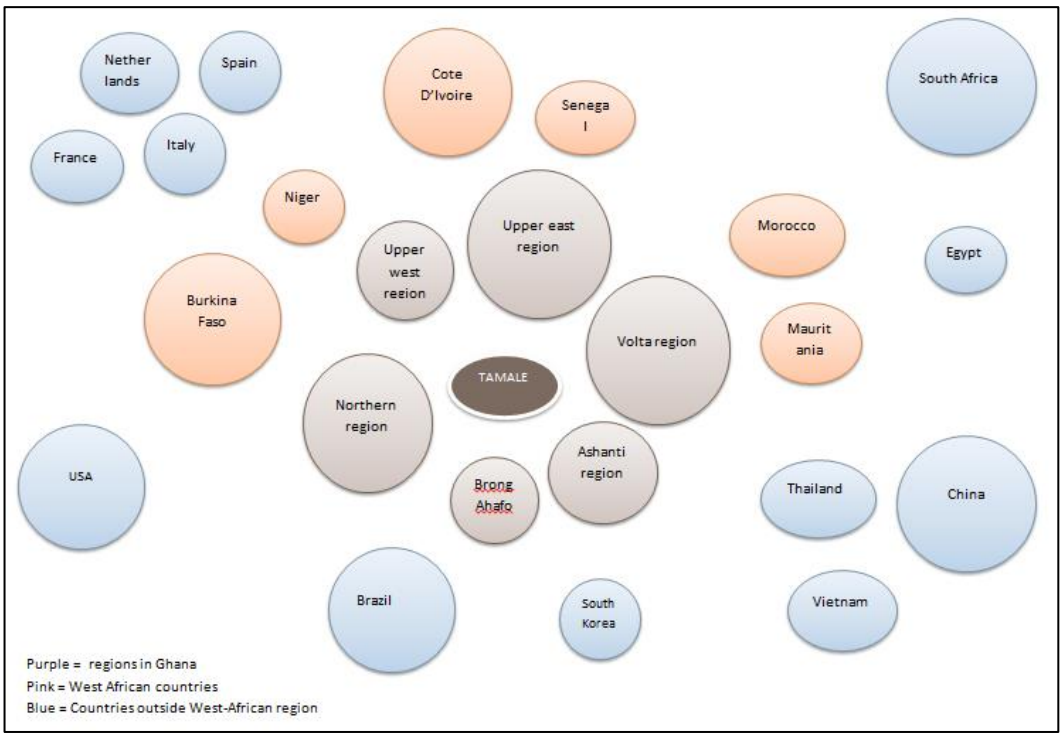
The main source of power supply to Tamale city is the Volta River Authority power substation, established in 1961 under the Volta River Development Act. Its mandate is to operate mainly as a power generator and transmission and distribution utility. The Northern Electricity Distribution Company (NEDco) is responsible for the electricity supply in the Northern regions. NEDco is operating as a private company under the Volta River Authority. It operates at 34.5KV, 11KV and 400V levels and currently provides power to around 350,000 customers among them are businesses, governmental institutions and individual households.

Power cuts and fluctuation are common in Tamale, but it is expected that power supply will improve, due to national investments in the energy sector. For example, in Bui a dam has been constructed which has a capacity to generate up to 400 megawatt, and a photovoltaic solar power plant will be opened in 2015 with a capacity of 155 megawatt. The government has a target to generate 10% of the energy through renewable methods in 2020 (Mensah, 10 2012). Besides, Ghana has some gas and oil fields for future exploitation.

4 The urban food system

4.1 The food network

Food (both processed and raw) is transported from over the world to be consumed in Tamale. Therefore one may say that Tamale city functions as a hub; it attracts food and redistributes it. However, its (re)distribution is mainly internal or to neighbouring places and regions. Little products that are grown or gathered in Tamale Metropolitan District are directly exported outside the country. This section will emphasize the sources of raw food. Only some information in the cereals and meat section from trademap.org includes processed food.. Map 6 displays the origins of the food. The size and distance of the bowls equalize the importance for Tamale's food supply. Large bowls are providing two or more products to Tamale. Situation of the bowls (nearby Tamale or further away) represent the frequency of supply. In the next sections the networks will be specified per product.



Map 6 Origins of food flows toward Tamale

4.1.1 Cereals, roots and tuber

Tamale Metropolitan cereal, root and tuber provision comes mainly from the three Northern regions of Ghana. In these regions maize, groundnuts, sorghum, rice, yams, cowpeas and cassava are grown, see table 2 for an overview. Up till 2009 a positive trend was visible in the yields of maize, rice and yams, while the yields of sorghum experienced a downfall (SRID, 2010). Export figures show that rice and maize are also interregional exported to Cote d'Ivoire, Burkina Faso, Liberia and Niger. Rice is exported up to 1,238 ton and maize is

exported to the quantity of 41 ton in 2011, while the export of sorghum finished in 2008 (trademap.org).

Region	Upper East	Upper West	Northern
Growth in area cultivated	Maize Groundnuts	Sorghum Yams Groundnuts Cowpeas	Rice Cassava Yams Cowpeas
Growth in yield	Maize Rice Sorghum Groundnuts	Rice Maize Groundnuts Cowpeas	Rice Cassava Groundnuts

Table 2 Cereal production Northern region (Odi and CEPA, 2005)

The main product imported in the Northern region from elsewhere is rice. The export quantity of rice has reduced over the last few years while its import has increased. In 2011 543,465 tons of rice was imported from Vietnam, Thailand and the United States of America amongst other countries (trademap.org). The invasion is clearly visible at Tamale market; there is almost no demand left for locally produced rice due to its limited quality, little stones are often found in the rice (interview wholesaler). Currently, local rice is only found inside the old market and is generally sold cheaper than the imported rice, while there are rice wholesalers with good warehouses that provide in rice from foreign countries.

4.1.2 Fish and meat

Animals are an integral part of the household food provision. Cattle, sheep, goats, guinea fowls, chickens and ducks are most common. These animals are in the possession of individual households or communities, and often extensively held. For most part of the year they are left to roam and feed for themselves, especially after the farming season when they cannot damage any crops. In Tamale Metropolitan, sheep and goats are dominating the streets. The free roaming in the city centre raises questions on traffic jams and health related issues, but still, not a lot of nuisance has been reported. The large ruminants are kept in numbers between 5 and 50, while fowls and guinea fowls are kept in numbers between 1 and 130 (Abubakari & Mahunu, 2005).

Intensive cattle and sheep production for commercial purposes is practiced in Aboabu, close to Tamale city, and in other parts of the rural Savannah which houses 91% of the households of Ghana that are engaged in livestock farming (GSS, 2008). An important new initiative is the enhancement of guinea fowl production (intensive battery type poultry) by the ministry of Food and Agriculture in collaboration with the Food and Agriculture Organization. This three year program started in 2012 and has the intention to raise guinea fowl production up to a 100 million in the next three years (Gyebi, 2012). There seems to be a demand for guinea fowl meat in both the domestic and international market.

Fish tends to be the premium livestock consumed among Tamale citizens. The fishes are cached from the White Volta and obtained through Yapei Tamale Port. Not much is known about the fishing methods of the fishermen; however it is quite important that these methods should be examined on its sustainability to prevent deprivation, since the inland fish production is reducing every year since 2007. For 2009 a total production of 70,898 has been measured (SRID,2010). Fish ponds for the cultivation of tilapia have been established in areas like Kamina, Kanvili and Dungu, it is uncertain if they are still in use.

Regarding export and import figures of meat and fish (both fresh and processed), meat is exported towards cote d'Ivoire and Philippines in small quantities up to a value of €3,450 in 2011, while it is imported from mainly Brazil and the United States up to a value of €160,208. Fish is imported up to the value of €173,075 in 2011, main countries being Morocco, Mauritania and Senegal. The export value of fish has been €14,886 with its main markets being Iran, Cote d'Ivoire and Spain (trademap.org).

4.1.3 Fruit and vegetables

The market in Tamale provides a broad variety of fresh fruit to the customers, see table (next page). These products are almost all collected from other regions in Ghana, see chart 5 and 6 (next page). The bananas, pineapples, oranges, limes and papayas are brought to Tamale from large production fields located in either the gold Coast? or Brong-Ahafo area. Sales women refer to this last region as 'Kumasi area', because the settlements where they go to buy the products, belong to the rural surroundings of the urban district of Kumasi. These are Kintampo (population = 176,480) and Techiman (population = 206,856). The watermelons are from a place called Nalerigu in the Northern region close to Bolgatanga (population = 131,550). Also the Mangos are cultivated in the Northern region, due to the efforts of the Integrated Tamale Fruit Company (ITFC) which aim is to cultivate organic mangos, see box 3. Compared to the markets around Kumasi, no passion fruit or avocado have been found on the markets in Tamale. No adequate explanation has been given for their absence.

Some data presented here is derived from export and import figures of fruit in Ghana; the figures contribute to a general idea of the flows towards and from Tamale. Pineapples were exported up to 11,362, papayas up to 831 tonnes and oranges have been exported to the extent of 3,093 tonnes in 2011 (these are mentioned to give an idea of the flows towards Tamale). Guavas and mangoes reached 628 tonnes, while watermelons where only exported to the amount of 1 tonne, all three are grown in the northern region and express flows from Tamale. The watermelons, mangoes and guavas are exported to Cote d'Ivoire, Canada, Belgium and Italy. Grapes were imported up to quantities of 684 tonnes in 2011 from South-Africa, Egypt and the United States of America. And, finally, apples were imported up to 6,983 tonnes from China, Cote d'Ivoire and South Africa (trademap.org).

The integrated Tamale Fruit Company

The ITFC is a private company established in 1999. Owned by both Ghanaian (70%) and Dutch (30%) shareholders, the company's motto was reducing poverty through business development.

In 1999 ITFC tried to build an export cluster of organic mango's according to Porter's theory of competitive advantage. They started with the establishment of a strong nuclear farm (160 hectares, 38000 threes) and several outgrower farms (a total of 2000 projected of about 1 acre and 100 threes), which together would have the potential to export large quantities of good quality mango's, thus guaranteeing continues export in a five years.

Currently, the yields and sales figures are less than expected and the farmers have difficulties to pay off their loan. ITFC is now working close together with the Organic Mango Outgrowers Association (OMOA) to increase their yield. Meanwhile some mango farmers turn towards the production of sheanuts, which seems to be more profitable at the moment.

(Osei, 2008: correspondence mister B. Gandaa)

Box 3 The integrated Tamale Fruit Company

Fruits	Vegetables	
1. Green Apple	1. Alefu	12. Bra/ kinaf
2. Red Apple	2. Bean leaves	13. Shiwaka
3. Red grapes	3. Cabbage	14. Pumpkin leaves
4. Mango	4. White eggplant (garden egg)	15. Cassava leaves
5. Pineapple	5. Sweet Pepper	16. Lettuce
6. Banana	6. Okro	17. Cucumber
7. Lemon	7. Onion	18. Eggplant (purple one)
8. Oranges	8. Hot pepper (adope shito)	19. Spring Onion
9. Tangerine	9. Tomato	20. Green beans (French)
10. Water Melon	10. Carrot	21. Potatoes (local/Irish)
11. Pawpaw	11. Ayoyo	22. Garlic
		23. Cauliflower

Table 3 Overview of fruits and vegetables for sale on Tamale Metropolitan market

Fresh vegetables are sold on the market and in little kiosks on the road in Tamale. The stalls display a wide variety of vegetables, both exotic and local ones, see table 3. Most vegetables, are collected from other regions in Ghana, see chat 6. Visits to production areas in and around Tamale show that especially cabbage, Kinaf, Alefu and hot pepper is grown in large quantities.[1] These crops can be harvested up to five times in a season (for example Alefu five times, and pepper two or three times) and require low input cost in terms of fertilizers and chemicals. The exotic vegetables in Tamale are almost all from Ashanti, Brong-Ahafo or from the upper east, where the soils are more suitable for vegetable production.

Some data has been collected on the export and import figures of vegetables in Ghana. Trademap figures mention for most exported crops in 2011: arrowroot (21,521 t.), onions (1,876 t.) and eggplants (58 t.). While onions, tomatoes and to a lesser extent potatoes are imported from Niger, Burkina Faso and the Netherlands in quantities up to 75,306 tonnes (trademap.org). Carrots are imported from South Africa in small quantities while exported to cote d'Ivoire in larger quantities. Cabbage is imported from South Korea, France and the Netherlands and exported to Cote d'Ivoire and United Kingdom. Especially tomatoes and unions are offered in the little kiosks, probably because Tamale lies on the main transport road from Burkina Faso to the Ghanaian coast which makes transport more

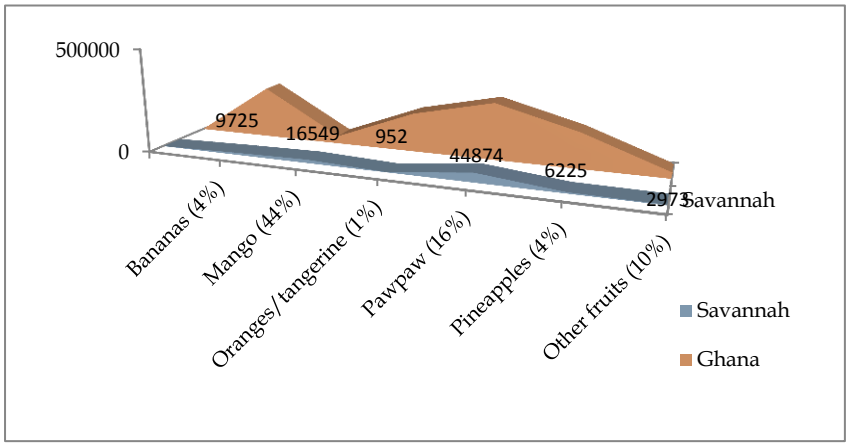


Chart 6 Comparison of produced fruit in Savannah to Ghana (SRID, 2010)

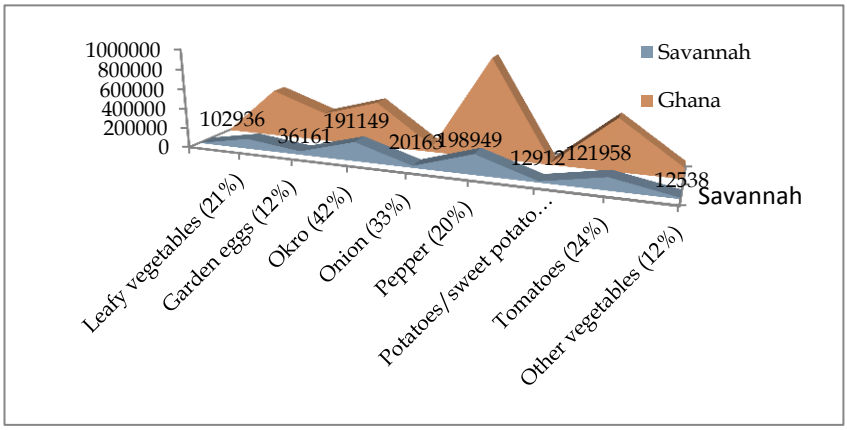


Chart 5 Comparison of produced vegetables in Savannah to Ghana (SRID, 2010)

[1] Alefu and Kinaf are local vegetables. They have both green leaves and look a bi t like spinach. The difference between both of them is the taste and the length of the leaves.

convenient and Tamale markets easy to reach.

4.2 The fresh fruit and vegetable sector

Fresh fruit and vegetables in Tamale are either produced on small plots in the district or transported to the city from other regions. Than they are redistributed, consumed and as waste recycled or dumped at the landfill. Key stakeholders in this process are the farmers who manage their plots individually, farmer associations, sales women and men, consumers, waste collection institutions and the government. The system is further influenced by NGOs, Universities, the government, the tree supermarkets and international supply and demand mechanisms. In the following section the structures and interactions between them are explained by means of an analysis of its value chain. In addition, attention will be paid to the phase of post-consumption.

4.2.1 Production and distribution

The first and second phase of the value chain discuss for the fruits and vegetables 'where it is produced' and 'where it is going'. Here the emphasis will be on the cultivation of vegetables, since fruit cultivation and distribution in Tamale concentrates merely on mangos which is done by the ITFC company through an outgrowers scheme. By contrast the vegetable sector is rather fragmented and not specialized on one product. Therefore it is most likely that its socio-spatial organisation could be enhanced.

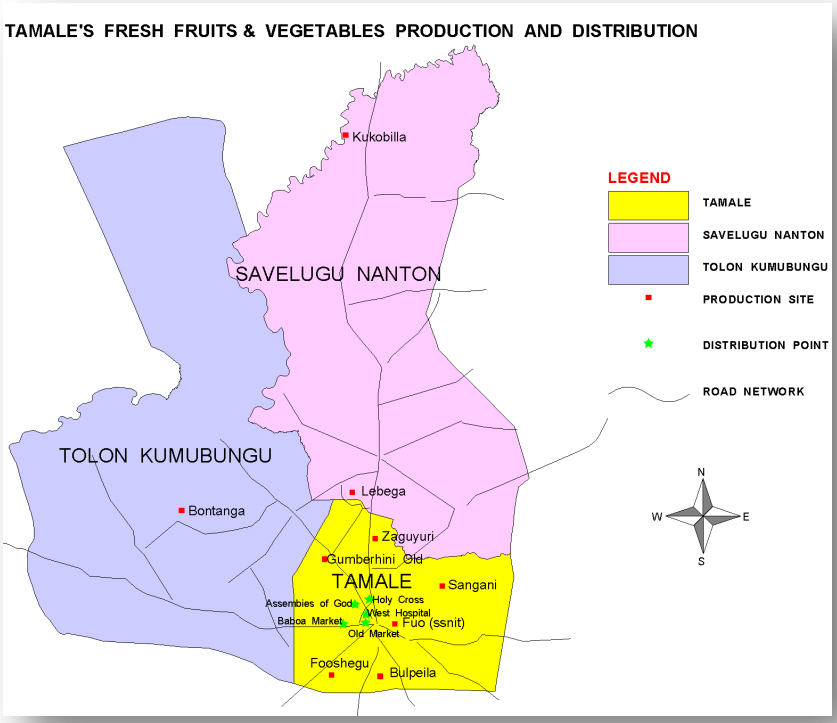
4.2.1.1 Characteristics

The production of vegetables takes place in several production centres in and around the urban core area, see map 1. These areas of production often belong to communities. Farmers cultivating the land either belong to these communities, or are leasing the land from community members. Especially in Lebega (or Libga), near the Lebega dam, several plots are leased-out by community members to businesses (such as the mango-tree production plant). The agricultural land near the dam is endowed with a simple irrigation system which provides water for irrigation the whole year round. Therefore, it is a favourite spot to start a business. The establishment and maintenance of the irrigation system near the Lebega dam is done by government authorities in exchange for joint decision making in land use management. The same construction is found at other productions sites as for example Bulpeila.

The total area for horticulture cultivation for commercial purposes in Tamale Metropolitan is small. In 2010, a total area of 33 to 40 hectares was in use in the core centre of Tamale, while another 70 hectares were considered to be under cultivation in the urban fringe (Kumah, Banful and Abubakari, 2010). Taken together this area accounts for a maximum of 110 hectares in Tamale in 2010. This is 68 hectares less than the total amount of 178 hectares protected agricultural land zoned by the department of Town and Country Planning in 2008 (sites.google.com/site/urbanetghana, 21-02-2013). Considering these

figures two options can be mentioned. Either not all land reserved for vegetable production in 2008 is used for cultivation in 2010, or the land zoned for cultivation is rapidly reducing by 30% annually due to real estate growth. Further investigation into these reasons is however necessary. Some farmers are carpenters in the afternoon, this could indicate that other jobs are currently more profitable than farming in the district. This could point to the first conclusion that land reserved for vegetable is not always cultivated.

Horticulture production is generally done by farmers in addition to arable crop farming or other professions. Fieldwork of UrbaNet in collaboration with the Faculty of Agriculture at the University for Development Studies shows that about 59% of the vegetable farmers are cultivating arable crops in the rainy season while engaging in vegetable production during the dry season. Half of the remaining 40% are primarily active as traders (14.8%), taxi drivers (3.3%) or in agro-processing (2%), while some 19.7% have no additional occupation other than vegetable farming. Out of all the respondents 72% have indicated horticulture as their primary occupation, since they see it as part of their livelihood (Abubakari & Mahunu, 2005). The agricultural sector is generally not considered to be an economic activity with a large potential. Farm plots are held from ¼ up to 1 acre and farmers are not specialized in the production of one commodity.



Map 7 Tamale Metropolitan District's production and distribution places (department of Town and Country Planning)

Agricultural inputs (fertilizers and seeds) are imported from France and the Netherlands (among others), transported to Tamale and there sold on the local markets. These inputs are considered expensive by local farmers and, therefore, other more beneficial methods are in use to sow and fertilize the fields. Regarding seeds, many people try to stock part of the previous harvest which will be used as new seeding material. Also, new seeds are obtained through projects or experiments of NGOs and international development organisations and businesses. With respect to fertilizers, alternatives are used like; animal, poultry and human manure and organic compost. Around 42% of the famers are using chemical fertilizers, while manure is used in 50% of the cases (Abubakari & Mahunu, 2005).

Distribution starts at the farm gate, where local women buy the yields for personal and commercial purposes. Sometimes yields are already bought before harvesting, depending on the demand. This is especially the case with cabbage. In the case of pre-harvest

contracts the commodities are harvested by the market women or their employees, instead of by the farmers themselves (correspondence with farmers at the Old dam, 11-12-2012). It is estimated that around 74% of the farmers are selling at the farms gate, while only 26% of the farmers sell their own products at the market centre (Abubakar & Mahunu, 2005).

Fruit and vegetables outside Tamale Metropolitan District are either transported to the city by truck, car or Vespa-cars, depending on the quantity. Small trucks with tomatoes and oranges have been spotted during research, while Vespa-cars were transporting alefu. Exotic vegetables and small quantities of imported fruits from Kumasi area (Techiman and Kintampo) are collected by car by small entrepreneurs. These entrepreneurs drive at least two times a week back and forth to several destinations up to 3-5 hours (one way) (depending on the supply) and have their fixed distribution points in the city. Map 7 provides an overview of distribution points and production places (ITFC is not included in the map).

4.2.1.2 Organisation of farming

There is only little collaboration between farmers. They manage their own plot individually and do not engage in collective activities on labour (like; watering plants in the morning) and material use (sharing water hoses, buying inputs together). Sometimes groups of farmers do share water bills (if applicable) as well as transport to and from the city centre. Contrary to the individual management of their plots, most farmers in the urban area do consider themselves to be part of an association. These associations are often bound to the production place where they cultivate and consist of traditional community members. They try to function in a broader network (with other communities) to secure their existence in the city. A visit to the old dam production place conceals that they hold UrbaNet responsible for the solidification of the network as well as for defending their position in real estate disputes (visit old dam, 11-12-2012). This seems to be a difficult job since government departments concerned with the position of the farmer as for example MoFa and the department of town and country planning have limited capacity and are hard to mobilize.

UrbaNet has a three-tier management structure with a General Assembly, an Executive Board and a Secretariat (sites.google.com/site/urbanetghana, 21-02-2013). The General Assembly is the highest decision making body and consists out of 'as many representatives as associations of the Network', thus currently more than 41 members. It gathers once a year to discuss the direction that the network should be going. The Executive Board consists of members of the General Assembly and should be rotated every four years. The Secretariat implements decisions taken by the General Assembly. Due to several changes in the key objectives and activities of the organization during the last ten years one may question if this structure still holds. Little is known about the effectiveness of the General Assembly and the transparency of the Executive Board. Its website does not display names of the members of the General Assembly, nor does it display the previous and former members of the Executive Boards.

The government of Ghana, international development organisations and universities have worked together to improve the competitive advantage of the sector. In this, the cultivation and processing of red pepper has received some attention over the last few years. In 2009 a training was organised by the Ministry of Food and Agriculture (MoFA) and the Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIS) in the farming community of

Fooshegu. Two trainers of the University of Development Studies assisted the community in practising agriculture to reach higher quality standards. The training was part of a larger programme in which the northern pepper farmers were assisted in producing high quality pepper for both national and international markets. It explored the possibilities to develop an export cluster. Unfortunately, at times of the fieldwork there were no pepper growing activities going on in Fooshegu, although it was supposed to be the season. Therefore, it can be concluded that the training did not have a long term impact despite its immediate results and outcome; the enhanced capacity of farmers for increased yield and quality of chilli pepper were effective in 2009 (Nyarko & Abubakari, 2009).

Aside of this apparently failed attempt, communications from University lecturers and professors show that there is a good interest in these kind of collaborative programmes (visit UDS campus Nyankpala, 4-12-2012).

4.2.1.3 Organisation of trading

Trade enterprises operating the supply of fruit and vegetables for Tamale Metropolitan District are not bound to a geographical location but to commodities. For example: if an onion trader from Bolgatanga knows that there is a large demand of onions in Accra, while in Tamale there is sufficient supply, it will transport its goods to the Accra market to gain more profit. This implies that the trader becomes more and more dependent on his network to provide him with the right information, instead of his geographically nearby markets. In this case a trustworthy network is highly important. For that reason these networks are often built along ethnical or family lines, through transparency in information sharing and long-lasting relationships, less so through associations or unions.

The trading networks active in Tamale Metropolitan District function for a large part in the informal sector. They are not registered at the Ghana Revenue Authority and are not provided with protection for any losses of goods during the trading process, nor are they subsidized by the government. This makes the food industry a risky business. Fortunately, trading has become more reliable and effective since 1995, with the privatization of Ghana Post and Telecommunication Cooperation. Since then, there has been a sharp increase in the use of mobile phones, which makes the trading process easier to manage. As Overa (2006) says, 'Telephones have enabled traders to better match rural supply and urban demand and to coordinate a larger number of activities, employees, and cooperation partners'.

The mapping of all wholesalers and wholesale retailers that manage the flows of goods towards Tamale is beyond the reach of this investigation. However, one can generally exclude the wholesalers that are focused on the export in this network. Large wholesalers as Companie Fruitière and HPW usually have fixed contracts with few producers that are solely producing for export purposes, leaving domestic markets for smaller businesses (Jaeger, 2008). ITFC is the exception in this, since it also produces for domestic markets (Osei, 2008). Another characteristic of these flows is that oranges, watermelons and tomatoes are transported in large qualities to Tamale. They are distributed on the wholesale market Aboabo. In contrast, apples, grabs and exotic vegetables are gathered in smaller quantities by retailers and distributed at special places in the city.

4.2.2 Processing

Picture 2 Open air vegetable store (the pineapples are from another saleswoman)

Three processing activities for fruit and vegetables that serve domestic commercial purposes were found during fieldwork in Tamale; the processing of banana or plantain into chips, the processing of mango into chips and the processing of chili pepper into sauce. In addition, chili powder of Ghanaian origin was found, which is produced in Sunyani outside Tamale Metropolitan District. The processing seems to be limited to the harvest season. There were no mango chips available during the two months of fieldwork, since the harvest season was to be started in January. A fieldtrip to a (rice) processing community showed that most rice processing is done manually. The public debate among Tamale citizens therefore strongly evolves around principles of hygienic processing as well as distribution and production (own survey, 2013).

Processed fruits and vegetables of other origins were also available in supermarkets and local stores. The most prominent among them were frozen vegetables, fruit juices from South-Africa and tomato paste from Italy. Especially the tomato paste is notable, since the Upper East and Brong Ahafo region have a tomato processing factory. These factories recently closed down since they could not compete with foreign prices. Limited domestic yields and high demand made the tomato price in Ghana above the breakeven point for processing for most time of the year, given the prices of imported tomato paste from elsewhere. The restrictions by international agreements on the implementation of import tariffs prevented Ghana to protect its own production industry (Robinson and Kolavi, 2010).

In addition, some support is given to small processing businesses by NGOs and international development organisations/banks. UrbaNet and Actionaid run a microcredit scheme in which they provide small loans to beginning entrepreneurs for example. Also, free tax zones are established for processing plants that tend to export their products without interference of a wholesaler.

4.2.3 Retailing

The distribution of fresh commodities to consumers is done by small retailers, petty traders and street hawkers. These traders are mainly women, operating by so called 'Magazias' or Queen Mothers. They act as negotiators in conflict between traders. Generally a saleswoman is specialized in fruit, local vegetables or exotic vegetables. Trading is done in informal settings; throughout the city open stores are built on which the commodities are displayed, see pictures 2 and 3 (next page). What is being offered depends on the season, supply and

Picture 3 open air fruit store

also on the demand. Fieldwork shows that a demand made for bananas was complied with the next day.

There are two markets in Tamale where commodities are traded, the old market in the central business district of the city and the Aboabo market, situated just outside the central business district and easily reachable by wholesalers. Both markets are overloaded, haphazardly built with narrow aisles and almost no air circulation, see picture 4. Consequently a lot of traders are quartering on the cycle pads and sidewalks of the main roads selling their goods, see picture 5 (on next page). This causes traffic congestion in the city centre and simultaneously shows the spatial division of the market. Fruits and exotic vegetables are sold on the right side of the road from Quality First up to the traffic light, while local vegetables are sold on the back sight of the Vodafone tower, near the trotro station.[2] In 2010 UN-Habitat has proposed to reform these two markets to stimulate the trading capacity of the city. Unfortunately no changes have occurred yet (Abankwa et al., 2009).

There are three large stores in Tamale that function as a supermarket; Quality First, Foresewhole Shopping Centre and Melcom. These supermarkets do not sell fresh fruit and vegetables yet. They consider it too risky due to its fast perishability in combination with the limited storage facilities they have (interview marketing manager of Quality First, 10-12-2012). They do sell processed fruits and vegetables though and it is not unlikely that they also start selling fresh food in the near future as well (interview marketing officer of Melcom, 10-12-2012). The supermarkets have their own suppliers. It depends on the products if they are presented and brought to Tamale or gathered from Accra by the supermarket itself. Their supply system varies from once a day to three times a week.

Picture 4 Entrance to old market of Tamale

4.2.3.1 Market prices

Fruit and vegetables are sold on the market in standard quantities: tomatoes and onions are sold in

[2] A trotro is a small bus (15 seats or so). It is the public transport of Tamale besides taxi's and large busses.

cans of different sizes, alefu and ayoyo are sold in bunches, bean and pumpkin leaves are sold in bowls, sweet peppers and carrots in satchels of three or four, pineapples, oranges and papayas are sold per piece.[3] Since fruit and vegetables can differ in size and these quantities are not quite precise, the general rule is that one pays more if the fruit or vegetable tends to be big or fresh and less if they are small and withered. So, there are no fixed prices.

Picture 5 Sales women on pave way

During the survey, the consumer was to estimate the sales prices of fruit and vegetable commodities in the off- and on (low and high) season in an attempt to discover the difference between the seasons, and the added value (in terms of highest profit) along the chain. Results on this question differ largely, since respondents were not familiar with the prices of all commodities. Also, to calculate the added value, one must have all the input and wholesale prices and costs which was quite difficult to obtain since farmers and retailers were not keen on talking about prices. Therefore this question has not been processed. However to be able to form a general idea on the establishment of the market prices, a price-markup has been calculated for one commodity, namely the carrot , see table 4 (next page).

The carrot has been indicated as a crop with potential by the farmers, although they are being stolen frequently by kids during production. The estimation has been based on the following assumptions: the carrots have been planted in rows with 4 cm between the plants and 30 cm between the rows on a bed of 30 m2. The input for this bed has been two containers of seed 100gr (40 GHS), and the profit was 170 GHS according to the farmer, which means a sales price of 210 GHS (visit to old dam, 11-12-2012, the farmer has not included other production costs in his answer, but these are included in the calculation). The input is quite high compared to the advised input namely 12 gram for 30 m2 (dezaden.nl), which indicates a lot of un sprouted seeds. According to this calculation the mark-up increases most in the sales price of the retailer (82%). The added value (in terms of highest profit) may be calculated once the costs are certain and deducted of the sales price.

[3] Ayoyo is also alocal vegetable, similar to kinaf and alefu.

Actor	Costs (GHS)	sales price for one carrot (GHS)	Price-mark up (%)	Volume
Input supplier	production & transportation costs	0,017	3%	100 grams seeds is 20 GHS (0,09 gram is needed for 1 carrot)
Producer (self-employed without personnel)	0,017 + chemical & water costs	0,1	15%	210 GHS for one bed +/-30 m2 of production grounds (2250 carrots)/ seeds input was 40 GHS thus 200 grams
Retailer	harvest labour + transportation costs	0,65	82%	3 carrots = 2 GHS (low season)
Consumer	n.a.	0,65	100%	1 carrot

Table 4 price-mark up carrots rough calculation

4.2.4 Consumption

During fieldwork no information was available on the demand of fresh fruit and vegetables. A survey has been conducted as a first attempt to fill this gap. In this paragraph the main findings will be discussed.

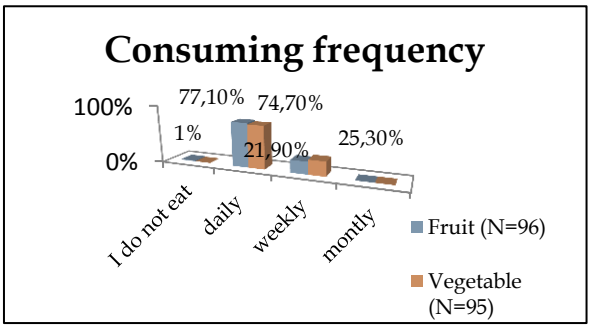


Chart 7 Consuming frequency of the respondents (N=96, N=95)

4.2.4.1 Consumer behaviour

96.9% of the respondents know that fruit and vegetables are considered to be good for one's health, that is why almost all of them are including fruit and vegetables in their diet. Only one per cent has indicated not to eat them, see chart 7. Furthermore, three quarters of the respondents indicated to consume fruit and vegetables every day, while only one quarter has a more weekly oriented diet of fruit and vegetables.

Meals are eaten two or three times a day. Breakfast and dinner are generally eaten at home, while lunch is eaten outdoors or at work, see chart 8. Outdoor restaurants serve a large variety of basics like rice and kenke, with sauces and meat or fish. Vegetables are added in small quantities either in the sauce (alefu/ayoyo) or as a side dish (cabbage, carrot, tomato, lettuce). Fruit is eaten additionally to breakfast or as a snack. The chart only partially displays buying behaviour since

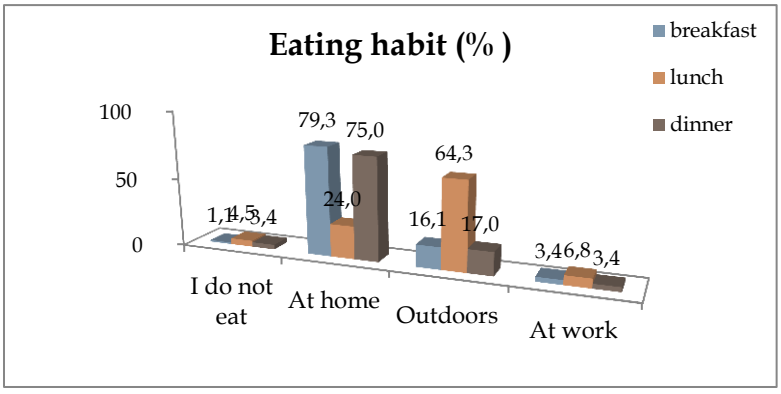


Chart 8 Eating habits of the respondents (N=87)

meals can easily be bought by street vendors and brought to home or work for consumption.

When one considers the information channels, the respondents were mainly informed by books, articles or TV on the value, preparing and cooking of vegetables and fruit, see chart 9. Although books and TV were mentioned mostly at first, second and third answers mainly included radio and family members and friends. Thus, one can say that all information channels are used.

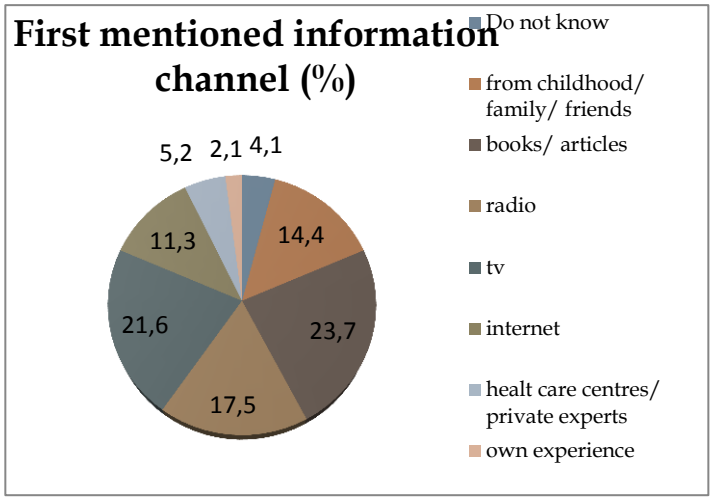


Chart 9 Information channels used by the respondents (N=97)

Questions on weekly expenditure on food, fruit and vegetables for an average household of 5 persons show an expenditure of 47 GHS on food of which 9 cedi on fresh fruit and 10 cedi on fresh vegetables (N=92). Consequently a household spends 40% of its weekly food budget on fresh fruit and vegetables, which means a weekly expenditure up till 3.80 GHS per household member on fresh fruit and vegetables (calculated with the median figures, thus reducing the outliers, it will be 36% and 3 GHS). Translating this into quantities, it could be for example; one pineapple or three sweet peppers or six bunches of alefu or ayoyo per person per week, depending on the season.

Considering an average income of 750 Ghana cedi per month (28 days) per person (the average of the three income categories, with the last category being 1,000-1,500 GHC) the monthly expenditure on food is less than 5% (47/5)*4 = 37.5/750 = 0.05) of the monthly income of one person. This means that the expenditure on fresh fruit and vegetables will be around 2% of a monthly income of one person in Tamale. It should be noted that I could not compare these income categories with other income figures, thus this calculation is an estimation.

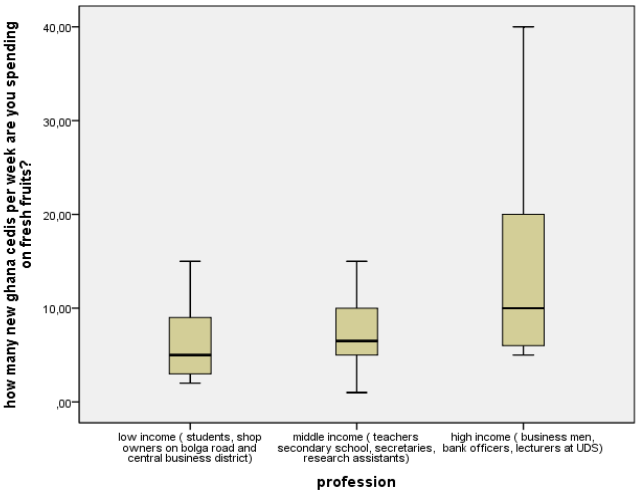


Chart 11 Boxplot on fruit expenditure of the respondents (N=96, Rho=.392, p=.000)

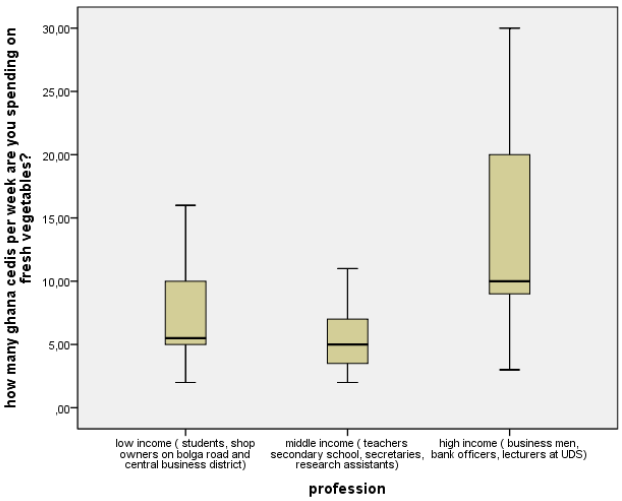


Chart 10 Boxplot on vegetable expenditure of the respondents (N= 96, Rho=.229, P=.038)

When one considers the weekly expenditure on fruits and vegetables according to income groups, one sees that in absolute terms the high income group is spending significantly more (double?) than the low and middle income groups, while the low and middle income groups are spending nearly the same, see chart 10 and chart 11 (previous page). Furthermore, persons with a high income tend to vary more in expenditures on fruits and vegetables then low and middle incomes.

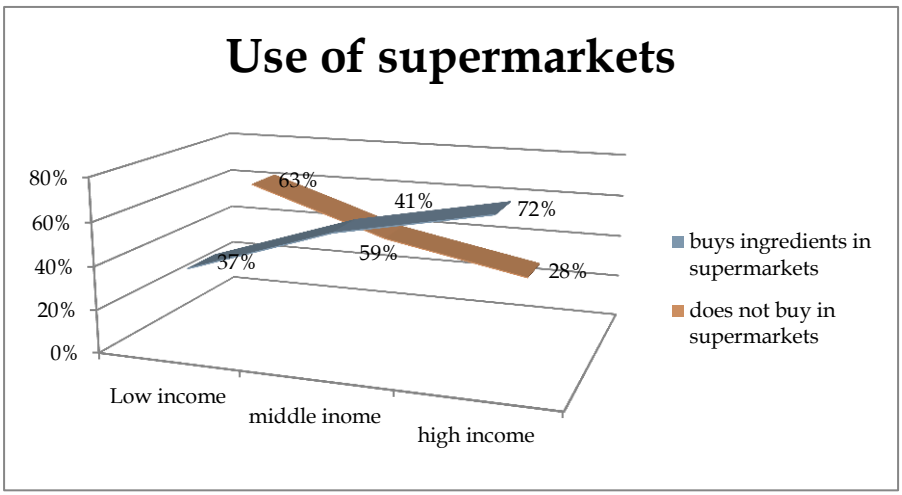


Chart 12 Use of supermarket by the respondents (N=78, X2= 6.87, V=0.297, p=.032)

Fresh fruit and vegetables are bought at local markets (Aboabo and old market) and in local stores. They are not yet bought in supermarkets since supermarkets only provide frozen vegetables and fruit juices, leaving the trade in fresh food to the local petty traders. However, it is expected that this will change in the near future. Chart 12, shows that basic ingredients are already bought in supermarkets by low, middle and high income groups. Besides, more people with a higher income tend to buy in supermarkets than people with a low income. Low incomes have indicated the local market as their main place to buy fruit and vegetables (own survey, 2013). Therefore, if income increases and when supermarkets decide to engage in fresh fruit and vegetables sale, it is most likely that fresh fruit and vegetables will be substantially bought more in supermarkets than local markets.

4.2.4.2 Demand

There is a large interest in diversifying one's diet with fruits and vegetables among Tamale citizens. Almost 80% (N=96) answered in favour of increasing the amount of fruit in one's diet, while even more (97%) agreed that they would like to increase the amount of vegetables. However, the willingness to pay an additional part of their income for fresh fruits and vegetables, if

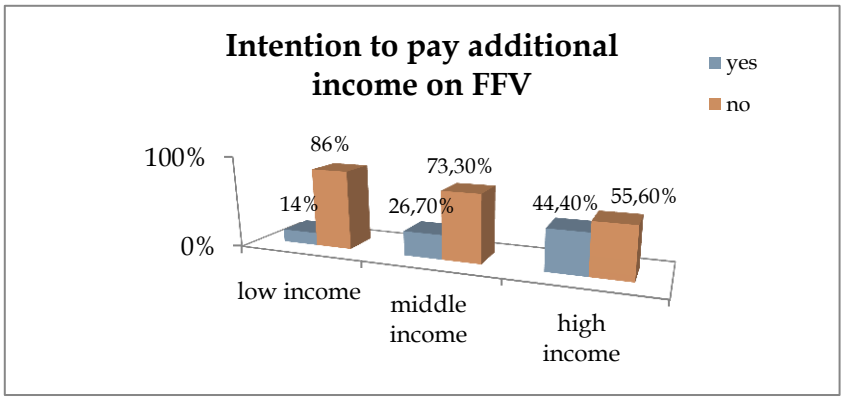


Chart 13 Intention of the respondents to pay additional income on FFV (N=91, x2=6.587, P=.037)

income increases, has been answered negatively. Some three quarters of the respondents answered that they were not interested in spending additional income on fresh fruits and vegetables. Noticeable is that respondents with high incomes were more obliged to spend a part of their additional income on fresh fruit and vegetables than lower incomes, see chart 13 (previous page). Still, 75% has indicated to have no interest in paying an additional part of their income on it. Further investigation on price fluctuation and buying behaviour may be of use to gain insight if Tamale citizens cut short their consumption of fruit and vegetables when prices increase or that they will pay a higher price for the same amount.

Nowadays, oranges, bananas, water melons, pineapples and to a lesser extent mangos are the main markets considering fruit demand. These fruits are consumed in all income categories, see table 5. If one analyses the two most mentioned preferences of the consumer, it seems that there is almost no possibility to expand the market for oranges, while there is some growth potential for bananas, water melons and mangos. Novice is the papaya, chosen among 75% of the respondents with high incomes.

	Most frequently eaten fruit (N=93)				**Preference in fruit to increase ones diet (N=60) (10 indicated more than 4 options and are therefore not included in N)**			
	1e	2e	3e	4e	1e	2e	3e	4e
Low income	Oranges (93.2%)	Banana (69.2%)	Pineapple (38.6%)	Mango (56.8%)	Banana (64.5%)	Mango (61.3%)	Pineapple (54.8%)	Water Melon/ oranges (51.6%)
Middle income	Oranges (90%)	Banana (76.7%)	Pineapple (63.6%)	Water Melon (50%)	Banana (76.5%)	Water Melon (58.8%)	Pineapple (52.9%)	Oranges (47.1%)
High income	Oranges (68.4%)	Banana (68.4%)	Water Melon (47.4%)	Pineapple (36.8%)	Papaya (75%)	Water melon(66.8%)	Green apple (41.7%)	Mango (41.7%)

Table 6 Demand in fruit (N=93, N=60)

	Most frequently eaten vegetables (N=95)				**Preference for vegetables to increase ones diet (N=58) (11 indicated more than 4 options and are therefore not included in N)**			
	1e	2e	3e	4e	1e	2e	3e	4e
Low income	Cabbage (47.7%)	Okro (45.5%)	Ayoyo (43.2%)	Tomato (36.6%)	Cabbage (43.3%)	Tomato (40%)	Alefu (36.7%)	Okro (36.7%)
Middle income	Cabbage (59.4%)	Tomato (53.1%)	Okro (40.6%)	Carrot (34.4%)	Carrot (50%)	Tomato (43.8%)	Lettuce (37,5%)	Ayoyo (31.4%)
High income	Cabbage (47.4%)	Tomato (42.1%)	Garden Eggs (31.6%)	Alefu (31.6%)	Cabbage (41.7%)	Cucumber (41.7%)	Lettuce (41.7%)	Sweet pepper (green ones) (33.3%)

Table 5 Demand in vegetables (N=95, N=58)

Most frequently eaten vegetables are cabbages, tomatoes, carrots, garden eggs, okro, ayoyo and alefu. Low income respondents tend to eat more traditional vegetables than respondents with high and middle incomes, see table 6. Some commodities have also shown the potential to expand their markets. When one analyses the two most mentioned preferences for vegetables one can see that cabbages and tomatoes are the most desired.

Regarding health concerns the following can be concluded. 50% of the respondents indicated the use of waste water, chemicals and unhygienic treatment by sales women as a problem in the fresh fruit and vegetable sector of Tamale (N=98), but only 16% (N= 86) answered that they preferred crops from the upper-east region and Ashanti region (including Brong Ahafo) because of these problems. More than 75% (N=86) had no preference for another area of crop cultivation. Thus the use of waste water does not seem to influence the demand of fruit and vegetables in Tamale to a high extend. In addition, the use of chemicals seems to have a far higher impact, 57% (N=95) favoured organically grown crops which are considered better for your health because they avoid the use of chemicals and potential residues inside. One fifth of the respondents (N=85) indicated to wash their vegetables with vinegar or cook them before consumption, while they peel their fruits as a solution.

Backyard and schoolyard vegetable growing takes place in Tamale for personal consumption and commercial purposes, and thus influences the demand on local markets. Vegetables known to be cultivated often in backyards are: alefu, bean leaves, cabbage, white eggplant, sweet pepper, okro, onion, hot pepper, tomato, carrot, ayoyo, bra/kinaf, shiwaka, pumpkin leave and cassava leave (correspondence, Abubakari, 4-12-2012). Fruits are also harvested for personal or commercial purposes from fruit trees that are grown in the wild, like the dawadawa and mango tree.

5 Effective management of the food system

In terms of food security it may be desired to raise yields and strengthen the trade networks of the city for a balanced distribution, as well as to reduce food spoil. This section will narrate on constraints and possible improvements in the system considering these measurements. In the second part of the chapter some attention will be paid on the clustering of food chains.

5.1 Constrains and possible improvements for the fresh fruit and vegetable sector

Yields could be raised by innovation in horticulture techniques but also by changes in the organisation of the production process. For example, shared plots and activities could raise productivity and the total square meters of arable land, it may reduce input costs, which could result in higher -and more competitively produced- yields which may result in lower prices. However, a key aspect is the trust of one farmer in the responsibility of associate farmers to perform correctly all activities needed in the process, from watering plants up till the completion of yield sales and production costs. Therefore it is important that the management of the area is done by the association itself, that there is a transparent accounting and that labour hours and profit are equally shared. This change in organisation could be implemented through the farmer associations that generally consist out of farmers from one and the same production area and community In addition, the warranty of land titles may stimulate production because it secures possession, and the expanding of arable land will contribute to more yields.

The lack of joint workforces in the production part of the system seems to contrast with the trading section that has organised itself in groups to harvest and sell under one magazia, or in the case of wholesalers depend on their informants from other areas. Since the Metropolitan District depends on this trading process for their food it may be wise to invest in this sector. As shown by a report of UN-HABITAT this could be done initially by revitalizing the old market and Aboabo market and thus by making more space for trade both local and from the Northern neighbouring countries (Abankwa et al., 2009). One should be aware of the changes that may occur in the system once supermarkets will start to sell fresh fruit and vegetables. It will most likely result in a loss of jobs in the informal sector than will be created in the formal sector, since supply networks will be organised more cost-effectively. Therefore, if one decides to create more space for trade in the district it should consider to minimize undesired effects by stakeholder collaboration in which both supermarkets and petty traders are presented.

On the subject of processing plants, most plants are not processing year round and work manually. This causes concerns on hygiene in the domestic markets. It would be good for demand and supply to reduce these concerns. This could be done by the introduction of new processing techniques that require low costs. Workshops on hygienic processing as, for

example, use of clean water, proper cleaning of material and use of plastic gloves and hairnets could be ventilated both at the production plants and public discourse. The district may consider to specialize in processing of agro-food. This would attract both goods and business towards the city. The sharp competition with foreign industries should however be investigated to search for the profitable niches for investments.

It is important to keep demand of fresh fruit and vegetables stable (in terms of actual expenditure on fresh fruit and vegetables and not the need for it) or even increase it. An increase in demand will stimulate trade and thus the flow of goods towards the Metropolitan districts. It will prevent producers and retailers from turning towards other markets directions, thus decreasing the districts food supply. Stimulation of demand could be done through public discourse. Note that, ventilating these thoughts may also raise fresh fruit and vegetables production by individual households, which should be cheered once food insecurity is at stake.

Improvements can also be made in the post-consumption level of the system. The reduction of crop failure and post-harvest losses through the use of fertilizers and storage facilities could contribute to reducing the spoiling of food. Also paper or textile packages could be reused and replace plastic packages, which will immensely reduce the amount of plastic waste in the city. This practice could be stimulated through public discourse. And, organic waste as well as sludge could be recycled into compost for arable land as is already practised in the district. Figure 4 explains this circle. The urban waste is processed to compost, if the processing is good and the compost is of quality, it may become used as fertilizer for industrial purposes. This will raise the demand and in turn the processing of waste in compost. Critical in this concept is that the production process needs to comply with the requirements of the industry in terms of capacity and quality. The product needs to be campaigned to establish itself as a substitute for well known fertilizers that are available on the market.

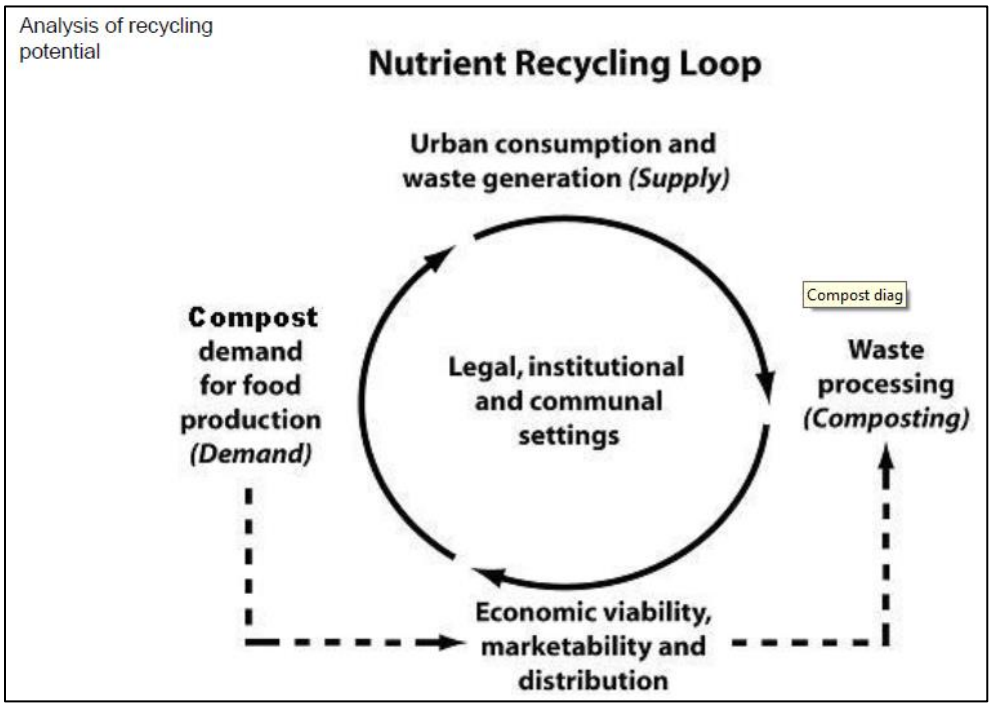


Figure 5 Nutriënt Recycling Loop (WASH ALLIANCE)

4.2.5 Post-consumption

Every phase in the fresh fruit and vegetable system generates a certain type of waste which should be managed to keep the district liveable. Horticulture cultivation and processing produce spoiled food (post-harvest losses), crop waste, hazardous waste (e.g. pesticide) and processing by products. Distribution and retailing are generating food waste and packaging waste (plastic, cardboard etcetera). The consumers produce food waste and off course sludge and contributes to the amount of packaging waste. Besides, the institutions in the post consumption phase produce exhaust fumes. The use of plastic packaging, food waste and the production of sludge are directly threatening the liveability of the area.

In principle the Waste Management Department of Tamale and the Metropolitan Assembly are responsible for the disposal facilities on neighbourhood level and accurate state of the landfill. ZoomLion Ghana Ltd. is responsible for the accurate waste collection. However both institutions have shown that their capacity is insufficient to manage the urban waste in an accurate way. According to a survey done in 2010, disputes between ZoomLion and residents existed about collection frequency and payments. Also, the presence of bins and skips in the city were infinitesimal while the landfill was not working properly (Puopiel, 2010). In 2012 48.82% of the total budget of the Metropolitan Assembly was spent on waste management in order to secure the liveability of the city. It has been, by far, the largest amount spent, see table 7.

NO	SECTOR	AMOUNT (GH¢)	PERCENTAGE (%)
1	CENTRAL ADMINISTRATION	3,463,119.00	28.20
2	EDUCATION YOUTH AND SPORTS	1,355,435.00	11.20
3	HEALTH	474,630.00	3.92
4	WASTE MANAGEMENT	5,908,600.00	48.82
5	AGRICULTURE	630,780.00	5.21
6	PHYSICAL PLANNING	212,635.00	1.76
7	SOCIAL WELFARE AND COMMUNITY DEV'T	1,091.00	0.01
8	WORKS	6,278.00	0.05
9	TRADE INDUSTRY AND TOURISM	51,235.00	0.42
10	URBAN ROADS	50,100.00	0.41
	GRAND TOTAL	**12,153,912.00**	**100**

Table 7 Key focus areas of Metropolitan Assembly (Metropolitan Assembly, 2012)

Sludge and food waste are often directly recycled in the horticulture sector. Dried sludge and composted organic food waste are used as fertilizer for soils.

5.2 Food cluster development

In the previous section an overview is given of possible improvements to professionalise fresh fruit and vegetables supply mechanisms. This overview does not address the clustering of all food chains. Therefore in this section the possibility for establishing an agro-park in which food chains are clustered. have been roughly explored An examination of Tamale's business environment has been conducted to discover its potentiality for establishing an operational industrial cluster as the agro-park. In addition, some reflections on the socio-spatial consequences of such a park for the Metropolitan district will be added to give a some idea of potential long-term effects and to encourage further research.

5.2.1 The current business environment

If one examines the preliminaries for building a successful business environment, see box 4, it appears that some conditions in the Tamale's surroundings are not yet capable to fully support High-Tec innovations.

Local labour in Tamale is sufficient although its level of education is quite low. This, and the fact that the University of Development Studies has limited capacity to upgrade their knowledge, are responsible for a limited knowledge infrastructure and skilled labour presence. For example, internet facilities are limited accessible for students and teachers, and there is little capital available for new research or the update of materials.

Furthermore, technological infrastructure as electricity, water supply and recycle mechanisms are not yet reliable; power cuts and voltage changes on the energy network occur on a weekly basis. In addition, water security seems to be at stake and land is increasingly less available. Land that is available, though, does not seem to be suitable for vegetable production. Thus, both the technological infrastructure and the natural resources are limited available. Specialized inputs are obtainable, but most of the times need to be imported from other places at a price.

There is a presence of locally based suppliers for the domestic market in Tamale Metropolitan District. Generally, they are not capable to guarantee large quantities and high quality when asked for instantly and in fluctuating quantities. Therefore, related industries as restaurants and hotels are sometimes relying on their own suppliers. Sometimes, these suppliers come from other regions, since agro-food is gathered from the neighbouring regions. In addition, competition is rising in the related industries, seeing a growth in numbers and size and may be called vigorous between the small petty traders on the old market. However, only limited competition was found among farmers. Their entrepreneurial skills could be improved.

And lastly, domestic demand seems to be limited according to the results of the survey on fresh fruit and vegetables in this research. These results should, however, be followed up by comparative analysis to compare them with demands elsewhere.

One could speak of one product specialized and leading firm in the mango-export industry of Tamale's surroundings.

Porters conditions for establishing a cluster

A local environment that encourages appropriate forms of investment and sustained upgrading can be reached when:

5. There is local labour, capital and natural resources, physical, administrative, information and technological infrastructures; specialized inputs
6. There is a presence of capable locally based suppliers and competitive related industries
7. Vigorous competition among locally-based rivals, and one leading firm (in case of export)
8. Sophisticated and demanding local customers, specialized local demand, Customer needs that anticipate those elsewhere

(Martin and Sunley, 2003, p.8)

Box 4 Porters conditions for establishing a cluster (same as box 2)

5.2.1.1 Attempts of export cluster development in the fresh fruit and vegetable sector

Two attempts to implement a competitive export cluster are on-going in Tamale's surrounding area. The first attempt concentrates on mango cultivation in the Nanton district (neighbouring district) near Savelugu

(Tamale Metropolitan District). The second initiative concentrates on pepper cultivation in Fooshegu (Tamale Metropolitan District). In Savelugu ITFC operates a mango out growers scheme with one leading firm and several smaller firms. It has a mango processing plant for processing them into chips for the local market (10-20% of the yields) and tries to build an international network for mango export (80-90% of the yields). In Fooshegu GIS and MoFa stimulate the pepper farmers in the district to produce high quality pepper for both local and export markets. The supporting organisations organised a training explaining production methods and irrigation as well as local market entry principles in 2006. This training was held by trainers from the University of Development Studies. The direct results were promising. Currently, more investigation on the pepper value chain is being conducted.

Both attempts tried to strengthen the business environment and paid attention to the establishment of a local network. ITFC presented an out growers scheme to include local farmers in its production and distribution process and collaborated with the Ghana Irrigation Development Authority (GIDA) on water irrigation out of the Lebega dam (Namara, 2011). The GIS and MoFa made use of UDS' knowledge to train farmers and connect them to related industries in the area. Unfortunately, little insight information was found on the frequency of interaction, trust and collaboration have been discovered during the fieldwork. However, it may be mentioned that both initiatives have suffered of which the cause seems to be management related. The ITFC struggles with low yield figures, and loss of out grower farms to the production of sheanuts. From the targeted 2000 out growers in 2007, only 1,200 are still engaged in mango productions (MIDA at mida.gov.gh). The reason for the low yields is uncertain. The Mofa/GIS training resulted in zero to low productivity among the farmers on the long term. At the time of fieldwork no peppers were produced in Fooshegu. No reason could be given, but one reason could be that farmers did not sufficiently focus on market entry strategies or that there has been insufficient demand among related businesses.

5.2.2 Suggestions for sustainable upgrading

The District's environment seems to be not yet fully capable of supporting the technological skills, biological knowledge, sufficient financial capital, rich natural resources (power/water etc.), required markets and the advanced management structure required for the operation of these agro-parks. It is thus doubtful if high-tech innovative firms like an agro-park, will be operational on the long term under the current conditions in Tamale Metropolitan Area. If one would like to pursue sustainable development the following actions may be considered to make the local environment more competitive:

1. Search for financial flows for investments
   For example: examination of tax system on possible improvements, examination of government expenditure on possible improvements, search for private investors or development banks
2. Sustainable management of natural resources to prevent water insecurity, (potential) fish deprivation

For example: investments in water filter systems, increase consumer awareness on sustainable use of resources, promotion of the use of sustainable fishing methods, fish quota (this should be further investigated),

3. Innovation in sustainable energy and water supply and transparent land allocation strengthen the technological infrastructure and to make these more reliable and accessible for all citizens

   For example: investments in solar energy and desalination methods, lobby for land allocation to citizens of the Northern region (it is advised to maintain the open spaces in the urban area for recreation or communal horticulture production)

4. Investments in agro-economic innovation in surrounding rural areas to support locally based rivals and create an agglomeration of competitive firms and related industries

   For example: reorganisation of agriculture and horticulture production process, technological innovation, increase awareness on sustainable use of resources and knowledge of healthy food production techniques. Promote linking local farmers, improve extension services, investment in trade and food processing facilities,

5. Investments in knowledge centres to strengthen the knowledge infrastructure

   For example: upgrade academic facilities

5.2.3 Remarks on socio-spatial consequences of clustering food chains

At the moment food is transported from Tamale's surrounding rural area to its urban district. The urban centre functions as a market and distribution area for flows of goods that are produced in the hinterlands. These flows of goods may change when an agro-park is established in the urban district and this may have consequences for the socio-spatial organisation in the Metropolitan District. If one analyses the situation from Tamale's mono-centric position in the Northern region, agricultural production and distribution may centralise. Therefore the city may start to operate more on its own, abandoning the networks with the surrounding area. It may also be that it will affect global networks.

furthermore, one may would like to consider the effects that these parks can have on the water and power supply of the urban region. Although the parks are developed to make use of water and energy in a sustainable way, the water and energy capacity required for the operation of these parks can still be a heavy levy for the existing water and power supply in Tamale District and negatively affect supply to Tamale citizens. These issues should be further investigated because too little attention has been paid on the use of these natural sources in the agro-park concept.

And lastly, it is not certain that the clustering of food chains will serve as a solution for potential food insecurity in urban areas. As has been mentioned in the first chapter, the cause of food insecurity seems to be not only a case of yield production but also of unequal distribution. Therefore one could also not be certain that these park will alleviate the withdrawal of the fish population in the Volta river or the cultivation of land.

Answer to the research question

The objective of this study was to gain insights in the socio-spatial organisation of the fresh fruits and vegetables sector in Tamale Metropolitan District in Ghana, to assess the need for an intervention on food security, and to identify possibilities to enhance or cluster food chains. This resulted in the following research question:

In what socio-spatial way is the fresh fruits and vegetables sector in Tamale Metropolitan District organised and could this organisation be enhanced by clustering food chains?

The research provided a study of Tamale Metropolitan District's urbanisation, a study of its food system and concluded with some suggestions for further upgrading of the system. In this section al important results are formulated to one answer.

Assessing possibilities for an intervention

During the twentieth century Tamale grew from a small settlement to the third largest city in Ghana. Its geographic location, alongside an important trade route from the inlands of West-Africa towards the coast, has contributed significantly to this growth. Migration from the rural areas to the city centre have greatly shaped Tamale's morphological character. Some neighbourhoods lack good roads, water and electricity infrastructure and have open sewages. An establishment of a green belt around the centre have not had the expected effect to limit migration and is currently invaded with squatter settlements. The establishment of the University of Development Studies, the housing of numerous banks in the centres business district and international development organisations attracted high-skilled labour to the city and strengthened the city's external relations. It has been said that these citizens seek housing at the borders of the city centre, where more space is left between houses and infrastructure is better taken care of. Recently a slight set-back in Tamale's population growth has been visible, its population has grown less compared to the overall population in the northern region during the last ten years.

The district's function as a gateway to the Northern regions has increased with the renewed road from Kumasi, the expanded airport and intensified air traffic. Looking at its geographic location one should reckon that it hosts the potential to become more industrialized with food-processing industries, since the district is surrounded by rural meat and cereal producing regions and hosts a good labour force (51% of the population is of working age). Some agro-processing plants have already settled in Tamale, they are processing sheanuts, meat, cotton and cocoa. Also, a new rice processing plant along the road to Nyankpala and some new guinea fowl ranches in the Northern regions by SADA and FAO point to the potential to develop a processing industry. If this trend continues the city's function could become more specialized.

The agricultural sector in the district is quite small, there are no large production sites left since the district is urbanised. Increasing land purchases for real estate purposes gradually reduces the amount of arable land that is still available in the district. This not only causes conflicts between residents but also affects total yields negatively (either for personal or

commercial use).Besides, soils do not seem to be suitable for crop production which means that they require more input such as fertilizers and special seeds, making production costly. Also, water is becoming increasingly scarce due to high urban demand and climate changes, which makes it difficult to produce all year round. Polluted water is used for crop production thus contributing to the contamination of food causing diarrhoea disease during dry season. And finally, current power facilities does not provide the whole city of electricity. Wood is still one of the main sources for cooking, which causes deforestation.

Consequently, Tamale is an urban district in development and becomes increasingly dependent upon other places for its food supply. Most of the food is collected from the Northern region and neighbouring regions. Fish is coming from the Volta region. Meat, cereals roots and tuber from the three Northern regions. And vegetables and fruits from the Ashanti Region, Brong Ahafo region or Upper east. Depending on the interest of the trading companies it is either brought to Tamale by outside companies or collected by local companies or petty traders. One can say that the city functions as a hub; it attracts food and redistributes it. However it is not (yet) a hub with widespread global allure. Currently, its (re)distribution is mainly internal or to neighbouring places and region.

If one takes a closer look at the socio-spatial organisation of the fresh fruit and vegetable sector in Tamale Metropolitan District detailed characteristics of Tamale's food supply mechanisms become visible. For instance, production processes are still organised according to familiar traditional socio-spatial structures in the district. Land management is still a business mainly done within the community. In this, a strong division between man and women is visible; man are working on the land while women harvest and sell the products on the markets. Therefore farmers do not enter markets themselves. These traditional structures also underlie current farmer and small entrepreneurs associations in the district. In most cases the associations consists out of community members and are also named after the community. In addition, inputs are provided as part of a development programme by NGOs or the government, generated out of former yields (as shown by trainers of the University) or (in most cases) imported from foreign countries and bought at the local market or stores. This part of the chain is thus highly supported by outsiders.

Furthermore, processing, retailing and wholesale seems not yet to be formalized. The processing plants are small, they do not operate year round and generally produce for the local market. These industries tend to suffer the most from global supply and demand mechanism since processed food can be conserved for a long time and therefore imported from outside the country where production processes are more advanced. Some processing plants gain some support from local NGOs , international development organisations and the government in the form of microcredit schemes or in the form of free tax zones for export if the processing plants are capable of exporting (as for example the sheanuts processing plants). Wholesalers, although there are three of them, seem to operate on individual basis in their supply. Retailers in contrary, tend to be organised in groups under the leadership of a magazia. They specialize in locally produced vegetables, exotic vegetables brought from Kumasi area and fruit as is shown by the spatial organisation of the old market. The retailers have had no support from the government, local NGOs or international development organisations yet. However, it is worth mentioning that UN-HABITAT has indicated both

markets in the Metropolitan District to be in need of a revitalization to stimulate local trade and solidify Tamale's functional externalities (Abankwa et al., 2009).

An important quest in the answer to the research question was to find out the consumer's view on food production and supply, because zero till no information existed on consumer demand at the University of Development Studies. The following characteristics of consumer demand in Tamale Metropolitan District can be mentioned. Fruit and vegetables belong to the daily diet of Tamale citizens, although the quantities consumed are still small and there is little room for expending the market; 2% of a monthly income is spend on fruit and vegetables for one person and 75% of the respondents indicated that they are not willing to pay an additional part of their income on fresh fruit and vegetables. Promising for new investments is, however, that when income tends to increase so does the actual money spent on fresh fruit and vegetables as well as the willingness to pay more for fresh fruit and vegetables. The use of chemicals, hygienic treatment and wastewater use, currently dominate the discourse in the Metropolitan District. These insights could be valuable for the new established faculty of agribusiness.

In addition, stakeholders in the post-consumption phase are interlinked with the farmers in search for fertilizers and enable the markets and consumers to keep continuing by managing their waste. Constrains in this part of the system are the sustainable processing of food once it is dumped at the landfill and the better collaboration of several institutions in the district. Governments expenditure is mostly directed to solve the constrains in waste management.

The research conducted has shown that there are some constrains in the management of the food system. Constrains are exposed in the basic development of production and processing activities, in the limited space for trade in the urban district and in waste processing. Some improvements have been suggested that may strengthen current practices in these areas. These improvements are based on the assumption that yield raise, a balanced distribution and the reduction of food spoil will contribute to agro-economic development and food security. The suggested improvements may be brought into practice by farmers, consumers, retailers, processers and government. And may be supported by NGO's and international development organisation. To reach results a thorough collaboration of all stakeholders in the system is required. It has been said that this is not always common practice in the district.

A solid answer on the question if the structuring of food chains in the Metropolitan District may enhance current socio-spatial organisation of the food system cannot be formulated since insufficient research has been conducted into the agro-park concept and other possibilities for clustering food chains. However, what may be concluded is that the business environment of Tamale Metropolitan District may be upgraded to provide in the services needed for a sustainable implementation of high-tech innovative investments like the agro-park. And, that current attempts to top-down established clusters for the export of one commodity are experiencing difficulties because of deficiencies in the environment. It seems that persons that suddenly are confronted with different practices do not copy or perform the expected practice, but adapt the new practices to the familiar 'traditional' ones. These are not always of use for a firm and therefore optimising a local environment to a suitable business environment of a firm is a slow process. In addition, it may well be

possible that an agro-park in the urban district or its near surroundings will influence current regional trade patterns between the district and the hinterland where most production processes are currently situated. One should be aware of these potential changes and difficulties if one decides to invest in the agro-economy.

Comparison to outcomes of previous research on food systems

Not all conclusions on current developments of food systems in Sub-Sahara Africa made in the first chapter can be affirmed by this research. The conclusions were:

1. Domestic markets are highly underestimated in development literature, although they serve great potentiality for agricultural trade (Satterthwaite, McGranhan & Tacoli, 2010).
2. There has been a transformation of wholesale markets from local and fragmented to larger and more centralized, occurring most rapidly in South and East Africa and encouraging intercontinental trade (Weatherspoon & Reardon, 2003).
3. Small agricultural producers generally face a much more difficult trading environment as a result of higher standards and the scale, quality, traceability and timeliness requirements of rising commercial supply chains (Maxwell & Slater, 2003).
4. Challenges and opportunities of this retail transformation should be on the agenda of local governments to prevent small farmers and firms from exclusion of the commercial supply chains (Weatherspoon & Reardon, 2003).

Insufficient literature research has been conducted to conclude that domestic markets are highly underestimated in development literature. However I would like to nuance the second part of the first statement that domestic markets serve great potentiality for agricultural trade. Following this research it seems indeed that interregional and intercontinental trade of fresh fruit and vegetables and intercontinental trade of other agro-food occurs in Tamale Metropolitan District, although the market, at least in Northern Ghana, seems to be limited. Research on consumer demand in the district has shown that 2% of a monthly income is spend on fruit and vegetables for one person and 75% of the respondents indicated that they are not willing to pay an additional part of their income on fresh fruit and vegetables. But, there are some signs that demand will increase when income increases which is promising.

With regards to the second statement one could say that also in Ghana centralisation of wholesale markets is started. Currently one national wholesaler namely Melcom has stores in several cities in Ghana, among which Tamale city. Besides, processed fruit and vegetables as fruit juices from South Africa.

It may well be possible that agricultural producers generally face a much more difficult trading environment as results of higher standards due to the rising of commercial supply chains. However in Tamale Metropolitan District these development are not yet visible in the fresh fruit and vegetable sector because supermarkets do not sell fresh fruit and vegetables. The request for higher standards on hygiene, quality and thus traceability is primarily dominated by academic and governmental discourse and spread among society. No information on the interest for large-scale or small-scale productions is discovered. For the

rice sector however, difficulties in the trading and processing environment have been measured due to rising of commercial supply chains.

With regards to the last statement one could say that government pays some attention for the position of small producers in Tamale Metropolitan District both for the upgrading of the production process to reach reliable yields and better quality, as well as to search access to markets of local related industries. The trainings organised by MoFa and GIS to stimulate the pepper production is one of these outcomes. No information was discovered on the total amount of such programme nor on the total expenditure invested. Therefore little can be concluded on the priorities of these programmes on governmental level. Therefore it should be good to keep addressing these issues to national and local governments.

Epilogue

If I reflect upon this research it amazes me how fast time is going. It seems only last week that I started to search for a suitable subject for the thesis, while in fact the preparation was initiated in September 2012, almost halve a year ago. In this half year the world has changed fast. Dutch policies on food security in Sub-Sahara Africa, which I choose to study are about to be implemented, and persons I got to meet have already changed their interest into other directions. Despite these rapid changes I do believe that the value of science is continuity. To look beyond the mania of the day, emphasize the long term perspective and encourage innovation for the benefits of all. I hope that this report envisions this reflection.

Looking back, I see a good experience that learned me to persist and engage in actions outside my own comfort zone. I learned to search for opportunities, establish long lasting contacts and engage in the world of academic research. In this, I have been greatly supported by so many people, for which I am so grateful. Therefore I hope that this report, which will be delivered to UDS and RUAF after an affirmative evaluation, could return the favour that they have given me during my fieldwork. May it be a guide to new insights for the benefits of the once that really need it.

My aunt told me once that the expression 'to kill your own darling' was a common phrase between scientists. The phrase refers to a scientist's personal interest in a certain subject which makes his vision narrow. In my case this is my strong believe in development and my eagerness to understand philosophical contributions on objects created by human and natural interaction through space-time. Nevertheless, I have tried to 'kill' or at least integrate my thoughts on these matters into the report to the extent that it does not bother the line of it. The once who are interested can read some loos thoughts on these subjects in annex 1 of this thesis.

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Annex 1

Theoretical reflections on the ecological approach of a system

In this thesis a food system is approached from an ecological perspective in which the interspatial interconnectivity of produced socio-spatial interaction becomes part of a larger whole in which also non-human actors operate and where an entity tends to live within, upon and of a larger system. I have tied to reach this ecological perception by adding an extra level to the value chain analysis, namely that of post consumption. Therewith I tried to emphasise the circular course of food, since food does not stop after consumption, but continues in other forms. During the analyses it seemed to me that the linkages between players in the post-consumption level and other levels were always shorter in terms of direct contact, than the linkages between players in other levels. For example; a wholesaler and a representative of an University do not directly influence each other while every person in the system stands in direct contact with the garbage man. It brought my attention to the difference between a system and an assemblage, and thus between nods and entity.

To further explain my reflections, both a system and an assemblage are considered to produce social organisation through practice. Contrary to a system, however, little is known about the content of the switches between two entities in an assemblage. If one examines a system, it becomes governed through the extend of the switches (flows) between two points in a network. The flows of goods create dependability between the nods, but a nod is capable to change its network and engage in other systems by redirecting its flows or attracting new ones. While, this seems to be not possible in an assemblage. The assemblage is governed through dependency of relations between points. Entities are bound to an assemblage that create the ecology in which they exists, while nods in a system can change networks and systems. This implies that the content of the switches in an assemblage are existential. Therefore, I am wondering what the content is of the switches in an assemblage, other than that of the switches in a system, that seems to be of existential importance. It would be an honour if somebody could enlighten me on this question or perhaps discover some missing links in my argumentation.

Appendix 1

List of interviewees

Aboubacar, Koisha, Head of Sub Office World Food Programme in Tamale, Ghana.
Abubakari, Abdul Halim, Lecturer, Department of Horticulture, Faculty of Agriculture at the University for Development Studies (UDS) in Tamale, Ghana.
Ahmed Tijanni, Fadila, Technical Officer Market Oriented Agriculture Programme Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) ad C/O Ministry of Food and Agriculture in Tamale, Ghana.
Alhassan, Amin, Associate Professor, Dean of Faculty of Agribusiness and Communication Sciences at the University for Development Studies (UDS) in Tamale, Ghana.
Atta-Saow, Lydia, marketing and promotion manager Free Trade Zone committee of the Ghana Free Zones Board in Accra, Ghana.
Chimsi, Eric, Country Coordinator WASH ALLIANCE- GHANA in Tamale, Ghana.
Gandaa, Bizoola Zinzoola, Lecturer Department of Agric Mechanisation and Irrigation Technology at the University for Development Studies (UDS) in Tamale, Ghana.
Gydgluu, Sylvester, regional director department of Town and Country Planning in Tamale Ghana. (interviewed on personal grounds, information is not mentioned in the report)
Jettey, Jozef, officer at Lupis-GIS-department for town and country planning in Tamale, Ghana.
Jibreel, Mohammed Basit, Micro-credit manager of UrbaNet in Tamale, Ghana.
Kranjac-Berisavljevic, Gordana, Associate Professor, Department of Agric Mechanisation and Irrigation Technology
Losmos, Pergeri, sales manager and marketing manager for multi-pro private LTD (quality first) in Tamale Ghana.
Sulemana Sumaya, Loans officer of UrbaNet in Tamale, Ghana.
(surname unknown) Bruce, Marketing officer Melcom in Tamale, Ghana.
Veenhuizen van, René, Senior Programme Officer at RUAF Foundation in the Netherlands.
Zakaria, Abdul Rashid, Programme coordinator of UrbaNet in Tamale, Ghana.
Zakaria, Isaahaku, Medior Advisor Northern Rural Growth program SNV Netherlands Development Organisation in Tamale, Ghana.

List of visits

Production

A farming community along the road to Bolgatanga, (peri)urban farming place for commercial purposes
The Lepega (or Libga) Dam, rural farming place for commercial purposes
The Old Dam, urban farming place for commercial purposes (short interview with the head of the farmer union in Tamale and 4 individual farmers)

Processing

A meat processing plant, one in total at UDS campus Nyankpala
A rice processing plant, community engaged in rice processing manual (10 persons)

Distribution and retailing

Beverage wholesale store, one in total in the centre of Tamale
Rice wholesale stores, three in total in the centre of Tamale
Supermarkets, three in total (Foresewhole, Quality first and Melcom)
Traditional (open air) markets, two in total (Aboabo Market and Old Market)
The suglo malruyori women group, involved in petty trading and small entrepreneurial activities and supported by the microcredit scheme of UrbaNet (30 persons)
VAT department Ghana revenue authority, one in total in Tamale, Ghana (phone call, 21-01-2013)

Consumption

Luxury, Jisonayili Junction in Tamale
Mike's place, next to SNV headquarter in Rice City Tamale
Restaurant at Mariam Hotel, on Mariam street in Tamale
Small diners and breakfast stalls along the road, everywhere in Tamale
SWAD, on the Catholic Guesthouse Road in Tamale

Post-consumption

Co-composting area, one in total at UDS campus Nyankpala

Appendix 2

Survey on Tamale's demand for fresh fruits and vegetables

I am conducting this survey to research the demand for fresh fruits and vegetables in the city in collaboration with UDS and Radboud University (the Netherlands). The survey will help us to gain insights in future market possibilities for the agricultural sector in and around Tamale. I kindly ask you to reflect on the questions beneath in order to give me your knowledgeable reply. I highly value your opinion.

Yours sincerely,

Afke Post MA

Please write your personal information:

Gender:
Age:
No. of years in school:
Profession:
Size of family:
Home town:

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1. Which situation is most applicable to you when you buy groceries?
   - I buy all my groceries in a supermarket (including my fresh fruits and vegetables)
   - I buy my basic ingredients (sugar flower etc.) at a supermarket, and bread, fruit, vegetables and meat at local stores
   - I buy all my groceries at the local market (old market or aboabo)
   - I do not buy food, I produce some and exchange with others
   - I buy my basic ingredients at a supermarket, and bread, fruit, vegetables and meat at local market (old market or aboabo)
   - I buy all my groceries at local stores
   - I only buy basic ingredients (sugar, flower etc.) and produce the rest myself

2. Please cross the answers that are incorrect

I eat breakfast	at home / outdoors (I buy it) / at work (they provide it)
I eat lunch	at home / outdoors (I buy it) / at work (they provide it)
I eat supper	at home/ outdoors (I buy it)/ at work (they provide it)

3. Do you eat fresh fruits and vegetables? And if yes, name the four most frequently eaten and the times (per week) that you eat them.

Fruits most frequently eaten	**How many times per week**
Example: pawpaw	**4 times a week as a snack**

Vegetables most frequently eaten	How many times per week
Example: Alefu	**7 times a week for supper**

4. How many cedis per week does your family spend on food in general, and fresh or processed fruits and vegetables in particular? Can you estimate the percentage of it of your weekly income?

	food in general	**fresh fruits**	**fresh vegetables**	**Processed fruits (juices etc.)**	**Processed vegetables (tomato paste etc.)**
Weekly family budget spend on (in cedis)					
Percentage of your weekly income? (in percentages)					

5. If your income would increase, would you spend an additional part of it on fresh fruits and vegetables?
   YES /NO

6. Are you interested in increasing your diet with fruits or vegetables? If yes which of the following ones would you prefer (you can cross mark max 4)? **If no please go to question 7**

No I am not interested in increasing / Yes I am interested in increasing it with:

Fruits

- Green Apple
- Red Apple
- Red grapes
- Mango
- Pineapple
- Banana
- Lemon
- Oranges
- Tangerine
- Water Melon
- Pawpaw

Vegetables

- Alefu
- Bean leaves
- Cabbage
- White eggplant (garden egg)
- Sweet Pepper
- Okro
- Onion
- Hot pepper (adope shito)
- Tomato
- Carrot
- Ayoyo
- Bra/ kinaf

- Shiwaka
- Pumpkin leaves
- Cassava leaves
- Spring Onion
- Green beans (French)
- Potatoes (local ones)
- Garlic
- Cauliflower
- Lettuce
- Cucumber
- Eggplant (purple one)

Please mention how often you would like to eat the fruits and vegetables that you have cross marked (per week)

Fruits to extend your diet	**How many times per week**
Example: pineapple	**2 times a week as a snack**

Vegetables to extend your diet	**How many times per week**
Example: Alefu	**2 times a week for lunch**

7. Why do you include fruits and vegetables in your diet?

.....
.....
.....
.....

8. How do you obtain important information about fruits and vegetables (how to use them, cook them, why to eat them etc.)?

……
……
……
……

9. Do you experience any problems acquiring fresh fruits and vegetables?

For example: I do not buy cabbage from the street unless I know where they are grown, sincea lot of them may be cultivated with waste water.

……
……
……

Why do you think this is a problem? And what solutions have you adopted in response to these problems?
For example: the use of waste water will raise the coliform level on the crop and this is not healthy, I am washing them with vinegar to reduce the level.
……
……
……

10. Do you have a preference for the origin of the fruits and vegetables that you eat? And if yes, which area do you prefer and why?
    - No I do not favor one particular area → **GO TO QUESTION 11**
    - Yes I do favor a particular area and this is;

    Fruits
    - Upper east region, because……
    - Northern region, because……
    - Ashanti region (Kumasi area), because……
    - Central region (Cape coast area), because……
    - Burkina Faso, because……
    - South Africa, because……
    - Europe, because……

    Vegetables
    - Upper east region, because…….
    - Northern region, because……
    - Ashanti region (Kumasi area), because……
    - Central region (Cape coast area), because…….
    - Burkina Faso, because……..
    - South Africa, because……
    - Europe, because…….

    If you mentioned Northern region, please can you write the name of the location where the crop is cultivated

11. Do you have a preference in the way crops are cultivated and can you tell us why?
    - I do not have a preference, because……..
    - I prefer organic grown crops because…….
    - I prefer conventionally grown crops, because……
    - I prefer greenhouse crops, because…….....
    - I do not eat fresh fruit and vegetables only the processed ones (canned veg./ juice/ dried)

12. We would like you to estimate the sales prices of the fruits and vegetables to investigate the changes per season. Please kindly fill-in the table beneath. (please note that some prices will not change per season and others will).

Fruits

Quantity	**Sales Price during on-season**	**Sales Price during off-season**
1 green Apple		
1 red apple		
1 little box of red grapes (200/ 250 gr)		
1 mango		
1 pineapple		
10 banana's		
1 plastic bag of small green lemons		
1 orange		
1 water melon		
1 pawpaw		
1 tangerine		

Vegetables

Quantity	**Sales price during on-season**	**Sales Price during off-season**
1 bunch of Alefu		
1 bunch of Bean leaves		
1 Cabbage		
1 White eggplant (garden egg)		
4 Sweet Pepper		
5 fingers Okro		
1 bowl Shiwaka		
1 bunch of Pumpkin leaves		
1 bowl Cassava leaves		
1 crop of Lettuce		
5 spring union		
1 bowl green beans (French)		
10 bulbs Onion		
1 bowl Hot pepper (adopeshito)		
5 Tomato		
3 Carrots		
1 bowl Ayoyo		
1 bunch of Bra/ kinaf		
1 Cucumber		
1 Eggplant (purple one)		
6 potatoes (local ones)		
5 Garlic		

1 Cauliflower		

Thank you so much for your effort, we appreciate it greatly. If you want to be informed of the results please write your email address:

Best wishes,

Afke Post MA