

The private biogas sector in Tanzania:

The companies are coming



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Preface and acknowledgments

This research internship in Tanzania was a great experience, the whole 14 weeks of them. Some moments were more difficult than others, but overall the feeling about the internship was great. In this section, I would like to thank everybody that has contributed to this thesis one way or another.

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Asanteni sana!

Alexander Dijkstra
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Executive summary

Energy is one of the most important factors in human development. Without access to safe and secure energy, it is difficult to develop yourself. The world's energy situation is unbalanced. Africa and Asia are the two continents that are the least developed when it comes to energy (access). Africa is the worst off, with one billion Africans are using just 4% of the global power. Africans lack access both to energy, as well as lack access to safe and secure energy (Nair, 2009). There are multiple problems with regard to energy in Africa. The energies used are unreliable in supply, causes illnesses, are expensive and/or take up time collecting them. Biomass is still the main used source of energy on the continent. Northern Africa is better supplied than Sub Saharan Africa but only so much. Tanzania has the same problems regarding energy as the rest of the continent. The grid network is unable to supply energy to everyone. In Tanzania, only 10-15% of the people are connected to the national grid network. These are primarily the people living in the cities (MEM, 2012).

Renewable energies can deal with many of the problems that countries are having with energy. Water, wind, solar, biogas and other renewable energies can be accessed without large investments in infrastructure. Biogas is the renewable energy that is subject of this thesis. Biogas has been on the continent as well as in Tanzania for some time now. As early as the 1970's biogas has been used to fulfill energy needs (TDBP, 2012). This first attempt at promoting biogas came from SIDO, the Small Industries Development Organization Tanzania. This organization was backed up by NGO's and eventually by CAMARTEC, the Centre for Agricultural Mechanization and Rural Technology Tanzania. The goal of the organization was to improve the awareness and dissemination of the biogas technology. In present time, CAMARTEC is joined by TDBP (Tanzania Domestic Biogas Programme) and Dutch NGO SNV (Netherlands Development Organization) to guide the domestic biogas sector to a new level. In 2011, the new strategy of the actors involved was the formation of BCE's, Biogas Constructing Enterprises. These companies are to be the sole suppliers of biogas digesters. Before, the construction of biogas digesters was either done by individuals or loosely formed groups. These companies are responsible to make the private domestic biogas sector a success. Biogas is a form of renewable energy that can help development (Nair, 2009). The benefits include the reduced time to get fire wood, the removal of smoke inside the house during cooking, less deforestation and in general people can use their time and health for better use. There are numerous socioeconomic benefits that come from installing a biogas digester. One of the most important factors of having a biogas digester is the fact that you are not completely dependent on the unreliable electricity grid in Tanzania. The electricity grid is not serving the whole country to begin with. But even when you are connected, you face regular power cuts (TDBP, 2012). The private biogas sector has been around from some time now (2008), and after the last phase with the emergence of the companies are going in a slightly different direction. The construction figures are picking up, even though the target of 12.000 digesters next year won't be made. There are much unaddressed opportunities to be used to the advantage of the sector. At the same time there are pitfalls that some BCE's don't seem to be able to avoid.

The private domestic biogas sector in Tanzania is facing some changes, now and in the near future. The private sector is at a crossroad. Either the sector picks up business and can continue doing business, or it will fall apart. The programme support given to the sector by the Tanzanian Domestic Biogas Programme (TDBP) and the Dutch NGO SNV will end in a few years. It is up to the sector to develop itself to a successful, viable and independent sector in the coming two years. Without programme support the sector will not succeed if it continues its current way. Changes need to be realized. There are numerous challenges and problems still hampering the development of the private biogas sector. These challenges include the lack of transport and good infrastructure, internal challenges, promotion and funds. It is the objective of the sector (and the BCE's, SNV/TDBP in particular) to make sure these challenges are dealt with before the programme support stops. The goal is to have an independent, viable and successful private domestic biogas sector as soon as possible. The level of entrepreneurship in the sector at this moment is too low to be contributing to the development of the sector. The BCE employees are not yet up to the task. Their knowledge of the sector is low, and the main problem is their lack of pro-activity. Training rounds that are incorporated in the programme are trying to improve this. The positive aspects of the sector are that some

companies are doing really well. They are just with a few now, but hopefully more companies will progress. These companies can probably rely on themselves when support stops. But their number is too low. More companies need to be performing better for the sector to become independent and successful. The research was based around the private domestic biogas sector in Tanzania. The topics that were part of the research were the private biogas sector, the entrepreneurship in the sector, the future prospects of the sector and the people of Tanzania. These four topics will help answer the main question: 'What are the main characteristics of the Tanzanian domestic private biogas sector (programme), what is the role of entrepreneurship and what interventions are needed to make the private sector successful, viable and fully independent?'

The theoretical framework is closed with five assumptions. These assumptions are based on the literature and will be tested to the practice in the empirical chapters. The assumptions are:

1. The *first assumption* we make is about the network theory. Communication is essential in doing business. Relationships with customers and other actors are important. In the developed world this communications go smoothly. In the developing world, this can be more of a problem. Due to the long distances in Tanzania and the lack of proper infrastructure, communications on both the short and long distance are weak in the private biogas sector. The lack of means of communication will hamper the communicational relationships.
2. The *second assumption* is concerning the network theory as well. Theory states that it is very helpful to have a network around your business. Is this the same case when you look at less developed countries like Tanzania? Will new businesses have a supporting network as well? Networks are probably helpful in every situation, but the assumption is that in the private biogas sector the networks are informal and not really structured and thus less helpful than they can be. The main communication is personal, instead of a social process involving organized structures.
3. The *third assumption* for the network theory is that virtual networks in Tanzania are difficult to establish because none of the BCE's are fully prepared and ready to participate in a network. The BCE's are not yet at the technological level that they can use the virtual network to their benefit. In time this will change perhaps, but not in the near future.
4. The *fourth assumption* which is concerning the energy context is as follows: because of the many benefits of renewable energy (and biogas in particular), and the characteristics of the people, the demand for biogas digesters will increase when enough information is given.
5. The *fifth assumption* about the entrepreneurship is that the institutions that surround the biogas sector are hampering the development of the sector. Because of the relative newness of the sector, the actors in it are not yet familiar with the institutions. This is especially true for the people in the BCE's. The institutions will therefore be more of an hindrance than a benefit.
6. The *sixth assumption* regards the entrepreneurship as well. The list in box 2 provides a lot of characteristics about entrepreneurs. The entrepreneurs should have these skills, or at least almost all of them. The assumption is that the entrepreneurs in Tanzania don't have these skills. The reason for that is the lack of education and training.

It turned out that not all the assumptions made were correct in practice. The communications on short distance were mostly as bad as those on longer distances. The communication between the customers and the BCE's was not good. There was too much negligence which resulted in distorted communication. The short distance between BCE's and IP's did prove to be good for communication. The second assumption entailed the network around a BCE. Theory states that especially small and medium enterprises benefit from a well performing network. This proved to be the case for the BCE's in the biogas sector. The third assumption is correct. Most BCE's have a mobile phone, but no other means of communication. Computers are non-existent it seems in the offices. The biogas sector is just too new and too underdeveloped

technically to be thinking about virtual networks. The fourth assumption regarding the acceptance of biogas as an energy source is correct. The acceptance of the biogas as a form of energy is high. The only problem seems to be that people don't like to connect their toilet to the digester. Most of the benefits are known and being practiced; when this number goes up the number of digesters will probably go up as well. For the last assumption we look at the entrepreneurship in the sector. Institutions are the frameworks in which the entrepreneurs have to work. It is stated, that because of the newness of the sector the entrepreneurs would have difficulties to conform themselves. This isn't the case: the entrepreneurs as well as the BCE's are aided by the institutional framework.

The conclusion is that the private domestic biogas sector will face a difficult time the coming years. The number of companies that is doing viable business is low. When this number doesn't rise, the sector will almost certainly have a hard time becoming independent and successful. Furthermore, there is no transparent organizational structure. This is not just at the BCE level, but on the network level as well. There are too few people with the right skills to build digesters. Both the transport and financial possibilities are low, with all the negative effects on the company. Lastly, the employees in the BCE's lack entrepreneurial skills. They are not proactive enough to help the company. This might have something to do with the low level of education that the people have.

But, there are several positive points to see. The companies that are doing well at the moment don't seem to be dropping their performance. To make the programme a success, recommendations are made. The following recommendations are the most important ones:

- Support the good-performing companies to even greater heights. The sector will have a better chance to become independent when good companies are supported. Support to non-performing companies should be phased out. These companies should either stop doing business, or be merged with a performing company in the area.
- Get more actors in the sector, because of SNV/TDBP leaving the sector in a few years. The government and Local Capacity Builders (LCB's) can play a bigger role in the sector.
- Expand the training rounds. Invite the biogas employees themselves to help make the curriculum of the training. The employees already had ideas and hopes about the training. If the training can be more tailored to the wishes of the employees, it will have more effect. **Entrepreneurship** should again be incorporated in the training round, but more extensive and more effective.
- Make sure people know the financial side of the sector. Both the supply side as the demand side can do with more information. The BCE managers need to understand the worth of taking up loans from credit facilitators. Currently, they are scared to take up a loan.
- The customers need to be informed on all the different benefits a digester has to offer. Making use of bio-slurry should be a top priority. This will result in more applicants for the digesters. In turn, this will aid the private sector and the programme as well.

Glossary of Acronyms and Abbreviations

ABPP	Africa Biogas Partnership Programme
BCE	Biogas Constructing Enterprises
BOWC	Biomass and Organic Waste Combustion
CAMARTEC	Centre for Agricultural Mechanization and Rural Technology Tanzania
DGIS	Directorate General for International Cooperation
ELCT	Evangelical Lutheran Church in Tanzania
FIDE	Friends in Development
GDP	Gross Domestic Product
GoT	Government of Tanzania
HDI	Human Development Index
ICT	Information and Communication Technologies
IMF	International Monetary Fund
IP	Implementing Partner
LCB	Local Capacity Builder
LED	Local Economic Development
MCC	Millennium Challenge Cooperation
MDG	Millennium Development Goals
MEM	Ministry of Energy and Minerals
MFI	Micro Finance Institution
NGO	Non-Governmental Organization
REA	Rural Energy Agency
REB	Rural Energy Board
SACCO	Savings and Credit Cooperative Society
SIDO	Small Industries Development Organization Tanzania
SME	Small and Medium Enterprises
SNV	Netherlands Development Organization
SSA	Sub Saharan Africa
SSD	Solid State Digester
TANESCO	Tanzania Electricity Supply Company
TDBP	Tanzania Domestic Biogas Programme
TZS	Tanzanian Shilling
UNDP	United Nations Development Program
VICOBA	Village Community Bank
WB	The World Bank

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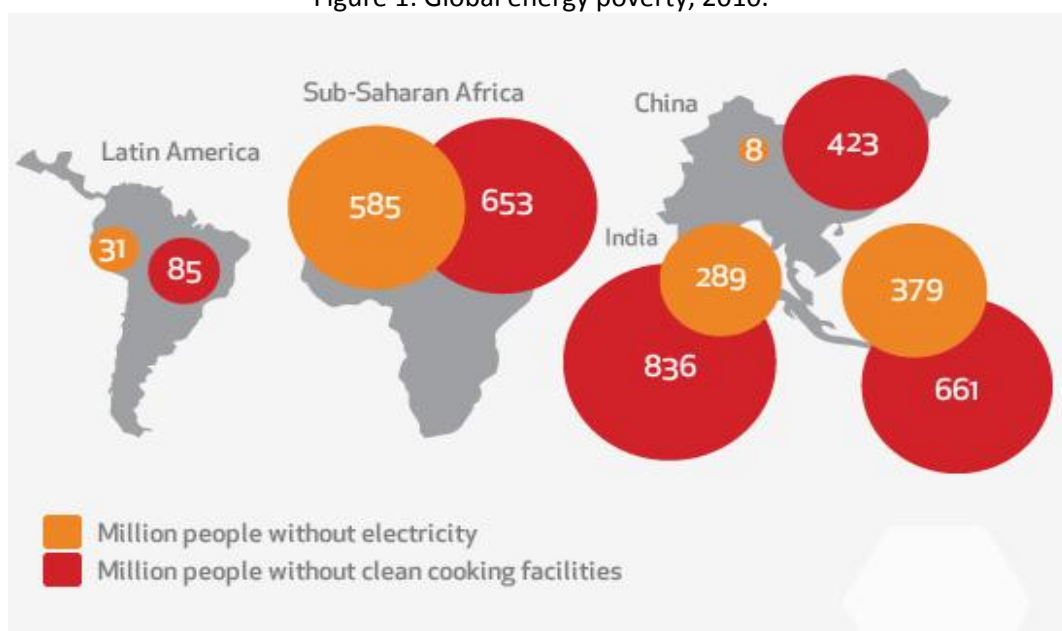
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Introduction

Globally, 1.5 billion people are lacking access to electricity, with over one billion more that have access to insecure electricity. Most of the people lacking access to electricity are those living in the rural areas and city fringes. Investments to make energy available for everyone using grids will prove to be very expensive. It is said that in 2030, 16% of the global population will still lack access to proper energy (The Economist, 2010). But why is energy so important? Claims are that energy is the missing link for the Millennium Development Goals (MDG's). Energy can create opportunities to escape the poverty trap. That is why there are voices that say that energy should be prioritized to help promote economic development. It is stated that the lack of access to energy is hindering the achievement of the MDG's (Industry for Development, 2010; Srivastava & Yumkella, 2010). See figure 1 for a quick overview of the developing countries and their lack of access to electricity and clean cooking facilities.

Figure 1: Global energy poverty, 2010.



Source: International Energy Agency, 2011

Africa as a continent remains one of the least developed continents. Energy development is something that is particularly lacking in most countries. Most African countries don't have the means or knowledge to provide safe and secure energy to their people. One billion Africans are using just 4% of global energy. This stems from the fact that most people don't have access to the grid. This lack of energy results in people having to walk long distances for different energy sources. Moreover, the lack of secure energy affects people's income, health, education, and other socioeconomic factors. In the paper of Nair, the author notes: *Africa currently has the highest level of energy intensity in the world. Energy intensity is the ratio of a country's total domestic energy consumption to its Gross Domestic Product. (...) Africans are using energy but are doing so in such a way that is not aiding economic development* (Nair, 2009). The reason that this energy usage is not aiding in the development of the country is the nature of the resources used: imported, expensive and environmentally degrading (Nair, 2009). So besides not having access to electricity, the usage of the energy they do have is doing harm to the country. Tanzania is no different than most of the African countries. If you are lucky enough to be connected to the grid (only 10-15% of the people), you face regular power cuts (Field research, 2012).

A solution to the problems could be the use of renewable energies. Water, wind and other renewable energies are accessible without large infrastructural investments. Of those, biogas is relatively simple and cheap. Biogas is a form of energy that uses organic material/waste (usually cow dung) to make gas. This gas can be used to cook, to heat and even to light your home. The benefits of biogas are multiple: among them are health benefits, easy to operate and saving time, and the possibility of using the slurry as fertilizer. Next

to these benefits, being independent from the unreliable (and often missing) electricity grid is a big plus (Nair, 2009; SNV, 2012).

'The Vision of the energy sector is to effectively contribute to the growth of the national economy and thereby improve the standard of living for the entire nation in a sustainable and environmentally sound manner.' and *'The Mission for the energy sector is to create conditions for the provision of safe, reliable, efficient, cost-effective and environmentally appropriate energy services to all sectors on a sustainable basis (MEM, 2003).'*

The Tanzanian Government plans to give renewable energies a more important role in the country's energy debate. Biogas is one of those renewable energies that can help fulfilling the Vision and Mission of the Tanzanian government. The objective of this research is to gain more knowledge and insight into the private biogas sector in Tanzania.

The main research question for this thesis is: *'What are the main characteristics of the Tanzanian domestic private biogas sector (programme), what is the role of entrepreneurship and what interventions are needed to make the private sector successful, viable and fully independent?'*

The private biogas sector is in a new phase in the biogas programme started by SNV and TDBP (with the support of international donors). This new phase is an important one. This research will try to find out what the current status is of this sector, and its future possibilities. Furthermore, it will present the interventions necessary to help the sector develop and become successful, viable and independent. The rationale for the main question and the eight sub questions that have been formulated will be explained in chapter three.

Structure of the thesis

This thesis is structured into five different chapters. Each chapter will present a part of the research. We will start the thesis with looking at the contextual background in which the research has been done. The first part will look at the national context. Chapter two will look at the theoretical background that surrounds the biogas sector. In the theoretical part we will see what energy, entrepreneurship and networks have to do with the biogas sector. The third chapter will present the methodology of the research. This chapter will lay out the manner of research, and its justification. The findings of the research will be presented in chapter four. The biogas sector has been studied intensively during the field research. Chapter four will present the current situation of the sector as well as the future of the sector. Lastly, chapter five will conclude the thesis. In this chapter there will be recommendations and interventions for the sector and for following research. The thesis will be closed with the bibliography and annexes.

Chapter one: Contextual Background

The first chapter will present the contextual background in which the research is done. Tanzania is a country with a lot of distinct features. In succession, the following background features will be presented: the geographical and demographical context; economic context; energy context; government and policies; infrastructure; and lastly the history of biogas in the country. These six different items will paint the full picture on Tanzania as a country.

1.1 Geographical and Demographical context

Tanzania is an African country located in East Africa, beneath the Sahara. In the north the country borders Kenya and Uganda, in the west it borders Rwanda, Burundi and the Democratic Republic of Congo and in the south it borders Zambia, Malawi and Mozambique. In the east lies the Indian Ocean with numerous islands that are part of Tanzania, including the Zanzibar archipelago (see figure 2). The country has an extensive surface that stretches over 940.000 square kilometers. Of those 940.000 square kilometers, almost 60.000 square kilometer is water surface. Included in these water surfaces, are Lake Victoria, Lake Tanganyika and Lake Malawi. These lakes are amongst the largest of the world.

Some of the most remarkable geographic features of Tanzania are Tanzania's mountains. The best known one is Mount Kilimanjaro, in the north east of Tanzania. Mount Meru, despite being smaller, is still one of the highest mountains of Africa. Besides these 'stand-alone' mountains, the Great Rift Valley boasts a long range of mountaintops. This geological feature stretches both in the west and in the east of Tanzania. The mountains sustain many people in their living. They are important for more than one reason. The mountains give the people firewood and agricultural land (after cutting). This cutting and burning does come with a price of loss of biodiversity and more erosion. Furthermore, the mountains serve as a water reservoir for cities like Dar es Salaam. The water that falls on the mountain is stored and transported to the cities. Next to drinking water, hydroelectric power is generated in the mountain areas. Tanzania knows two main seasons: the dry season, and the wet season. This affects the Tanzanian people greatly, since most of them are subsistence farmers. The dry season is a disaster for these farmers. A long dry season means more problems for the people since they don't get their harvest.

Tanzania's population has grown to over 43 million people (July 2011 estimate). The age pyramid is built up with 42% of the population being 0-14 years old; 55.1% is 15-64 years old and just 2.9% being 65 or older. Tanzania is still largely a rural country. 26% of the people live in the cities, with an annual urbanization growth rate of 4,7%. Dar es Salaam is by far the biggest and most important city in the country. The official capital Dodoma is far behind (CIA, 2012).

Figure 2: Tanzania and its location in Africa.

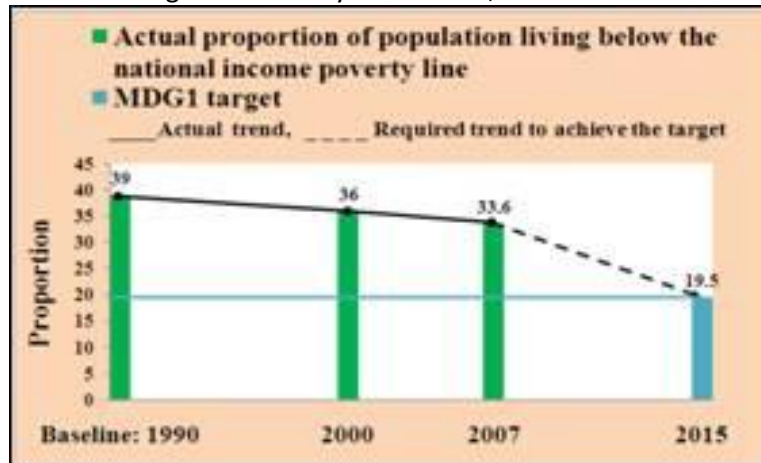


Source: Tanzania NBS, 2010

1.2 Economic context

Economically, Tanzania is experiencing economic growth for almost a decade now. Growth numbers are at an annual average of around 7%. This growth is mainly thanks to the export of gold and the ever increasing tourism in Tanzania. The World Bank sees the country as one of the top performers in Sub Saharan Africa (CIA, 2012; World Bank, 2012; UNDP 2012). Despite these facts, the majority of Tanzanian people live in poverty. Almost one third of the population is living in poverty (UNDP, 2012). Figure 3 shows the percentage of people living below the national poverty line. The MDG is to half the people living in poverty in 2015 as opposed to 1990 (UNDP, 2012). A lot of work is still to be done to realize this goal. One of the reasons for this poverty is the fact that one in every ten persons in Tanzania does not have a job. Although not being as high as some years ago when unemployment reached 12.9%, the 10.7% unemployment figure Tanzania had last year is still very high. Not surprisingly, Tanzania is in the low development group of countries, with a Human Development Index ranking of 152nd out of 187 (HDI, 2012).

Figure 3: Poverty in Tanzania, 1990-2015.



Source: UNDP, 2007

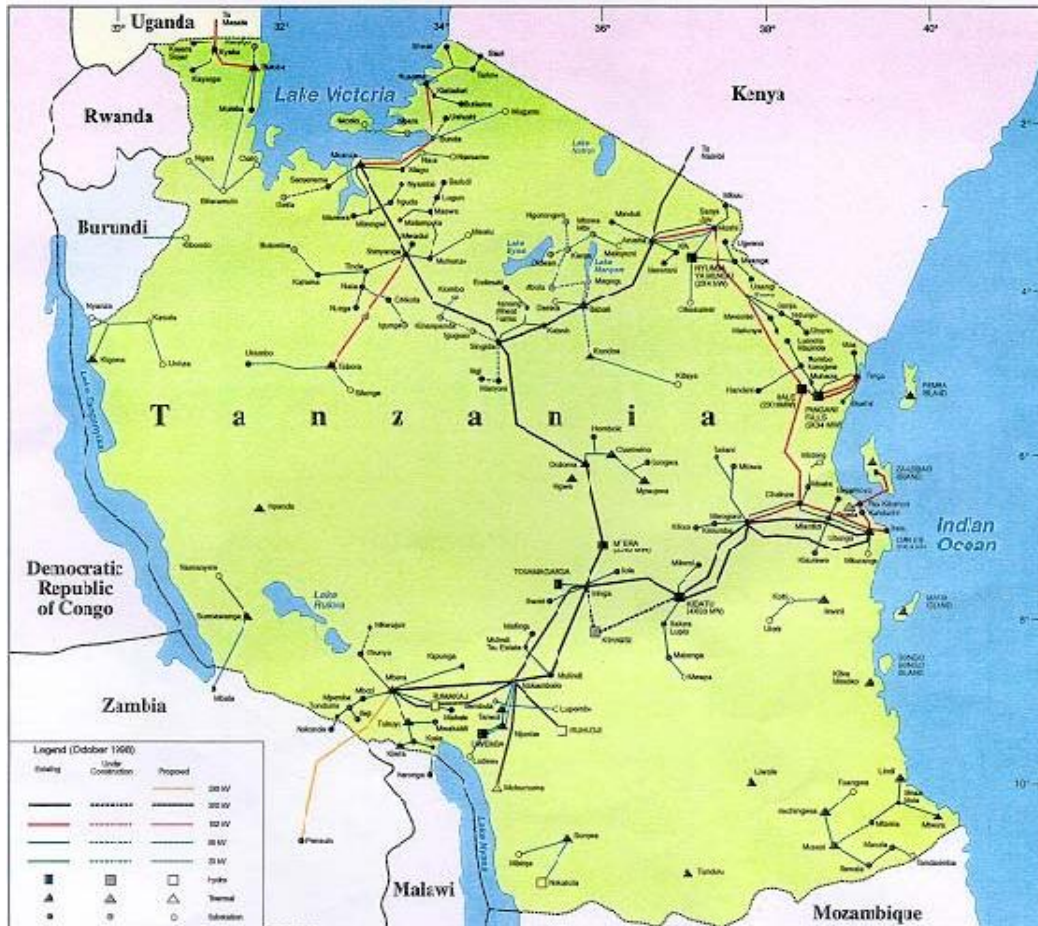
The Gross Domestic Product (GDP) of Tanzania was over 23 billion US dollars in 2010, which is the highest GDP in the history of Tanzania. One quarter of this GDP is accounted for by the agricultural sector. Most people are farmers: 80% of Tanzania's workforce is in the agricultural sector. The remaining 20% is employed in the industry and services sector. Most farmers have small plots, being managed by hand work. Only 30 percent of the farmland is being cultivated by either mechanics or animal help. That is one of the reasons that the economy of Tanzania consists mainly of agricultural products: coffee, cashew nuts and cotton. The agricultural sector provides around 85% of the total exports. Other important export products are gold and manufactures (CIA, 2012; Tanzanian Government, 2012; Tanzania Bureau of Statistics, 2012). The export products find their way to India, China, Japan, the UAE, Germany and The Netherlands mainly. Imports are coming from India, China, South Africa, Kenya and the UAE. Normally, imports were worth more than the exports of Tanzania, creating a negative trade balance for the country (CIA, 2012). Though Tanzania is doing fine in rate of growth, it is still one of the 'donor darlings'. 2008 saw the highest Millennium Challenge Compact (MCC) grant being given to Tanzania. This grant was given to Tanzania by the MCC. This is a bilateral US foreign aid agency. A hefty amount of 698 million dollar was given to Tanzania to help Tanzania restructure the economic infrastructure (CIA, 2012; MCC, 2012).

1.3 Energy context

With a population of more than 40 million, Tanzania's energy needs are great. The main source of energy is biomass based fuels. These include charcoal and firewood. About 90% of the country relies on biomass based fuels. Commercial energy sources only account for just 9%. As stated in the introduction, this is a continent wide problem. The country relies on imported petroleum to fuel the needs of the country, mostly used in the industry. Other energies used are hydro-electric based electricity. This does have the downside that in dry spells the electricity is not always guaranteed (Field research, 2012; Government of Tanzania, 2012). The supplier of energy in Tanzania is the Tanzania Electric Supply Company, known as TANESCO. This company supplies 98% of the country's need. Hydropower is the most important source of energy for the grid. Over 70% of the grids electricity is hydropower (MBendi, 2012).

The Tanzanian electricity grid is only giving power to 10-15% of the people in Tanzania. Figure 4 shows the national grid of Tanzania. Dar es Salaam in the east, Arusha and Tanga in the North and Mwanza in the Northwest are the areas that are well connected. But, parts of the more rural areas are not connected at all (South and West). Only 2% of the rural population is connected to the grid. That means that around 39 million people don't have access. The cities are in general better connected, with Dar es Salaam as high point (see figure 5). Without investments, the energy sector will have a hard time reaching the whole country (MBendi, 2012; World Bank, 2010).

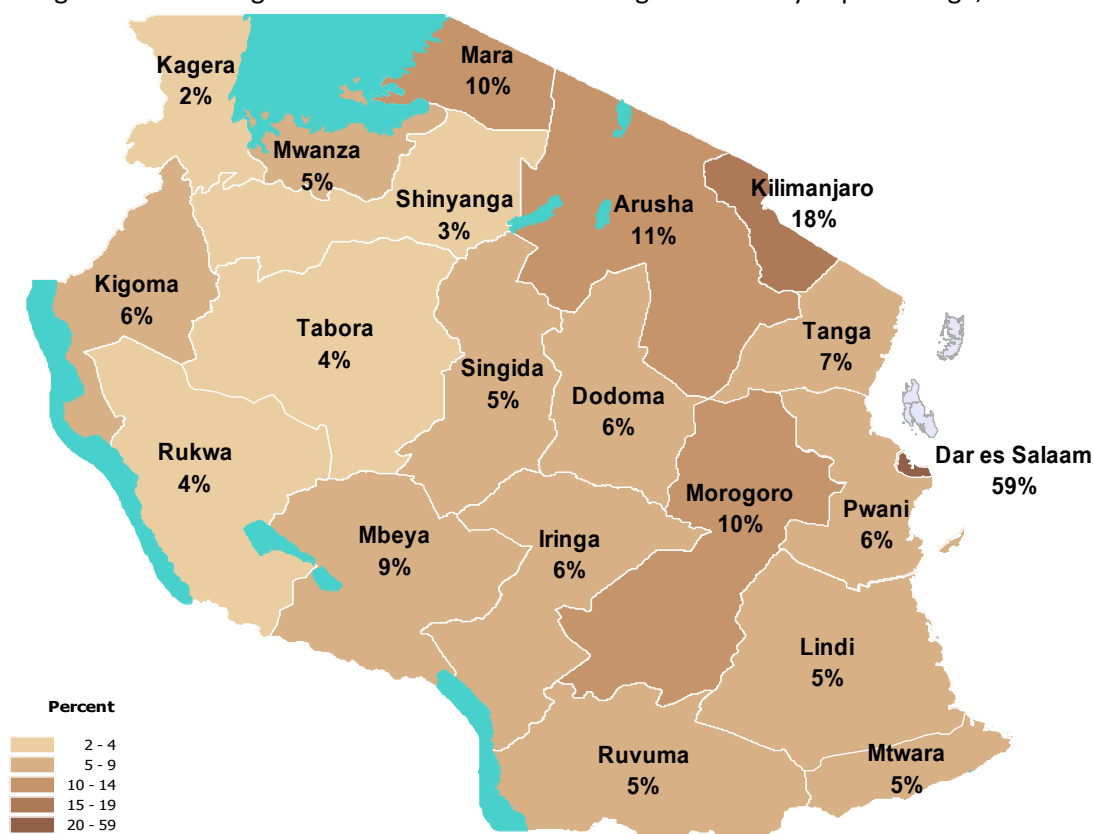
Figure 4: The national grid system of Tanzania.



Source: REA, 2011

The problem in Tanzania is not the lack of energy sources. The utilization of these sources is the problem (again, a continent wide challenge). Coals, natural gas, wind and water are some of the energy sources that can be utilized (better). The policy of the government (not renewed since 2003) is to explore the possibilities of renewable energies: *'The dissemination of renewable energy technologies have been limited to the promotion of improved stoves, improved charcoal production techniques, solar, biogas and windmills and to lesser extent photovoltaics. Initiatives to increase utilization of coal for electricity generation are being explored.'* (MEM, 2003). There are numerous renewable energies not yet exploited. These means of energy can be used for the benefit of the energy situation in the country. The government has an agency that is responsible for the rural energy situation: the Rural Energy Agency (REA). This agency is autonomous under the ministry of Energy and Minerals (MEM). The goal of the REA is to *'promote and facilitate improved access to modern energy services in rural areas'*. Biogas is a note in the energy policy of the country (GoT, 2012; REA, 2012; MEM, 2012). The problem is that the latest energy policy is dated seven years ago. The renewable energies, biogas included, have however evolved in these seven years. It seems clear that the government needs to update its energy policy. We will come back to the government in the next section (1.4).

Figure 5: Percentage of households with access to grid electricity in percentage, 2010.



Source: REA, 2011

1.4 Government and policies

Tanzania is since its independence a republic. The political system is currently one of parliamentary democracy. The system is based on the Trias Politica: there is an executive organ, a legislative organ and a judiciary organ. The president (currently Kikwete) is the head of the state (GoT, 2012). Right after the independence from the British, the country was a socialist state. The first president, Mr. Julius Nyerere created Tanzanian socialism. He nationalized the economy and gave great importance to Ujamaa. Ujamaa is 'familyhood' in Swahili. Tanzania should be centered on collective agriculture. It was all part of the bigger plan to make Tanzania one not just in name, but also within the country (African History, 2012). The government is engaged in the energy sector via the Ministry of Energy and Minerals. The MEM '*has been mandated to facilitate development of energy and mineral resources. The Ministry delivers various services related to development of energy and minerals resources through the participation of various stakeholders including public, private, public-private partnerships, local communities, NGOs and civil society.*' Their latest energy policy is the 'Rural Energy Development' act of 2005. It is the job of the MEM to help facilitate:

- (a) Modern energy supply to rural areas promotes growth in economic production and productivity as well as social welfare;
- (b) Sustainable development shall be achieved when modern energy services in rural areas are promoted, facilitated and supported through private and community initiative and involvement;
- (c) The role of Government in rural energy service provision is that of a facilitator of activities and investments made by private and community entities;
- (d) The fulfillment of Government's role shall be best managed through an institution that is independent of, but accountable to, the central organs of Government (the REA);
- (e) The public institution designed to facilitate rural energy service provision shall have a small core administrative capacity, and shall rely on the technical and financial capacity of qualified private sector entities;

(f) Facilitation of rural energy service provision shall take the form of financial support for the capital costs of investments, technical assistance to project preparation, training and other forms of capacity building. (MEM, 2012).

This ministry in its turn is overseeing the REA. This agency is, as explained earlier, responsible of the electrification of the rural part of Africa. They are the institution mentioned in points (d) and (e). In the Act there is the intention to establish a Rural Energy Board (REB). The REB *'is to be known as the Rural Energy Board whose objective shall be to promote rural socioeconomic development by facilitating extended access to modern energy services for the productive economic uses, health and education, clean water, civil security and domestic applications'*. The REB hasn't been established as for now, and will probably not be established at all.

1.5 Infrastructure

Infrastructure is an important part of a country's economy. Without proper infrastructure, it will be difficult to get the economy going and be a part of a larger economic system. Tanzania has a below par infrastructure in the country. There are a few railway tracks, but they are not covering the whole country. The main line goes from Dar es Salaam in the East to Kigoma in the West. Besides this railway, there are some minor railways going North and South. But, the railroads in the some parts of the country have been neglected and are unusable (Field Research 2012). Public expenditure on roads and transport systems has increased over the years. Rural roads account for more than 60% of the total road length and less than 1% of rural roads are paved. Even 38% of the trunk roads remained unpaved in 2000. There is also large regional variation in access to road infrastructure. For detailed information, see figure 6. The table shows that the majority of the roads are unpaved. Especially in the rural areas, the number of paved roads is slim to non-existent. Despite being a somewhat older figure, the current situation is not much different. The government is addressing the problem concerning the roads. In collaboration with Chinese companies, roads are being made tarmac or paved (Field research, 2012; GoT, 2012; Fan e.a., 2005).

Figure 6: Road network by research region (in kilometers), 1996-2000.

Region	Up to 1996				Up to 2000				Total roads 2000	
	Trunk Roads		Rural Roads		Trunk Roads		Rural Roads		P	NP
	P	NP	P	NP	P	NP	P	NP		
Arusha	223	223.3	0	1153	266	280	10	1228	276	1508
Tanga	298	0	12	1029	267	57	32	1044	299	1101
Dodoma	146.5	421.7	5	691.3	133	425	5	699	138	1124
Kilimanjaro	0	469.6	0	635.3	240	151	66	630	306	781
Singida	3.5	606.8	0	863.4	8	600	0	979	8	1579
Manyara	X	X	X	X	X	X	X	X	X	X

Source: Fan et al. (modified), 2005

*P= Paved

NP=Non-paved

X= No data available

Infrastructure is also important in the biogas sector. Although the digesters themselves don't need to be moved once they are set, it are both the materials and the masons that have to cross the distance. If this is done on unpaved roads or no roads, this will make their job more difficult, more time-consuming and more expensive. Despite the ongoing investments made in the country's infrastructure, there is still much ground that can be won. The road network is being improved as we speak, but it will still take many years for the road network to be in good shape. The roads that are being patched up are the main roads. The rural roads remain dusty sand roads. For the biogas sector, this is a loss.

1.6 Tanzania's biogas history

The last part of chapter one will present the history of biogas in Tanzania. Biogas has been in Tanzania for almost 40 years. In 1975 SIDO introduced the biogas technology in Tanzania. Despite some involvement from NGO's, the dissemination and acceptance of the biogas technology came when CAMARTEC joined in. From 1975 up to the late 1990's, there were some 1900 biogas digesters built. Other parties like the current IP's MIGESADO (Dodoma Biogas and Alternative Energies Organization) and FIDE (Friends in Development) stepped in when government and NGO support began to lessen. CAMARTEC remained an authority on the subject, but is not as leading as it once was (TDBP, 2012). The second big programme regarding the biogas dissemination in Tanzania was the start of the Tanzania Domestic Biogas Programme (TDBP). This began with an idea to revive biogas in Tanzania. At a May 2007 conference in Nairobi, Kenya, a small stakeholder group paved the way for TDBP. The programme itself started up in the last quarter of 2008. In order to operationalize TDBP, SNV offered to finance the start of the programme from its "Special Core Funds", whilst awaiting the final agreement with the Africa Biogas Partnership Programme (ABPP). On the 1st of October 2009 the Partnership Agreement on the TDBP was signed between Hivos, ABPP's fund manager, and CAMARTEC, TDBP's National Implementing Agency (NIA). The ABPP is a partnership between the Netherlands' Directorate General for International Cooperation (DGIS), Hivos and SNV whereby DGIS provides financial support; Hivos is responsible for fund management and SNV for technical assistance.

The goal of the Tanzania Domestic Biogas Programme is to improve the livelihoods of rural farmers. The way they do this is through exploiting the market and non-market benefits of domestic biogas. The ambition is to support the installation of 12.000 domestic biogas installations in the first phase from 2008-2014. Furthermore, TDBP aims to develop a commercial viable domestic biogas sector by improving the demand for biogas through marketing and the support of masons to form enterprises that construct the biogas digesters. This process is just starting up, but the results are already visible (TDBP, 2012; SNV, 2009).

The type of digesters used has changed during the years. Plastic and brick ones have been used, small and big digesters alternated with each other. The original digester from CAMARTEC was an Indian model that was modified. The first years when biogas was installed saw mainly floating drum types of digesters (figure 7). Later on, the fixed dome digester became more common, and is still presently the first choice (figure 8).

Figure 7: Floating drum digester.

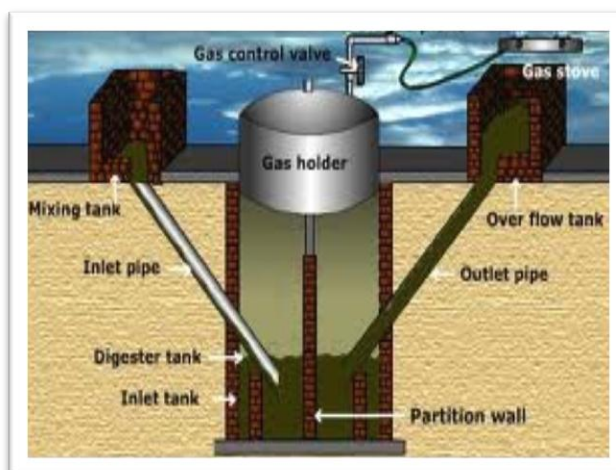
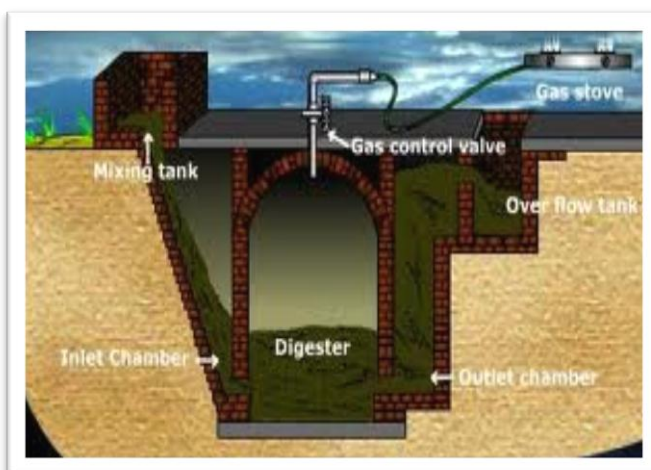


Figure 8: Fixed dome digester.



Source (both figures): Tutorvista, 2012

Historically, the initial high costs of a digester have hampered the dissemination of the technology. Where there used to be a plan to reduce costs and keep quality, nowadays the digesters are partially subsidized. Around 300.000 Tzsh. is being used to lower the investment costs for customers (TDBP, 2012).

The contextual background of Tanzania shows that the country is still a low development-group country. Despite the fact that the economy is steadily growing with an annual rate of 7%, a third of the population still lives in poverty. The supply of energy is as poor as the people are. Besides the fact that the grid isn't supporting the whole country (just 15%), it is unreliable as well. Black-outs are common in Tanzania. The grid is mainly supported with hydro-power electricity. Because of the lack of access to the grid, almost 40 million people rely on biomass for energy. This means that people use charcoal and firewood to suffice in their energy needs. This in turn leads to deforestation, environmental degradation and indoor smoke development. If people are not using biomass they import expensive petroleum to fuel their energy needs. This leads to a financial investment of 30% of people's income. The company is aware of the situation, and has started a number of programs to improve the situation, mainly through government agencies. The infrastructure in the country is improving from a bad starting point. The government is upgrading the main roads in the country. The more rural roads however are still in bad shape. If this does not improve, the biogas companies remain challenged. Without the improvement of the roads it is difficult for them to get to places faster.

Chapter two: Theoretical Framework

Chapter two will present the theoretical framework in which three different theories are being discussed. This theoretical background consists of three different subjects: Social network theory, (renewable) energy and entrepreneurship. We will see in what way they are connected to the biogas sector. Throughout and at the end of chapter two, assumptions will be made with respect to theory and practice. In chapter four, we will come back at the theory and we will assess the practice with the theory and see whether the assumptions were right or not. These three different subjects have been chosen for their connection with the private (energy) sector.

2.1 Networking your way to the top

The *network theory* is a theory on the role of (social) networks in different views. The network theory (or actor-network theory or social network theory) views social relations in terms of nodes (the individual actors within the networks) and ties (the relationships between the actors). Furthermore the theory describes how the social structure of relationships around an actor affects beliefs and behaviors. Using a set of methods, the level of the social ties between actors is measured. The network theory is not interested in the characteristics of the individual. It studies the relations between and within the actors. There are different relationships to be investigated. Among these relationships are the exchange of information and the sharing of goods and money. When mapped, these relationships become visible and analysis is possible. In the article of Felez et. al, the statement is made that information sharing is more and more restricted to personal relationships. The sharing of information has become a social process. Knowledge transfer is traditionally seen as one of the pillars for networking. Via dissemination of knowledge, more knowledge and innovations are created. Furthermore, people's capabilities can be expanded to a new level (Kamuzora & Msanjila, 2012; Felez et al., 2005). There must be some consideration however, despite knowledge sharing and creation is in fact a good process. If people take knowledge for granted without checking the validation of it, knowledge can go the wrong way (Maskell & Malmberg, 2007). Despite the world being more and more connected to each other, face-to-face contact remains very important for certain types of information and knowledge exchange. The shorter the physical distance is, the smoother the communication will be (Maskell & Malmberg, 2007). The first assumption we make is about the network theory. Communication is essential in doing business. Relationships with customers and other actors are important. In the developed world this communications go smoothly. In the developing world, this can be more of a problem. Due to the long distances in Tanzania and the lack of proper infrastructure, communications on both the short and long distance are weak in the private biogas sector. The lack of means of communication will hamper the communicational relationships.

Box 1: Actor and network explained.

Actor, Actant

These interchangeable terms are "semiotic, abstract terms, and refer to either human or nonhuman entities. Actants have interests, projects, desires and strategies, with the ability to excite other relevant actors. They are a product of a more or less stable relationship between various effects that together form an actor-network". Connected to power, different actants have different levels of agency, as an entity in an actor world only exists in context and in juxtaposition to other actants. The number of connections that an actant has with different networks determines what the actant is and what he, she, or it can do, as configured by a series of negotiations.

Ties

The ties are those relations that bind the actors together. Without these ties there is no network. These ties can be social ties (friendships), cultural ties and so on. The tie is of great importance.

Actor-networks

These are composed of a series of heterogeneous animate and inanimate elements linked to each other over time. They rely on people, machines, and codes (narrative, text), they inhabit a particular site, and they are partial in their embrace. They are a description of the way things are, a set of assumptions about how relations are organized and networked.

Successful network

These occur where aligned interests are created through the enrollment of a sufficient body of allies and where the network is maintained through the translation of interests that bind all actants. Each modification in the network can be considered a displacement that affects not only other actants, but also the networks of other actants.

Source: Rhodes (with own modification), 2009

Networks have historically been seen as potential beneficial. These benefits include increasing profit and increasing factors for survival. This is especially the case for SME's. *'Social networks have also been used to examine how companies interact with each other, characterizing the many informal connections that link executives together, as well as associations and connections between individual employees at different companies. These networks provide ways for companies to gather information, deter competition, and even collude in setting prices or policies.'* This is a citation from Kamuzora and Msanjila, stating that social networks are usable to examine companies and their interaction. With these interactions, there will be more collaboration between companies. This results in positive points (more information, more streamlined business for example) but also negative points (like cartel forming/price setting) (Kamuzora & Msanjila, 2012; Villanueva-Velez et. al, 2009). The second assumption is concerning the network theory as well. Theory states that it is very helpful to have a network around your business. Is this the same case when you look at less developed countries like Tanzania? Will new businesses have a supporting network as well? Networks are probably helpful in every situation, but the assumption is that in the private biogas sector the networks are informal and not really structured. The main communication is personal, instead of a social process involving organized structures.

Nowadays, networks have changed. Social media, mobile phones and Internet are becoming more and more important inside networks. These forms of networks are called virtual networks. Virtual organizations, virtual enterprises have been starting up since 10-15 years ago. Although most of the virtual organizations are in the so called First World, Africa is not without them. The virtual networks have the ability to restructure the ties within a network. These virtual networks (and the actors in them) now have more insight in the market. The collaborative, virtual networks are now called the pre-condition for a successful business. As the authors of the article *'Collaborative Networks as a Mechanism for Strengthening Competitiveness: Small and Medium Enterprises and Non-state Actors in Tanzania as Cases'* say it: *'Today, collaboration has become a key for enhancing rapid response to market demands in different sectors of production and service delivery as it facilitates sharing of competencies and resources owned by participating organizations.'* The key goal of a 'collaborative network' is to structure the different activities of the actors within a network (Kamuzora & Msanjila, 2012).

The digital world we are now living in requires the formation of these new virtual networks. Without being virtually connected, companies cannot cope with the requirements that are asked in this connected global market. In the developed world this is indeed the case. Companies have followed the new innovations and are connected. Companies in the developing world however seem to have more difficulties getting connected to the 'global economy'. The problems are multiple: lack of technical resources and technical experts, and the lack of capital to acquire these two resources. It is the lack of starting capital of SME's in the developing world that prevents them from growing towards the global economy. This is a problem with the biogas sector as well. Chapter four will give more insight in this. Back to the networking issue; Internet is getting increasingly more interesting for (starting) companies to build up a network. Kamuzora & Msanjila note that the Internet is an important and useful tool to form collaborative networks. However, you do need other parties to be ready and prepared to participate in the network. You need to establish communal agreements in order to make it work. The *third and final assumption* for the network theory is that virtual networks in Tanzania are difficult to establish because none of the BCE's are fully prepared and ready to participate in a network. The BCE's are not yet at the technological level that they can use the virtual network to their benefit. In time this will change perhaps, but not in the near future. The BCE's should stick with mobile phones, and perhaps Internet for e-mail addresses.

The network theory shows that having a social network can help SME's to develop (faster). The sharing of information and knowledge can benefit any company in the network. This is especially the case for smaller companies. The digitalizing of the networks is something that can be somewhat more difficult for companies in the developing world as they often lack the means to do so. The network has a structuring function for the actors inside, which leads to a clear division of tasks. This clarity helps the different actors to know their place and they will get better at the job they are doing. Repetition is a form of learning after all.

2.2 Renewable energy in Africa and Tanzania

Energy is since long a major factor in the lives of humans. Access to safe and secure energy is one of the most important things that people need to develop themselves. Without access to electricity, development is a lot harder to accomplish. This section will present the current discussion on renewable energies in Africa. What is the current status, and what are the future prospects? This section will start with the general energy outlook on Africa.

For many Africans, energy is not a given fact. Africa is responsible for almost half the people that are lacking electricity. The number rose to 589 million in 2008. Of all the Africans lacking access to electricity, Sub Saharan Africa makes up 99.6%. This is in spite of the increase of the electrification rate to 40% in 2008. Rural electrification is with 22.7% far behind urban electrification (66.8%). Of all the people in Africa that are lacking access to electricity, 99.6% is living in Sub Saharan Africa. These are not connected to the grid, especially when living in the rural parts of the continent. Of all the people in Sub Sahara Africa, 90% of the rural population does not have access to electricity. In overall, this figure is 74%. Rural communities are the ones that are hit hardest in respect to access. There are multiple problems: the high number of people living in the rural areas; the lack of finances; the unwillingness to pay; low per capita energy consumption and the lack of electrification in the rural areas. These problems are not solved easily. Biomass is still the most important source of energy for these people (Belward et al., 2011). Table 1 shows the dependence on Biomass and Organic Waste Combustion (BOWC) in five different countries. It is clear that some countries are almost exclusively fueled on biomass.

Table 1: Dependence of residential energy needs from BOWC in five SSA countries.

Country	Share of BOWC used for residential needs - 2008	Share of residential energy needs covered by BOWC - 2008
Dem. Rep. of the Congo	80%	99%
Mozambique	90%	99%
Tanzania	85%	98%
Togo	90%	91%
Ethiopia	100%	99%

Source: Belward et al. 2011

This using of biomass requires walking long distances to get firewood; time that could be used better. Furthermore, kerosene is purchased to light the homes. Both ways to get energy are time consuming, expensive and has impact on more than one level. The lack of access to clean and affordable energy also reflects on socioeconomic factors. Education, income, health, water food and air quality all suffer. It is for this that energy is seen as one of the most important factors in development. Already explained in the introduction is the energy intensity of a country/continent. The energy intensity is the ratio of a country's total domestic energy consumption to its GDP. Africa has a very high intensity level. The reason is that Africans are using the energy in such a way that development is not aided. The reason for that is that the energy sources that are used are mainly imported, expensive and degrading the environment (Nair, 2009; Belward et al, 2011).

Energy is important for development for different reasons. The first one comprises the users, the people. As said, people in Africa walk long distances to get unhealthy and costly forms of energy. Cutting this time and expenses can lead to development, Nair argues in the article. With good access to energy/electricity, people can study and educate themselves outside of the daylight. This extra education can be put in use in jobs for example. Public works benefit from regular and safe electricity (e.g. hospitals). Entrepreneurs can become more productive with electricity and overall, save time that people can make better use of. Using electricity inside the house will lead to healthier houses without smoke. TV, radio and telephone can be installed, to be better informed and educated. It is thus stated that energy and in particular electricity can aid development (Nair, 2009).

Africa has a whole range of renewable energies that they can use. Some of them are presented in table 2. This table gives the challenges, costs and potential for the five best known renewable energies in Africa. Exploiting these benefits Africa with cleaner energies and cheaper energy (Nair, 2009; FAO, 2012).

Table 2: Renewable energies in Africa which are most common.

Renewable Energy	Challenges and constraints	Costs	Potential
Solar	Lot of land needed for construction. Not yet a big market.	Expensive, because the market is still small.	High; despite high costs, is solar one of the most easily accessed renewable energy form. Efficient form of energy.
Wind	Variable resource: you never know when there is wind and how much.	Costs are decreasing as the market is growing at a rapid rate.	Egypt, Morocco and Tunisia already started. Other countries are to follow. Easy accessible form of energy.
Biogas	Need for (zero-grazing) animals. Water is not always available.	Small digester cost as less as 45\$. Bigger ones can be more expensive.	Making energy from waste. Bio slurry as a fertilizer. Clean.
Geothermal	High initial costs. Long project of finding the right places. Geological uncertainties are always present. Amount of heat can diminish	Initially high. Surveying of areas is costly. Operating costs are low. Per kWh 2-10 \$ct.	Kenya and Ethiopia are using geothermal energy. Countries with rift valleys are very potential. Tanzania, Zambia, and Uganda are some of the countries that are potential.
Hydro	The costs to set up the program are high. Financially not self-sustaining. Dependent on water flows.	Initially high; upkeep is relatively low. Per kWh: 800 Pounds	High. Supposedly, only 7% of Africa's hydropower is utilized.

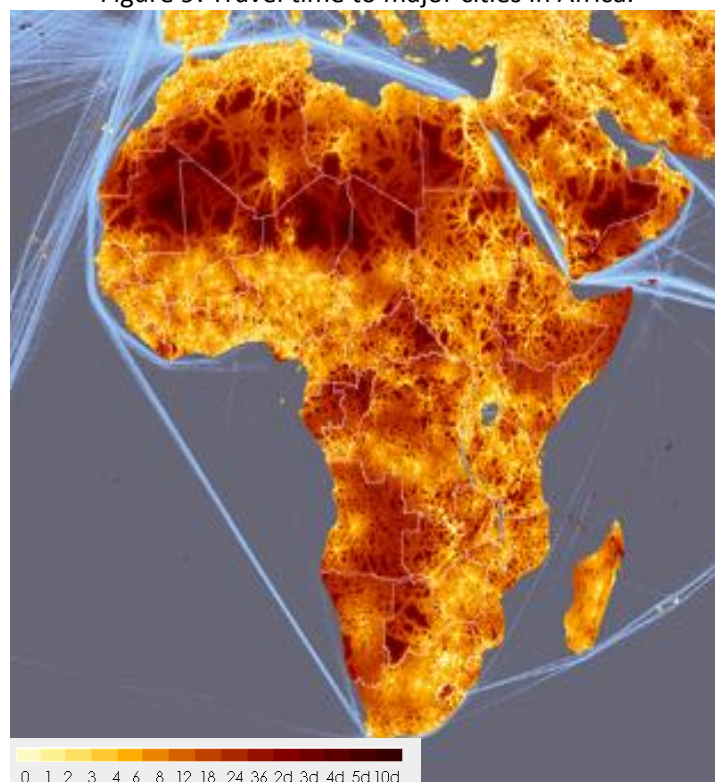
Source: Nair, 2009; Belward et. al., 2011

In 'The Economist', it is argued that besides the problems discussed above, there is another issue. The governments of African nations are often very slow in putting policies to use. They argue that a bottom up approach is the new way of making sure that the people in Africa are getting energy. These bottom up solutions are getting more attention lately. Not only in political circles, but also among the people themselves. An example of the bottom up solution becoming more in the picture is the presence of 50 lighting firms at a 'Lighting Africa' conference. The previous year there were only a handful of companies. People are getting the idea of small enterprises to step in the missing link of distribution (and development) (The Economist, 2010).

The Economist uses the term 'leapfrogging' to describe the fact that Africa can jump right to renewable energies. They don't have to follow the path of the developed world. Going from no energy to clean renewable energy in a short timeframe is not impossible. Renewable energies can take care of different problems. As for now, people in the developing world spend 30% of their income on energy. The energy

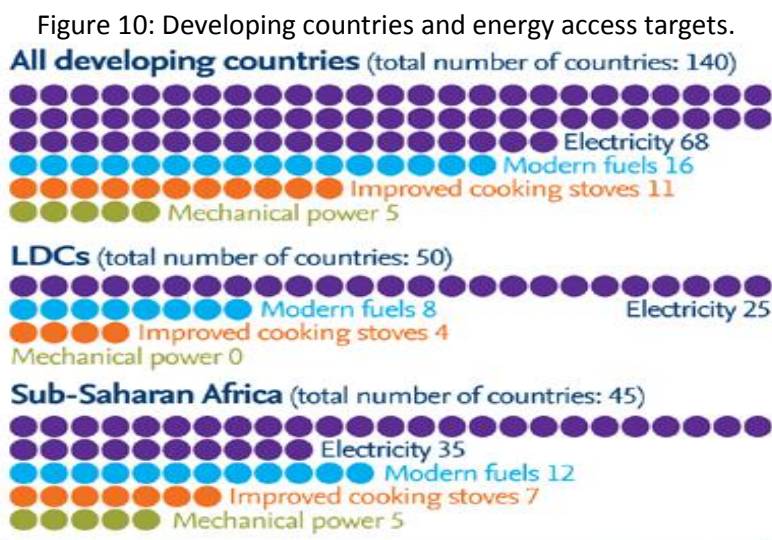
used is mainly kerosene, which causes indoor air pollution and fires. Renewable, cleaner energies can solve both problems. It is both cheaper and safe. Being cheap is however not yet enough: the poorest of the poor still don't have access to these forms of energy. A problem will be the distribution of the new forms of energy. Especially in the rural areas (where the most people without access to energy live), there is a lack of infrastructure and supply chains. The energy isn't reaching them. The last problem is that both the demand and the supply side must be educated on the new energy forms. This will cost money which isn't always available. That is something else that bottom up practices will have to find a way for. However, in the article of Belward et al., it is stated that the stage of fossil fuels is especially difficult to skip. The reason is that renewable energies are often more expensive to start up. But the fact that people are spending hours on collecting biomass isn't cheap as well. And because the infrastructure in the rural areas is not good, transport costs are very high as well. So, it is difficult to tell whether fossil fuels or renewable energies are cheaper. Figure 9 shows the distance to the nearest major city for whole Africa. The darker the red is, the longer the distance (in days and hours). It shows that especially in the Sahara the travel times are long, in the south-west and the east. The Sahara is not surprising as there are fewer cities there. But the other two regions illustrate the point made by the Economist. With larger distances, the transportation costs go up making energy more expensive (Belward et al, 2011; The Economist, 2010).

Figure 9: Travel time to major cities in Africa.



Source: Belward et. al. 2011

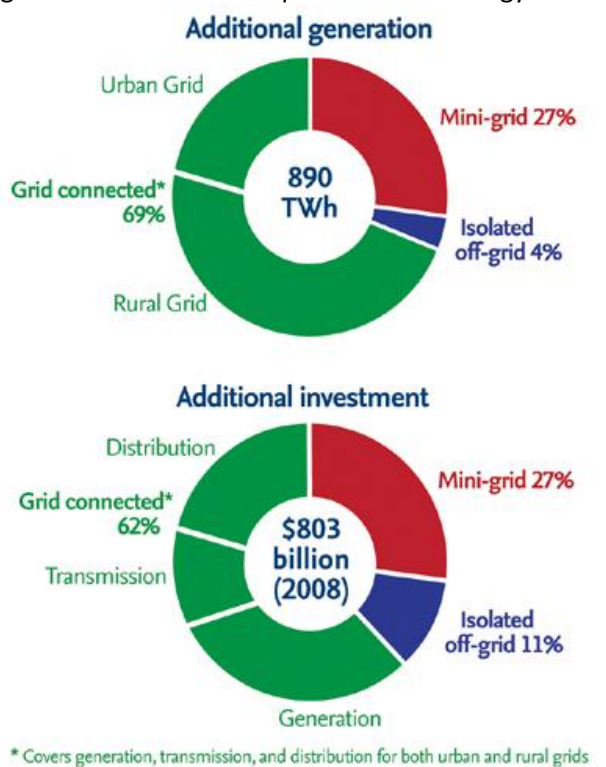
The biggest problem with renewable energy in Africa is the fact that there are not enough skilled people who can take care of the distribution, channeling and dissemination. Locating the energy is one thing, but you need people who can work the new energy as well. The same goes for MFI's. Without proper knowledge of the renewable energy sector they cannot build a support network around the sector. They lack the knowledge and funds to identify reliable energy suppliers and to educate loan officers (The Economist, 2010). Not always is information about renewable energies available. Belward sees a lack in the availability about energy in general and renewable energies in particular (Belward et al, 2011).



Source: UNDP, 2009

Figure 10 shows the number of countries that have set energy access targets for themselves. We can see that of all the developing countries, 68 have set an energy access target for electricity. For Sub Saharan Africa, this is 35. This shows that countries are trying to change the situation. But as we can see in the figure 11, several investments are still needed.

Figure 11: Investment requirements in energy till 2030.

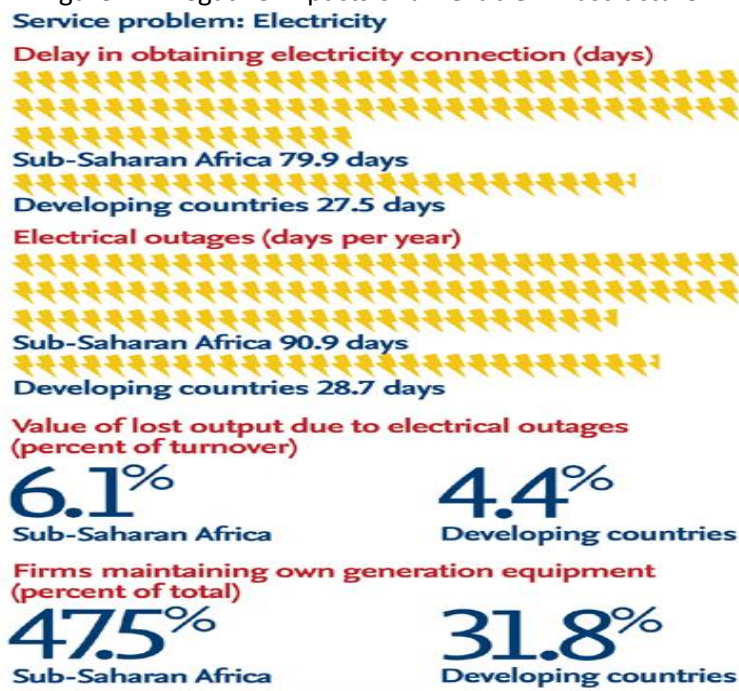


Source: IAE, 2009

Figure 11 shows the extra need for energy for the year 2030 and where this energy needs to come from (above). The second picture shows the investments needed to get this infrastructure up. It is clear that there is still a lot to be done to make sure that safe energy access is for everybody. One must not think that merely supplying the energy will be sufficient. Without proper equipment and appliances, the energy will do no good. The energy has to serve a purpose as well: it has to positively affect communities. Industries need to be powered, health care services improved and transportation has to go up. The benefits will be

great: more light in the home to study or read, perishables stay good longer and increased value of products through the first steps of industrialization. Energy markets in the developing world are usually subsidy based. This is a situation that isn't favorable. In the end, the energy market must follow the market based approach without outside funding.

Figure 12: Negative impacts of unreliable infrastructure.



Source: World Bank, 2007

Figure 12 shows the value that is lost due to electrical outages (center). Take that away, and you are one step further in your development. Secondly, it also gives an overview of how many companies have their own generator to get electricity. Both numbers are much higher than the average developing country. Africa has many renewable energies sources that can be used. Solar, hydro, wind and biogas are just a few of them. Each energy form has its own price tag, and it is up to the countries to choose the best one. Renewable energies can be a solution to the problems that come with the current energy sources. The grids in the countries are unreliable, and biomass has many negative effects. With cleaner renewable energies, you take away health and environmental issues. Plus, if you have your own solar or biogas energy you will be independent from the grid. This means that you will have no more black outs. Especially SME's can benefit from this, but the Tanzanian people as well. Renewable energies in a small form can be easily managed by households. This makes the jump to renewable energies even more interesting for countries like Tanzania. Of those small scale renewable energy solutions, biogas seems the most feasible one. It is very small scale, not high tech like solar cells, and you can adjust many things to your likings. The *assumption* for the energy context is as follows: because of the many benefits of renewable energy (and biogas in particular), and the characteristics of the people, the demand for biogas digesters will increase when enough information is given.

2.3 Entrepreneurship in Africa/Tanzania

'It is now widely agreed that the entrepreneur is the prime driver of economic progress (Boettke & Coyne, 2003).'

This part of chapter two will deal with entrepreneurship in Africa and Tanzania. Part of the main question is about entrepreneurship in the biogas sector. The goal of this section is to see what qualifications people need to have to be seen as an entrepreneur. The quote from Boettke and Coyne shows that

entrepreneurship has become very important in today's economy. In chapter four, we will see how the entrepreneurs in Tanzania match up against these qualifications. Entrepreneurship hasn't got a single unified and accepted definition. It is even believed that the term is used to mean whatever one likes (Gedeon, 2010). In this thesis we try to come up with the traits that are seen as being entrepreneurial and some definitions of entrepreneurship.

The term entrepreneur as used in catallactic theory means: acting man exclusively seen from the aspect of the uncertainty inherent in every action (Mises, 1949). Despite being an old quote, the notion still stands. An entrepreneur is someone who is acting on uncertainties. But without taking this risk, you will never improve. That is something an entrepreneur does: he 'jumps' into something new. He tries to make it in something that he (or no-one) has done before (Timmons, 2006; Boettke & Coyne, 2003). Or, as Boettke and Coyne describe it: *'The entrepreneurial element in human action entails the discovery of new data and information.'* Furthermore, the entrepreneur has the ability to see changes in information, and acts accordingly (Boettke & Coyne, 2003). Others describe entrepreneurship as *"any attempt at new business or new venture creation, such as self-employment, a new business organization, or the expansion of an existing business, by an individual, a team of individuals, or an established business"* (Achim & Popescu, 2008). Characteristics that are seen as specifically suited for entrepreneurs are numerous. In interviews with renowned entrepreneurs, good health came on top of the list of entrepreneurial traits. With good health you work longer, get sick less and are able to put more time into their venture. Especially when you have a company with few employees, it is important that everyone is present as much as possible (Business Town, 2003). Other traits that are attributed to entrepreneurs are presented in box 2.

Box 2: Entrepreneurial traits.

Self-confidence	Entrepreneurs feel like they are always in control. Tackling problems is easy for them, and they persist in pursuing their objectives.
Sense of urgency	Always wanting to develop ideas is a trait than an entrepreneur has to have. They like to be ever active, doing things that require action.
Comprehensive awareness	An entrepreneur can comprehend complex situations, is farsighted and aware of important details.
Realism	Entrepreneurs are realistic in their plans. They accept things as they are, and deal accordingly. Timely and factual news is important to them, in order to keep their planning up to date.
Conceptual ability	The ability to identify things quickly is another trait attributed to entrepreneurs. Whether these are relationships, problems or otherwise; the entrepreneur quickly identifies them and deals accordingly.
Status requirements	An entrepreneur seeks confirmation about his success. He finds satisfaction in the performance of his business. The appearance of the company is of second interest.
Interpersonal relationships	It is stated that entrepreneurs put the success of the company before personal relationships. The problem arises when communication and empathy in the workplace is missing. The entrepreneur should show tolerance and empathy towards those he is working with. Otherwise, the company will have a problem.
Emotional stability	Entrepreneurs need self-control to handle day-to-day business. The ability to cope with stressful situations is an important part of being an entrepreneur.
Dedication	Dedication to your goal (becoming the boss of your own company) is something every entrepreneur strives for. This goal makes them to dedicate all their time to become successful.
Proactivity	Making sure that you are the one to solve problems and find new opportunities means being proactive. Don't wait for things to come your way, but search for them yourselves.

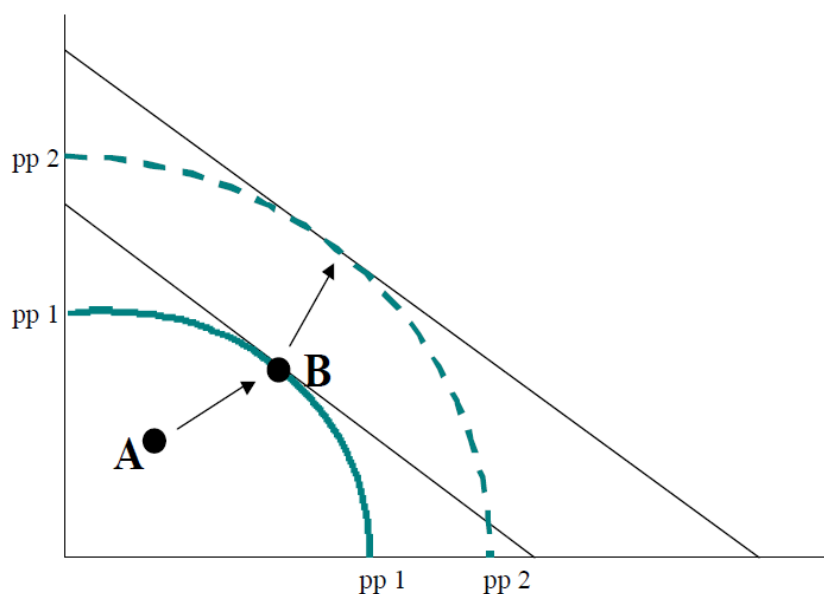
Source: Business Town, 2003; Timmons, 2006; Field Research

There is some debate whether the ability to notice changes is solely a quality of entrepreneurs. Maybe everyone has some entrepreneurial qualities in him. The citation that entrepreneurship is the driver of economic development may not be correct in that case. It is difficult to describe the relation between entrepreneurship and economic development. It has very much to do with the institutions that surround the entrepreneurs. Entrepreneurs work in a web of different institutions. These institutions range from political and legal to cultural. These institutions make up the framework and rules in which the entrepreneurs have to work. The view of the authors is that entrepreneurship is not the driver of economic development. Rather, the institutions can help entrepreneurship to further developmental growth (Boettke & Coyne, 2003). The second question is whether entrepreneurship is teachable. Are entrepreneurial skills and the ability to innovate things you can learn someone? An entrepreneur needs different skills to make it: awareness as to the importance of initiative, decision-making, innovation, risk-taking, as well as planning, financing and the implementation of a business idea. The underlying idea is to foster creativity and learning independence. Entrepreneurs should also take into account that a new venture won't be profitable for the first months or even years. It is the determination that brings entrepreneurs ahead (Achim & Popescu, 2008). Training rounds of weeks, or months is often not enough to become an entrepreneur. Entrepreneurial training goes on for a lifetime, learning new lessons everyday (Consortium for Entrepreneurship Education, 2006). The *first assumption* for the entrepreneurship is that the institutions that surround the biogas sector are hampering the development of the sector. Because of the relative newness of the sector, the actors in it are not yet familiar with the institutions. This is especially true for the people in the BCE's. The institutions will therefore be more of an hindrance than a benefit.

We made a start on entrepreneurial traits and definitions. To continue, there are three different views on entrepreneurship that are generally accepted. Those views are: the entrepreneur as an innovator; entrepreneurship as arbitrage and entrepreneurship as one of betting on ideas. The view of the entrepreneur as an *innovator* comes from Schumpeter. He saw the market not as a competitive construct. Schumpeter's analysis came from the notion that the market was in perfect balance. The market process was a dynamic process driven by creative destruction. In this process of development and progress, the entrepreneur is the innovator. Besides being an innovator, the entrepreneur is a leader as well. The leader goes to unexploited opportunities and people follow this leader. In short: '*entrepreneurship is the ability to break away from routine, to destroy existing structures, to move the system away from the even, circular flow of equilibrium*' (Schumpeter, 1934). Even though an entrepreneur has to explore new areas, that doesn't mean he doesn't has to conform to institutions. Lastly, Schumpeter noticed the need for a financial motivation for entrepreneurs. Without the necessary financial motivation, there would be less or no entrepreneurial action. This financial motivation is one of the reasons for entrepreneurs to respond to opportunities (Boettke & Coyne, 2003). This does not mean that entrepreneurs spend the money they earn on luxury goods. They are more concerned about paying off debts or invest the money in the company. Luxury goods are in the picture when the business is going well (Business Town, 2003)

Kirzner himself did not differ from Schumpeter that much. The biggest difference between the two is the position the market takes in the debate. Kirzner sees entrepreneurship as *arbitrage*. The market is in his opinion something that tends towards equilibrium. This equilibrium is the consequence of entrepreneurial discoveries. The entrepreneurs see opportunities and act accordingly. Alertness is the term Kirzner uses. These opportunities also stem from mistakes made by others. The similarities of Kirzner and Schumpeter come from the notion that entrepreneurship is grounded in the exploitation of profit opportunities. Schumpeter 'destroys' the equilibrium by finding new opportunities; Kirzner restores equilibrium by righting the wrongs of past errors (Kirzner, 1973; Boettke & Coyne, 2003). Figure 13 shows the effect of entrepreneurial action. The entrepreneur moves the line from point A to point B. Point A is a state where the market is economically ineffective. Point B is the economically effective point. With new technological and production processes, the entrepreneurial process shifts the entire production possibility curve from pp1 to pp2. An increase in real output is realized due to the increase of real productivity (Boettke & Coyne, 2003).

Figure 13: Result of entrepreneurial activity.



Source: Boettke & Coyne, 2003

The last view on entrepreneurship is the view that entrepreneurship is *betting on ideas*. This view is used in historic view to explain the economic advancement of the developed countries. The notion is that entrepreneurs take risks and thus innovate the production process. The entrepreneurs were enabled by the institutional framework around them. The institutions provided the needed stability for entrepreneurs to take the risk. Before there were institutions, many opportunities proved too risky for entrepreneurs to step in (Boettke & Coyne, 2003). To try to get an even fuller picture on the different ideas behind entrepreneurship, the following quotes are assembled. These quotes, along with the entrepreneurial traits of box 2 will be the standard against which the Tanzanian biogas entrepreneurs will be measured. The important part is the distinction between entrepreneur and manager.

The distinction is drawn between “entrepreneurs” who are goal and action oriented as contrasted to “managers” who carry out policies and procedures in achieving the goals... Owners of mom and pop motels appear as the entrepreneurial type who have invested their own capital and operate a business (Litzinger, 1965).

“The person or group of persons who assume the task and responsibility of combining the factors of production into a business organization and keeping this organization in operation... he commands the industrial forces, and upon him rests the responsibility for their success or failure (Ely and Hess, 1937).”

The carrying out of new combinations we call ‘enterprise’; the individuals whose function it is to carry them out we call ‘entrepreneurs’ (Schumpeter, 1934).

An Entrepreneur is someone who perceives an opportunity and creates an organization to pursue it (Bygrave and Hofer, 1991).

A person who organizes and manages a business undertaking assuming the risk for the sake of profit (Hull and Bosley, 1980).

The entrepreneur (whether or not he in fact also doubles as a manager) has a different function. It is his job to locate new ideas and put them into effect. He must lead, perhaps even inspire... he is the Schumpeterian innovator and more. He is the individual who exercises what in the business literature is called ‘Leadership.’ And it is he who is virtually absent from the received theory of the firm (Baumol, 1968).

Chapter two presented the theoretical framework for his thesis. Three different subjects (networking, entrepreneurship and energy) that can be related to the Tanzanian private biogas sector. Networking and entrepreneurship are important for the companies and the biogas sector. These two subjects show what can happen when you have a network of rewarding ties, and if you or your company has entrepreneurial skills. Both seem to be important in the development of a private sector. The energy context is mainly a

context for the country, to see what the impacts are of different forms of energy in the country. This is also important for the people. Right now, the Tanzanian people are not all connected to the electricity grid. As a result, the Tanzanians are using a lot of biomass energy. Renewable energy solutions, linked to bottom up solutions perhaps, can be an answer to this problem. We will now take a look at the different assumptions based on the theory.

For section 2.1, the network theory, the following assumptions have been drafted:

1. The *first assumption* we make is about the network theory. Communication is essential in doing business. Relationships with customers and other actors are important. In the developed world this communications go smoothly. In the developing world, this can be more of a problem. Due to the long distances in Tanzania and the lack of proper infrastructure, communications on both the short and long distance are weak in the private biogas sector. The lack of means of communication will hamper the communicational relationships.
2. The *second assumption* is concerning the network theory as well. Theory states that it is very helpful to have a network around your business. Is this the same case when you look at less developed countries like Tanzania? Will new businesses have a supporting network as well? Networks are probably helpful in every situation, but the assumption is that in the private biogas sector the networks are informal and not really structured. The main communication is personal, instead of a social process involving organized structures.
3. The *third and final assumption* for the network theory is that virtual networks in Tanzania are difficult to establish because none of the BCE's are fully prepared and ready to participate in a network. The BCE's are not yet at the technological level that they can use the virtual network to their benefit. In time this will change perhaps, but not in the near future. The BCE's should stick with mobile phones, and perhaps Internet for e-mail addresses.

For the energy part, one assumption is drafted:

4. The *assumption* for the energy context is as follows: because of the many benefits of renewable energy (and biogas in particular), and the characteristics of the people, the demand for biogas digesters will increase when enough information is given.

Lastly, for section 2.3 (entrepreneurship), two assumptions are drafted:

5. The *fifth assumption* about the entrepreneurship is that the institutions that surround the biogas sector are hampering the development of the sector. Because of the relative newness of the sector, the actors in it are not yet familiar with the institutions. This is especially true for the people in the BCE's. The institutions will therefore be more of an hindrance than a benefit.
6. The *sixth assumption* regards the entrepreneurship as well. The list in box 2 provides a lot of characteristics about entrepreneurs. The entrepreneurs should have these skills, or at least almost all of them. The assumption is that the entrepreneurs in Tanzania don't have these skills. The reason for that is the lack of education and training.

Chapter three: Methodology

Chapter three will present the methodology of the thesis. After the context has been presented, this chapter will give a detailed methodology of the research. The chapter starts with a short introduction of the research internship, stating the goal of the research and the different research questions (3.1). The chapter continues with the conceptual model and the explanation of the conceptual model together with the operationalization of different concepts (3.2). Section 3.3 will present the methods that are used to come up with the field data. The chapter ends with the research population and the research area in 3.4.

3.1 Research objective, research question and sub questions

The subject of the field research was to analyze the domestic biogas programme in northern Tanzania, with a key focus on the private biogas sector. This programme is supported by the Dutch NGO SNV (Netherlands Development Organization), and executed by the parastatal organization TDBP (Tanzania Domestic Biogas Programme). For a year now, the TDBP is trying to form companies out of single masons and help them set up their businesses. Before, the digesters were built by either lone masons or groups. Based on the assignment given by SNV and Utrecht University, finding out what the status is of these companies (the private sector) was the main objective. The research question is as follows:

‘What are the main characteristics of the Tanzanian domestic private biogas sector (programme), what is the role of entrepreneurship and what interventions are needed to make the private sector successful, viable and fully independent?’

To be able to answer the main research question, we need to know more about the sector and its characteristics. The actors in the sector are important. Who are they and what do they do? Besides these questions, the future of the sector is important as well. What are the possibilities and what are the pitfalls? Both are vital to know for the continuation of the sector. In total eight sub questions are formulated. The sub questions deal with all the different aspects of the biogas sector. The first six questions deal with the biogas sector and its affiliates, whilst the last two questions deal with the Tanzanian population. These sub questions were derived from both the context chapters as well as the conceptual model that will follow (figure 14). The sub questions are:

- 1. Who are the actors in the biogas sector and what are their characteristics (focus on the Biogas Constructing Enterprises, BCE’s)?**
Who are we dealing with when we talk about biogas in northern Tanzania? This question will investigate the characteristics of the most important actors currently active. The main interest point is to find out what the characteristics of the BCE’s are (gender, education), being the most significant player in the private sector. The first topic will deal with this.
- 2. Are there network ties present in the sector, and if so, what kind of ties?**
A company in the private sector will have a hard time surviving without ties that are connecting him to other parties. The ties that are surrounding the BCE’s are subject of investigation. Since the private biogas sector in Tanzania is relatively new, it will be interesting to see how the network around a BCE looks like and how it is used. We have already discussed the network theory, and this part will come back to it.
- 3. Is there any sign of cluster forming of any kind?**
An aspect of a developed private sector is that cluster forming is in progress or already done. Cluster forming gives companies more possibilities, both internal and external. This question is important, as it will help establish the current status of the private biogas sector. The current status of the cluster forming will be answered in this question. As explained earlier in the thesis, cluster forming was originally one of the key focuses of this thesis. Despite it not being one of the key subjects, it is still important to see the status of the cluster forming in the sector.

4. What is the role of individual entrepreneurship in the sector?

Entrepreneurial spirit is an important factor in establishing an independent private sector. The section dedicated to entrepreneurship is divided in two parts: firstly we will elaborate on what entrepreneurship is (done in the second part of chapter two), and secondly what it means for the biogas sector. The question for this second part is whether the biogas sector has entrepreneurs in it, or not. Entrepreneurship is already discussed in chapter two, and will return in this part.

5. What are the opportunities in the sector?

Question five will deal with the opportunities that are not yet (fully) addressed by the private sector. These opportunities are important to recognize, as they can help the sector towards more independence once properly addressed. The goal of the programme is to help establish a fully independent and successful sector. Unaddressed opportunities can aid this objective.

6. What are the pitfalls in the sector?

Every starting private sector and every starting company will face some adversity. The second sub question on the sector will be discussing the different pitfalls the sector is already dealing with, or could be dealing with in the future. It is important for the BCE's to know the challenges they are facing.

7. What are the characteristics of the Tanzanian people (in particular those who are most likely/suitable to get a biogas plant)?

The characteristics of the Tanzanian people will be answered in question seven. Without demand, supply is useless; without demand, there is no private sector possible. This question will deal with the characteristics of the Tanzanian people: are they rich, poor, what is their access to different means of energy etcetera. This will give an overview of the customer side of the biogas sector.

8. What is the acceptance of biogas as an energy source?

If the acceptance for biogas isn't big enough within the Tanzanian population, there is no chance for an independent private biogas sector. The question is whether the target population for biogas is interested to actually get involved in the programme.

The main research question consists of three different parts: first, the characteristics of the sector; second, the role of entrepreneurship; and third, the interventions needed to help the private sector become independent and successful. The private biogas sector is new, and is an interesting subject for research. Entrepreneurship is an important part to get the sector towards independence, as are the interventions. The interventions meant are not only those interventions that are positive and should be addressed; it also means interventions to avoid pitfalls that can hamper the sector. The main question will be answered at the end of the thesis. The sub questions will be subject of different topics in chapters four, five and six (research findings).

3.2 Conceptual model, operationalization and hypotheses

This section of chapter three will deal with the conceptual model for the research. First the conceptual model is presented, with the description of the different aspects. After the model, the operationalization of different concepts is presented. This is to fully understand the terminology used in the sector.

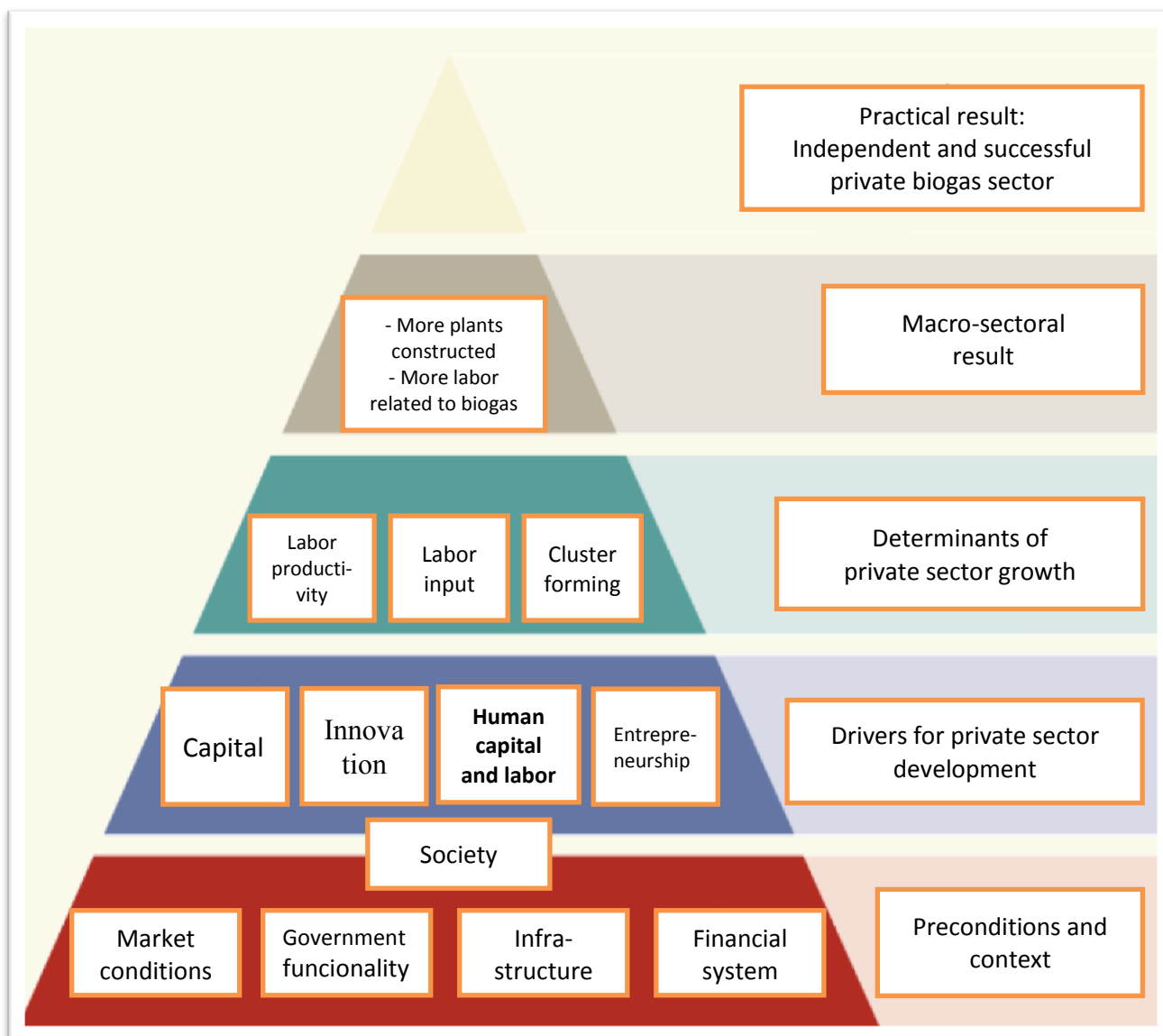
3.2.1 Conceptual model

The conceptual model (figure 14) of the research gives an overview of all different aspects of the biogas sector. The model is based on a pyramid, with the (expected) outcome at the top and the way to get to that outcome building up from the bottom. The research questions follow the conceptual model, being a visual representation of them. The sub questions are factors that are contained in this pyramid. This pyramid is

derived from the CBS Netherlands economic development model. This model contains a number of layers with on the one hand factors that affect the economic performance of a country (or in this case a sector) and can be counted among the business climate of a country or region (or sector) and the economic performance itself. The underlying layer contains factors that the preconditions of economic growth and social context determine the financial situation, the market conditions, the functioning of government and infrastructure. Society is in between the bottom and second layer. Because society (the customers) is both a precondition and a driver for economic growth, it is difficult to put them in one of the layers. The second layer contains factors that serve as drivers of economic growth: innovation, entrepreneurship, human capital and labor, and capital. A third layer is explicitly dedicated to the factors that serve as the determinants of economic growth, labor productivity and labor input. For the biogas sector, cluster forming has been added. As explained earlier, the level of cluster forming could give an idea on the status of the sector. A fourth and a fifth layer finally pay attention to the things that ultimately result in economic and social forms: the gross domestic product (GDP), environmental sustainability and quality of life. This model shows the prerequisites for a sector to reach its final goal. The pyramid has been modified to show the prerequisites and goal for the domestic biogas sector. The different levels are supporting one another. Not just from the bottom up, but also in the top down the layers and factors are influencing each other (CBS modified, 2012).

Competition has been left out of the original model. The biogas sector does not fully benefit from competition as yet. Some of the companies are just started up a few months ago. Competition will be too disadvantageous for them. These preconditions are explained more in detail throughout the thesis. In chapter two, we already saw what entrepreneurship and innovation can mean for a private sector. Chapter four, the research findings, will explain the other preconditions that are in the model. The concluding chapter will answer the questions.

Figure 14: Conceptual model.



Based on a model from CBS Netherlands, modified with the field research findings (2012)

3.2.2 Operationalization

In the biogas sector, there are different specific sectorial concepts. Some of them are fairly straightforward, but some need some operationalization or clarification. This paragraph will help understanding the different concepts. The different concepts to be operationalized are:

- *Biogas*: energy that comes from ecological sources/waste (dung, plants). The digestion process of agricultural and non-agricultural wastes results in the provision of gas for cooking and lighting.
- *Actor*: Refers to either human or nonhuman entities. "Actants can be capable of interests, projects, desires and/or strategies, with the ability to make other relevant actors enthusiastic. They are a product of a more or less stable relationship between various effects or ties that together form an actor-network" (Rhodes, 2009).
- *Biogas plant/dome/installation/digester*: four different names for the same concept. The most widely used term is biogas plant. A biogas plant is the complete structure that is required to produce gas from animal and human dung.

- *Bio-slurry*: After the process inside the biogas digester is finalized, you end up with gas and manure. The manure is called bio-slurry. This slurry can act as a fertilizer for gardens and farm products.
- *Commercially viable biogas sector*: see 'Independent private sector'.
- *Cluster (forming)*: A cluster is geographical concentration of companies that maybe cooperating together (but not necessarily). Marshall described the concept of cluster as a group of companies that operate on the same market and who are making a joint use of local production. (De Pater et al., 2005)
- *Entrepreneur*: Someone who is practicing entrepreneurial skills (see entrepreneurship).
- *Entrepreneurship*: Entrepreneurship is a quality of someone to see opportunities before others see them. He is a risk taker and knows what he wants from these risks/investments. He is one of the people that help development by going paths that haven't been taken yet.
- *Fundi*: See 'Mason'
- *Independent private biogas sector*: An independent private sector means a sector that doesn't need financial help or otherwise help from other parties (like TDBP and SNV). The private sector can sustain itself, it is commercially viable. The companies in the sector have grown to such a stature that they are fully independent. They have enough work for their employees, and know how to stay in business. This doesn't mean that they are not receiving any help at all. Some help can always be useful.
- *Lone wolfs*: Term used for those masons that are working alone, building biogas plants. The new strategy of TDBP is to cut off the lone wolfs, and work with groups or preferably companies.
- *Mason*: Normally a term for a stone mason (construction worker), but in Tanzania a general term. In this thesis, a mason is an employee of a BCE, dedicated to building biogas plants.
- *Myopia*: Not directly a term from the biogas sector, but something that describes the lack of vision inside the sector. Myopia is described as nearsightedness. People don't look further than their own area, and thus miss opportunities (Levinthal, 1993).
- *Nodes*: Nodes are the points in which the network ties come together. In this thesis, actors are the nodes.
- *Piki-piki's*: Swahili word for motorcycle
- *Pitfalls*: Opposite of opportunities, are the pitfalls. These pitfalls are those factors that can hamper the development of the sector, or even set it back.
- *Small and Medium Enterprises*: This term is used to mean very small business that produces goods or services for cash income. There is no universally accepted definition of SME's; different countries use various measures of size depending on their level of development. The commonly used methods are total number of employees, total investment and sales turnover (Maleko, 2005).
- *Successful biogas sector*: See 'Independent private biogas sector'.

- *(Network) Ties*: A term closely interlinked with cluster forming. The network ties are those ties that exist in a network (in this case the network of the biogas companies) (De Pater et al., 2005).

3.3 Used methods

This part of chapter three will present the way in which the research was conducted. The methods with which the data were collected were qualitative methods like interviewing and participating, and literature study. The three different methods did have different target groups: for the interviews the target group was the biogas companies; for the literature review and the meetings, the target groups were the actors around the biogas sector.

The way the research was primarily conducted was by interviewing those directly involved in the biogas programme. Among them were officials from governmental organizations, NGO's, credit facilitators and most importantly the people working at the biogas companies. These interviews were generally held throughout the whole duration of the internship, with three key periods. End of February, mid-March and mid-April. In practice, the people interviewed at the biogas companies were the managers and the assistant managers of the companies. This does not lead to a distorted image (only speaking the top of the company), since the managers and assistant managers are also masons of the company (and an average company has just 6 employees). The company chooses a manager from their midst to lead the company, but the manager is still also directly involved in construction. So by interviewing the manager, you get a complete view of the company.

The interviews were mostly one on one, with a translator that could translate from Swahili to English. At some venues, there were staff members from SNV or TDBP present (or both), to help facilitate the interviews and ask questions themselves (since the program is only a few years old and the formation of companies just a year, they themselves had some questions as well). This led to a very complete set of questions, since both parties (the local organizations and I) had different interests which proved to be mutually beneficial. There was a semi structured checklist for the questions, with both open ended and closed questions to be asked. In this way, there was enough room to improvise and also letting the interviewee give his or her opinion. As a feedback, both SNV and TDBP recorded their findings and shared their experiences. Interviewing is the most effective way in researching this subject, since you get the information first hand. By just looking at the biogas plants you will get very little information about the biogas sector. Thus, the choice was for interviewing the actors in the programme. Besides the interviews, you get a real-life look on the biogas programme. The masons and managers of the companies could show the different biogas plants they had constructed. This way, you get both the theory as well as the practice of being a biogas company in Tanzania. The Implementing Partners (IP's) were also interviewed one-on-one. The IP's were sometimes present during interviews with the BCE's, or they were visited along the way. Speaking with the directors of the IP's was useful to check the answers that the biogas managers had given, since the IP's know the status of the BCE's as well.

Next to the interviews, a literature study was done at the SNV office in Arusha (see the separate file in the bibliography). This helped understanding the different aspects of the biogas sector. Several internal reports have been written, as well as status/progress reports. This was useful to construct the short history of the TDBP in northern Tanzania. The history of other actors (like IP's), as well as their relationship with the different aspects of the biogas sector were documented as well. These reports proved valuable, but the interviews and the hands on view of the biogas were more important. In the bibliography there will be a separate list of literature used in Tanzania. The last method of data collection was by attending meetings, work and focus groups and learning days. These gatherings discussed a wide range of topics. Topics discussed included the role of Local Capacity Builders, IP's, and tackling the biggest bottlenecks SNV and TDBP were facing. There were no direct one-on-one interviews, more often the talks were with small groups, or plenary sessions. The discussions always were about biogas, so the outcomes of these meetings are useful to give the right advice/recommendations to help the sector towards an independent sector. It gave a different perspective on the sector, as you get the ideas from those related to the sector but not

those who are constructing. These different viewpoints were of great use. During the internship, a week-long training for biogas managers was attended as well. Here, the managers got their training to help develop their company. See the annex for the complete training.

During the research, large questionnaires were not used to get information. The reasons for not using a method consisting large questionnaires were threefold: the relatively small research population of biogas companies (26); the sometimes very big differences between the; and the research was aimed at getting qualitative results, for which interviews are more suitable. This made it hard to make a uniform questionnaire. Questionnaires would do no justice to the difference between the companies, especially those just starting up compared with those already longer in the business. However, there was a semi structured checklist to be able to ask the same sort of questions to everybody. (Participatory) observation was practiced, following the manager training in Same.

3.4 Research population

The key population for the field research consisted of the newly formed and already present Biogas Constructing Enterprises (BCE's) in Northern, Central and Eastern Tanzania (see figure 15). In total, 26 companies are active in the sector. The research subject was the private biogas sector, in which the biogas companies were the main actor. Other actors were more at the side, giving support and help to the companies. For that reason, the choice was made to make the BCE's and their employees the main research population. Because of the relative small population (26 companies), the choice was made to take all the companies into the research population.

The second part of the research population consisted of the actors surrounding the biogas companies. These were credit facilitators, support organizations and others. The list can be found in box 3 in paragraph 4.2. For these actors, SNV and TDBP have held numerous meetings which were attended. It was not clear how many actors there were before leaving. In retrospect, all the important actors have been spoken to. There were some 10-15 meetings which were attended. The actors ranged from SNV/TDBP to LCB's.

The third and last part of the research population is the demand side: the Tanzanian people. But, since there was another research going on about the market for biogas (the Biogas User Survey, BUS), this last population has only been studied to some extent. The people in Tanzania regarding the research can be categorized into four different categories: 1. People who own a digester; 2. People who are getting one constructed; 3. People who want a biogas digester; 4. People who don't want one, or can't get one (because of the preconditions are not met).

The research area consisted of the following areas: Arusha, Singida, Manyara, Kilimanjaro, Tanga and Dodoma. This does not mean that every inch of the area was visited, but all the 26 BCE's are located in the green area. At the same time, that doesn't mean that the companies are restricting their operations to these areas. The starting point was the city of Arusha. The SNV office was located there. From there, trips to the research sites were conducted. The Indian Ocean in the east (the city of Tanga), and Haidom in the southwest were the limits of the research area. Closer to home, around Arusha was the largest concentration of BCE's, followed by the region of Same.

Figure 15: Research area (in green) in Tanzania.



Source: Tanzania NBS, 2010 (own modification)

Chapter three showed the different aspects of the research in Tanzania. It showed where the research was done and how. The questions that will be leading to an end conclusion are stated here. The main question was formulated with the assignment of SNV and the University in mind. The sub questions were prepared on the basis of the two context chapters and the conceptual model. Now that we have the contextual background as well as the way in which research was done, it is time to move on to the research findings.

Chapter four: The biogas sector

The next four chapters will present the research findings. Chapter five presents the entrepreneurship and cluster forming in the chapter; chapter six gives the data on the people in the sector (the demand side) and the future of the sector; the last chapter (seven) will be somewhat of a roundup of the previous three chapters by giving some case studies. This fourth chapter of the thesis will present the first part on the biogas sector. In the 14 weeks of the internship, the biogas sector has been extensively investigated. The biogas sector in Northern Tanzania is a sector in development. Although biogas has been present in Tanzania for a long time, since the TDBP programme started up in 2007 the sector is more planned and organized. To start with, the different phases of the research will be presented. These five phases are the main phases of the research; in between other smaller parts of the research have taken place. These other parts included meetings or visits to actors to give an example.

Phase 1: Desk study

The first phase consisted of getting to know the biogas sector. Different reports and other literature were read. This was an inventory study. Furthermore, getting acquainted to the staff of SNV and TDBP was another part of the desk study.

Phase 2: Training

The second phase was the attending of a week-long biogas manager training in February. In this week, the biogas company managers were taught a set of different topics. With some translation, this was also valuable for the research. See the Annex for the detailed information about the training. The training was useful not just to see what the managers were learning. It was a good opportunity to see what kind of people the managers were and to speak with them. This proved valuable for later visits to the BCE's.

Phase 3: First round of BCE visits

The first real phase of research was visiting the BCE's in the Arusha region. These BCE's had already done the training described in phase two in January. This visits were a chance to see what the BCE's had done already. During the training, the managers had been given assignments to do (like making an organizational chart). These visits were to check their progress and comment on the way that things were done. This was both for SNV/TDBP and for me a valuable trip.

Phase 4: Second round of BCE visits

The fourth phase comprised of visiting the BCE's whose managers had got the training in February. This was the same concept as phase three. All the managers were interviewed and checked on their progress.

Phase 5: Rounding up and report

The last phase was returning to the office and start rounding up. This meant writing down all the research findings and analyzing them. After this, the report for SNV/TDBP was made. This report concluded the internship.

The way the next three chapters are structured is according to the sub questions that have been presented in chapter two. It is possible to split the eight sub questions that have been formulated into four topics. The topics cover the different aspects and actors of the biogas sector. Topic 1 will be subject of this chapter (chapter 4); the second topic will be presented in chapter 5; and topics 3 and 4 will be the focus for chapter 6. The topics and their respective sub questions are:

Topic 1 (chapter four): The sector and its ties, with the following sub questions:

1. Who are the actors in the biogas sector and what are their characteristics (focus on the Biogas Constructing Enterprises, BCE's)?
2. Are there network ties present in the sector, and if so, what kind of ties?

Topic 2 (chapter five): Entrepreneurship in the sector, with the following sub questions:

3. What is the role of individual entrepreneurship in the sector?
4. Is there any sign of cluster forming of any kind?

Topic 3 (chapter six): The future of the sector, with the following sub questions:

5. What are the opportunities in the sector?
6. What are the pitfalls in the sector?

Topic 4 (chapter six): The people

7. What are the characteristics of the Tanzanian people (in particular those who are most likely/suitable to get a biogas plant)?
8. What is the acceptance of biogas as an energy source?

4.1 Characteristics of the sector

The subject for this first topic section is the biogas sector (the characteristics of the sector and the actors in it), and the existing and non-existing (and perhaps future) ties that are active inside the sector. We will also take a look whether cluster forming is present. This section is based on the first three sub questions. The history has already been discussed, so we will not recap this extensively. The most important part is the new phase that commenced last year (2011).

The biogas sector in its current form is relatively new, but biogas has been around in Tanzania since the 1970's. The biogas sector in its current form started from 2007, when the Tanzania Domestic Biogas Programme started. With the help of international donor organizations, the programme wanted to improve the livelihoods and quality of life of rural farmers. The way they want to achieve this goal is through the promotion of biogas digesters. This way, they hope to contribute to both economic as well as health related benefits. The economic benefits are more employment for the rural and urban population. The health benefits stem from removing the smoke inside the house. With traditional cooking, the wood produces much smoke. This leads to respiratory and eye diseases. With the gas from the biogas digester, you remove this smoke which leads to health benefits. You also get a more reliable access to energy and you save time in which you can develop yourself. Deforestation is a problem, and biogas can counter this because the necessity to cut wood is gone.

In 2011 the newest phase started. This phase comprised of the support to help masons form legal companies. Before the companies were active, biogas digester masons were either lone wolves or loosely connected to some sort of group. This new phase is an important phase for the programme; if it succeeds and the companies can establish a commercially viable domestic biogas sector, programme support can be phased out. This is essentially the goal of the program: making yourself (as TDBP but also SNV) not needed anymore. The biogas companies will have to develop themselves to be fully independent from programme support. Northern Tanzania has 26 companies spread across the area. They have a total of 164 people working in their companies, which gives an average of 6.4 members per company. These companies have constructed 125 plants up till the end of the field research, which gives an average of 4.8 plants constructed per company. For June the prospects were high, with the 26 companies planning to have built in total 533 plants. If they succeed in this, the average plants per company will go up to 20.5.

Talking to masons and managers from various companies, the magic number of production is two digesters a month. These two digesters can be constructed by one mason working alone. When there are two masons at work on one digester, this goes down by half: in one week, one digester can be constructed. Simple math teaches us that the average company (six members) can make twelve digesters a month. But the practice is that just five companies are constructing twelve or more biogas plants a month. That means that less than 20% of the companies is making the amount of digesters they can. Of course there are companies that have just started up their company (some in January this year), and other companies don't have six employees. But fact is that five companies haven't constructed any plant up till May when the

research ended. The sector consists of the BCE's primarily, but there are numerous other actors that are either on the demand side or the supply side. Those actors are described in the next paragraph.

4.2 Characteristics of the actors

In the biogas sector there are multiple actors active. Section 4.2 will present these actors, along with their characteristics. Box 3 shows a list of the most important actors in the private biogas sector. These are (in random order):

- ❖ TDBP
- ❖ CAMARTEC
- ❖ SNV
- ❖ BCE's
- ❖ IP's
- ❖ LCB's
- ❖ SACCO's
- ❖ Credit Facilitators
- ❖ Tanzanian Population
- ❖ Tanzanian Government

- A. **TDBP:** TDBP stands for Tanzania Domestic Biogas Programme. The goal of the Tanzania Domestic Biogas Programme is to improve the livelihoods of rural farmers. The way they do this is through exploiting the market and non-market benefits of domestic biogas. The ambition is to support the installation of 12.000 domestic biogas installations in the first phase from 2008-2014. Furthermore, TDBP aims to develop a commercial viable domestic biogas sector by improving the demand for biogas through marketing and the support of masons to form enterprises that construct the biogas digesters. That process is just starting up, but results are already visible. TDBP is an organization who primarily focuses on facilitating the biogas sector. Or, as they say: '(TDBP) will act as an autonomous entity, responsible for coordination and management of the support activities'. They are supporting both the demand side (customers) through credit facilitators and the supply side (training the BCE's) (TDBP, 2012).
- B. **Camartec:** CAMARTEC (Center for Agricultural Mechanization and Rural Technology) is a parastatal institution located in Arusha and headed by the Ministry of Industry and Trade & Marketing. CAMARTEC has a long history of biogas, and since the 1980's it was able to build up huge expertise in biogas technology and related issues. This led the organization to become one of the technological and research centers of Africa concerning biogas. Despite being an organization that is targeting the entire agricultural and rural development aspects, it has done a lot for the biogas sector. Tens of classes of people have been trained in biogas construction by CAMARTEC, mainly from Tanzania, but also from all over Africa.

The three main functions of CAMARTEC are (not necessarily related to biogas):

- To carry out and promote the carrying out of applied research designated to facilitate the designing, adoption and development of machinery and equipment suitable for use in agricultural and rural development.
- To develop and manufacture approved prototypes, components and cultural techniques and technologies and evaluate their suitability for adoption and alternative use in rural agricultural production.
- To perform tests on all types of machinery and equipment intended for use in agricultural and rural development in Tanzania and to publish the results of each test (CAMARTEC, 2012).

- C. **SNV:** SNV/Netherlands Development Organization is a Netherlands based international development organization that employs more than 1,200 experts in 26 countries worldwide. More than 70% of their staff comes from the countries in which they work. SNV is an advisory organization to local organizations in developing countries in order to support their struggle against poverty. Their overall mission exists of realizing a society in which people benefit from freedom in order to follow their own sustainable development. In short, SNV supports sector development focused on:
- Market based dissemination and distribution
 - Policy links and development
 - Private sector development
 - Access to adequate financial services
 - Effective Research and Development

Biogas is one of the focus areas in which SNV is active. They have a multi-stakeholder sector development approach, in which they try to optimize organizational and institutional capacities. They have two advisors on Renewable Energy, in which biogas falls under (SNV, 2012). Furthermore they have advisors on agriculture and water in the organization.

- D. **BCE's:** The BCE's are the Biogas Constructing Enterprises. These companies are responsible for constructing the biogas plants. These companies represent a new phase in the TDBP, being around for about a year. Before the companies, the plants were constructed by either unregistered groups or 'lone wolfs'. The BCE's consist of a number of masons, with one mason taking up the job of manager of the company. On average, a BCE has 6.3 employees active in the company (164 in total). The BCE's were led by and employed with middle age men (25-45). The number of digester construction is on average per company 20.5 digester up till June (533 in total). It is possible to make a distinction between the BCE's. In the report given to SNV after the research, a tripartite division (in low, medium and high performing) has been made to divide the different BCE's. The division was based on how the BCE's scored on different characteristics. Some of those characteristics were the number of biogas plants constructed, whether they had an office, company logo and organizational chart ready and the level of pro-activeness they had.
- E. **IP's:** The Implementing Partners of the programme are helping the new BCE's with their business. They act as the extension of TDBP through the TIPI, the TDBP Implementing Partner Infrastructure; mainly because they are closer to the BCE's than is possible for TDBP (because of the geographical distances). IP's can help companies with an array of activities: helping getting registered, helping with the constitution and aiding the BCE's with promotion to name a few of them. The IP's know a great deal about the BCE's, but also about the sector. The IP's are very different in size. Karatu Development Organization has eight employees; Evangelical Lutheran Church in Tanzania over 40 employees. They are not only supporting the biogas sector. A range of activities are the support of gender projects, agricultural projects and biogas. A good functioning IP is held in high regard by the biogas company managers, but there are also negative sounds when the supervisor from an IP is not functioning correctly. A few IP's are currently important in the biogas sector in this region. These are FIDE, ELCT, MIGESADO, NRCF and KDA.
- F. **LCB's:** Local Capacity Builders (LCB's) can aid the BCE's and other actors in the network by (as the name suggests) building capacity. The relationship with the LCB's is a tricky one. Not that they are not performing, but because they can take up different roles in regard to SNV. A LCB can be a client for SNV, where the LCB itself gets capacity building from SNV; the LCB can be a subcontractor where the LCB provides capacity building services to clients of SNV; and lastly the LCB can be a partner, where SNV and the LCB have engaged in a partnership that allows for the exchange and pooling of resources for mutual benefit. However, it is not yet clear where and how the LCB's can do their work in the biogas sector. There have been learning days at the SNV office with SNV, TDBP and LCB's to brainstorm about the matter. It seems clear that LCB's can partially take up the role of

SNV to provide capacity building. One way in which the LCB's are already aiding the sector is by giving training to the managers, and following up that training with visits.

- G. **SACCO's:** Savings and Credit Cooperative Societies (SACCO's) are privately-owned institutions. SACCO's have a number of members who have savings accounts at the SACCO, in order to be able to lend money. Only members can loan money from the SACCO. This is done because of the control the SACCO has; as a member, all your information is available to the SACCO. This way, the SACCO can help making sure that the members are not lending too much money (normally three times the borrower's savings account). At the same time, they protect their own finances. They make sure that the people who take up loans can repay them. The way in which SACCO can help the sector is by giving out loans to members that want a biogas digester. The interest rate for a biogas loan is low, just 2%. The paying back time for a SACCO's loan is normally about a year. Normally, a SACCO consists of 5-10 employees. Managers, assistant managers, secretaries and credit agents are the normal staff of a SACCO.
- H. **Other credit facilitators:** The principal providers of financial services to the poor and low income households in the rural and urban areas of Tanzania consist of licensed commercial banks, regional and rural unit banks; savings and credit cooperative societies (SACCO's); and several NGO's whose micro-credit delivery operations are funded and supported with technical assistance by international donors.
- I. **MFI's:** These institutions can help the biogas sector in the same way that the SACCO's do: giving people the opportunity to get a biogas digester. The term Micro Finance Institution means that it targets the smaller loans that people need. Difference with the SACCO's is that MFI's give out loans to everybody, not just members. During the field research, MFI's were not encountered, which means that there is still much ground to win for the biogas sector.
- J. **Banks:** Banks can be a huge help for the sector in supporting the BCE's with loans. Almost all of the BCE's have financial issues, and a bank can help resolve these issues. Banks like the CRDB Bank are already engaged in supporting rural projects. Biogas enterprises can be one of them, if the companies take the step to take on a loan from the bank. For now, the banks are still largely inactive in supporting the sector. The way in which a bank can help is not only support the BCE's with loans, but they can help SACCO's and customers of biogas digesters as well.
- K. **Women groups:** Women groups are active to support women with different financial needs, and are operated by just women. The women groups are generally groups of five to eight women in charge, and a very diverse number of members. They act similar to a SACCO or MFI, giving out loans but only to women, and only if they are members of the women group. These women groups are becoming increasingly important in the biogas sector (more important, but still a small player) because they give women more options. Field study has shown that it is mostly the man who applies for the loan, while women are the greatest benefactors of the biogas plant. Also, many women are the head of the household, since the man is either working or sick/deceased. These women get a lot of help from women groups in securing the money needed to purchase a biogas plant.
- L. **Government:** See the paragraph on ties in the sector (4.2)
- M. **The people:** See section 6.2

Now that we know who the actors are, it is important to know a little bit more characteristics are. These characteristics range from age and gender to the degree of professionalism and proactivity. They will be presented here. The majority of the people working in the biogas sector are male, aged 25-45. This could be because of the relative novelty of the sector. Younger people are maybe more interested to get involved into something new than older people are. Another characteristic is the fact that women are greatly

underrepresented in the sector. As an example we will take a look at the percentage of women in the BCE's.

Table 3: Percentage of women in BCE's in different countries, 2011.

Country	% of female masons (trained)	% of female masons active
Burkina Faso	4	4
Ethiopia	1	3
Kenya	6	3
Senegal	0	0
Tanzania	4	6
Uganda	6	6

Source: BUS Report (modified), 2012

From all the managers in the BCE's, there is only one female manager and two female assistant managers. There are a handful of female masons active, around 6% as can be seen in table 3. The reason that there are just a few female employees is unclear. The women themselves did not have the explanation, nor did the male employees. It seems that the biogas sector is a sector where men are more interested in. The BCE's have on average 6.3 employees in their company. The highest number is twelve employees in one company; the lowest number is four. The BCE's also distinguish themselves from each other in level of professionalism and proactivity. In the next section on entrepreneurship we will further explain this. Tanzania is a country that has education in high regard. The government sees education as one of the most important pillars of development (GoT, 2012). But the reality is that only 26% of the male students and 24% of the female students attend (or have attended) secondary school or higher (UNICEF, 2012). This reflects on the labor market. The biogas managers and employees are mostly schooled with primary education. Education is improving, but that does not help the current actors in the biogas sector.

The other actors in the sector show a more diverse image on characteristics. Especially when it comes to gender, credit facilitators are different. SACCO's and women groups are institutions where women are more integrated. LCB's and IP's are somewhat more male-led institutions, but less than the BCE's are. The similarity between these actors is the age group active: this is just like the BCE employees from 25-45. LCB's can be seen as one of the more proactive actors. They are actively seeking ways in which they can aid the BCE's. IP's are less proactive, according to the BCE's. But at the same time, the BCE's are not that proactive as well.

Table 4: Number of interviewees during the research.

BCE personnel	42
IP's, LCB's, SACCO's, Credit Facilitators	22
SNV/TDBP	8
Total	72

Source: Field Research 2012

Overall, some 30 people were seen. 42 managers, assistant managers and/or masons were interviewed in these 26 companies. The visits were carried out with a consultant, a PSD&Credit officer from TDBP and a driver. This way, there was always enough expertise and Swahili-English translation available. The population of (northern) Tanzania was not in the research population, even though they are important for the development of the private sector. The reason for this was that there was a simultaneous research in progress about the demand side of biogas in northern Tanzania. Furthermore, during the interviews and meetings the most important features of the population of Tanzania were covered. Table 4 gives an overview of the number of people interviewed or spoken to. Only the BCE personnel has really been interviewed one-on-one. The other categories have been spoken with, and discussed with (see above). The customers are slightly different, as there was more of an informal conversation than really an interview.

To conclude the characteristics part of this chapter: there are different actors active in the biogas sector. The different actors (around the BCE's) can be categorized as supporting actors. They help the biogas companies in one way or another improve their business. The biogas sector is mainly a male-driven-sector, with the actors being 25-45 in age. The BCE's are at the top of being male-led, with just one female manager out of 26 companies active. The other actors in the sector are somewhat more diverse in gender. The supply sector has much ground to win with regard to gender. But the question is whether this 'inequality' should be addressed. The biogas market is an open market, where every individual can start his or her own company. Apparently women are less eager to start up a business in this sector. The fact that few women are leading companies doesn't say that women are marginalized. Most sectors in Tanzania are led by men, and the biogas sector (and in this sector especially the BCE's) is no different. The level of education seems to be low regarding the low number of attendants to secondary and higher education.

The number of plants constructed up till June is 553. This is if all the biogas managers have kept their promise on future building statistics they gave. These 553 digesters have been built by the companies from January 2012 up to June 2012. 164 people are working as a biogas company employee. The biogas sector is looking for 12.000 digesters in two years. If the rate of construction stays at the same pace, at the end of the year there will be 1000 digesters. This is not enough given the timeframe the programme has. As for now, some 3000 digesters have been constructed. If the programme is to reach the goal by 2014, a lot is still to be done.

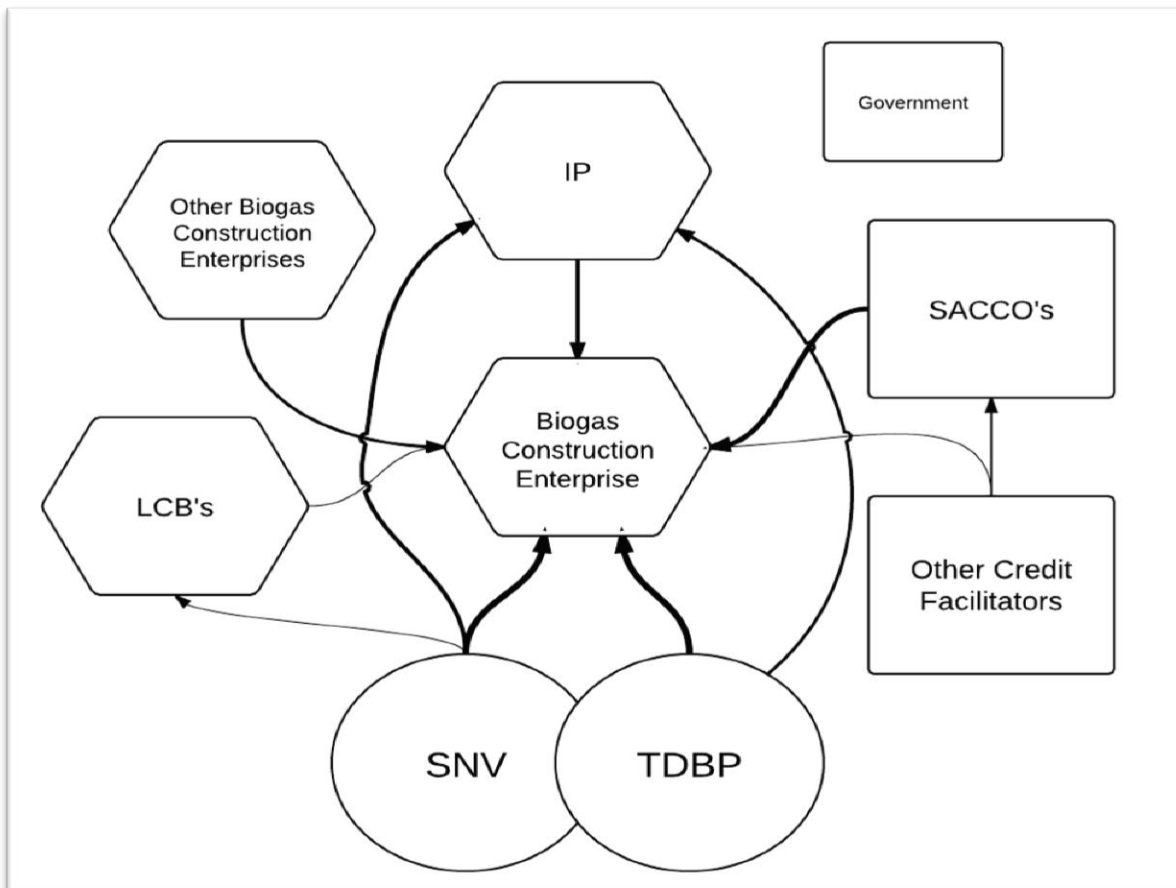
4.3 To what extent are there network ties present in the sector?

Naturally, where there are many actors there should be many ties. The actors have been discussed in the previous part. This section will try to present a full picture of the different ties that are existent in the sector. Furthermore, the ties that are not yet present will be discussed as well. The reason for that is that the biogas sector is to become independent from programme support in a few years. Maybe, with a few other (rewarding) ties this goal will be reached. The main focus of the chapter will be the ties between the BCE's and the other actors. Not losing sight of the current situation, the other (missing) ties between actors will be discussed as well if this proves valuable for the private biogas sector. The conclusion will analyze whether the practice matches the theory.

4.3.1 Existing ties in the sector

The theory on networking discussed the mapping of actors to get a good analysis. Figure 16a shows the network of actors around a BCE and the ties. This makes the picture a bit clearer, and ready for analysis. The thicker the line is, the more important the tie is. Customers have been left out of this figure, because adding it would make the figure unreadable. The government has no links yet, as field study has shown that they are not involved in the sector. SNV and TDBP are linked together, because field research has shown that both parties are very much intertwined together and have the same goals regarding the BCE's and the sector. Furthermore, figure 16a shows that the BCE has ties with almost all the actors, except for the government and the other credit facilitators. The government is absent altogether and has no links (yet) whatsoever. The missing link with the government will be further discussed in a different section of this chapter. The missing link with other credit facilitators will be discussed further on as well. In time they will prove a valuable asset to the ties of a BCE perhaps. The most important tie for the BCE's that is currently present is the tie with SNV/TDBP (the two are very much intertwined, as explained above). SNV and TDBP are the main driving force behind the creation of the private sector where the BCE's operate in. TDBP and SNV support the BCE's in more than just one way. Naturally, they help the BCE's directly giving training and building capacity. But more indirectly, they give support to IP's and LCB's who in turn help the BCE's in their own way. The BCE's are positive about the link with SNV/TDBP.

Figure 16a: Overview of the different actors around a BCE, with the ties between them, current situation.



Source: Field Research, 2012

A rewarding tie is the tie between a BCE and a SACCO. Field research has shown that companies that have strong ties with these credit facilitators prove to be more successful in doing business. The reason is that a SACCO usually has a large clientele. By promoting biogas to their customers, the awareness of the product raises. That is one benefit. Secondly, of those clients exposed to the biogas promotion, some do apply for a loan to purchase a biogas plant. So both the biogas as a technology benefits (more exposure) as well as the BCE who gets more customers. BCE's are also dependent on their IP. They are helping in more than one way which is described in section 4.2. To give the example more power: the BCE called DANKO got 42 customers from a nearby SACCO. This more than quadrupled the clientele of the BCE.

The second sets of ties are those separate of the BCE. Briefly discussed already in the previous paragraphs, SNV and TDBP are significant players in the sector and have many links. The links with the IP's and LCB's have been briefly touched. Here we will extend the discussion on these ties. In section 4.2 we already saw what the characteristics of the IP's and LCB's are. What do the ties between these four different actors add to the sector? The relationship between the IP's and SNV/TDBP is one of mutual benefit. The range of SNV/TDBP is limited. With limited time and manpower available it is not possible for the organizations to be everywhere at the same time. That is where the IP's come in. They act as an extended form of SNV/TDBP in the field. The ties between them consist of information sharing and updates regarding the BCE progress. From SNV/TDBP it is support and guidance.

4.3.2 Non existing ties in the sector

Despite the many actors and links that are in the sector, there are still some links missing. Most notably is the lack of government interaction. Some BCE's (about three of them) say they have some interaction with the government. This is debatable according to SNV/TDBP, but even if there is some interaction, it hasn't led to anything. The government is not involved in the biogas sector as present. The fact is that the

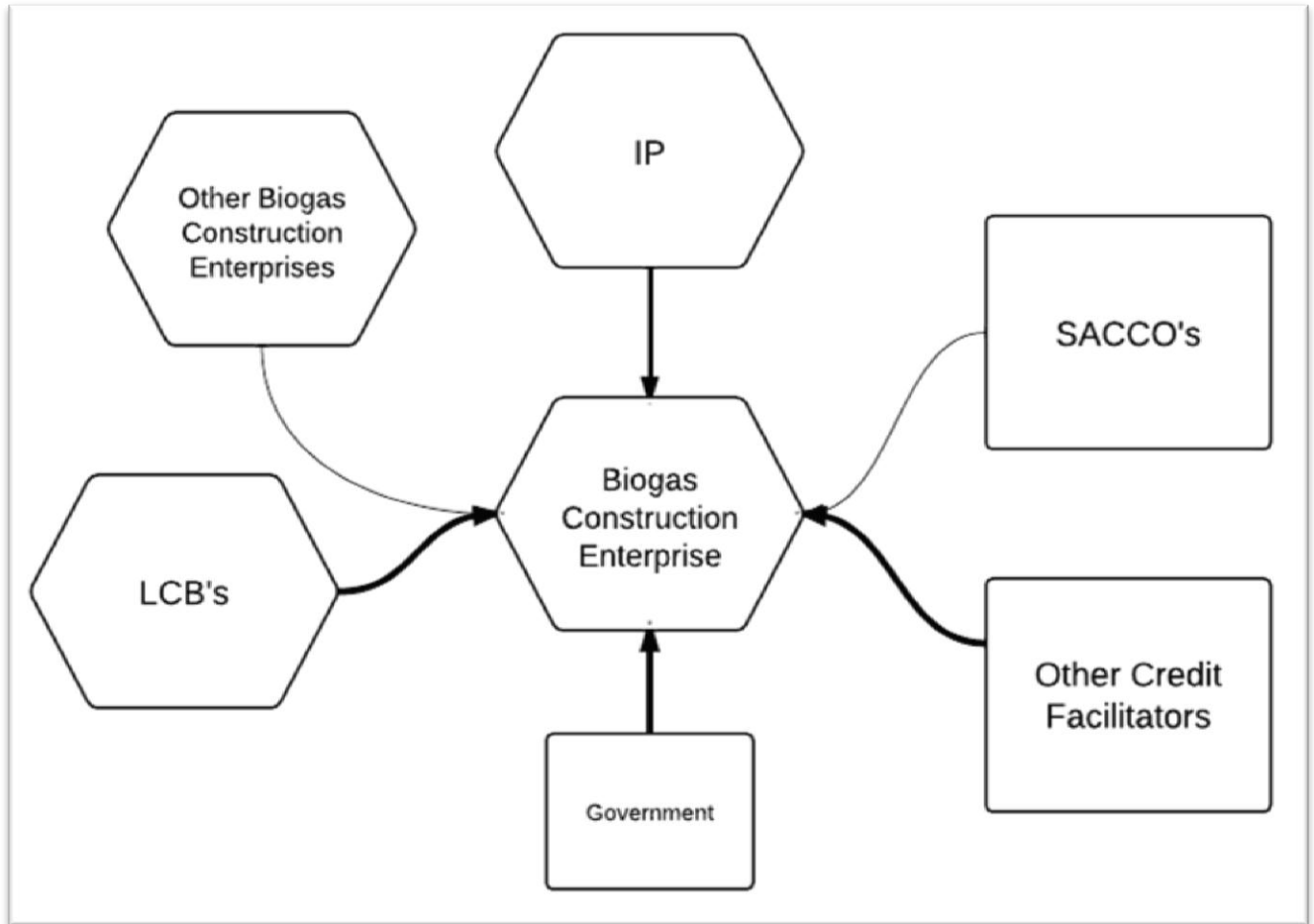
government can be an important factor in the sector. It has the scope, the manpower, and the control to aid the sector in achieving its goal. Other credit facilitators (not SACCO's), are the second missing tie in the sector. SACCO's prove to be very helpful for BCE's. Other credit facilitators (see the list in 4.2) can take up the same role as SACCO's. Furthermore, they can aid the BCE's in another way. Banks can help BCE's set up their businesses by handing out loans. One company already took up a loan to get started with their business. They acquired an office, furniture and construction materials. When banks get more involved and give out more loans, the BCE's have a solid base to start. Disappointingly, there is only one case known of a bank giving a loan to a BCE. When this changes in time, the sector will benefit from this construction. There is one problem that this construction brings with him: Tanzanians are scared to take up loans. After field research it seemed that managers were scared to loan money because they don't know the concept of investment and loans. This financial hesitation corresponds with what we have read in chapter two in the section about emerging enterprises. This financial inability is something SNV/TDBP and perhaps the IP's and LCB's can help with.

4.3.3 Future of the sector regarding ties

The sector is currently sprawling with ties. But what will change the coming years? This section will discuss the future of the sector regarding the ties between the actors. We already discussed two of them, being the government and the credit facilitators. These two actors should be more involved in the sector. The picture from figure 16a is going to look very different. SNV/TDBP will exit the sector in a few years. This loss has to be compensated. The government and credit facilitators can cover this. Besides the government and credit facilitators, two more possible ties are left. These actors are already active in the sector. They are the IP's and the LCB's. The degree of involvement of both parties has to go up. This is a process that should begin as soon as possible. The LCB's are not yet that involved in the sector. Mainly because SNV is a capacity builder of its own, their role is not yet that big. But seeing that SNV will most likely leave in the coming years, the role of the LCB's will grow.

Figure 16b shows the ideal situation when programme support stops. The government has taken over the role of SNV/TDBP in supporting the BCE's. Despite this being wishful thinking for now, it is not unrealistic. Again, the thicker the line, the more important the tie is. We can see that other credit facilitators and the LCB's have gained more responsibilities concerning the BCE's. The LCB's as capacity builders can be seen as the replacements of SNV. Both are capacity builders, and the LCB's have already shown with the training round that they can support the biogas managers. The credit facilitators will get the task of funding the BCE's. Not subsidizing, but funding. BCE's have to realize that they need funding to develop. This means taking up loans from banks and MFI's to name some credit facilitators. Other BCE's and SACCO's have decreased in importance. For the other BCE's, this has to do with the competition that has to start up eventually. BCE's are not yet competing much with one another. In the near future, this should be the case. The SACCO's importance has decreased as well. They have been doing a great job supporting the BCE's with customers. But that is foremost something they do for themselves: they give out the loans and get interest. BCE's should be at that level that they can find their own customers. SACCO's are still good for bringing in customers, but BCE's should not rely too much on this alone.

Figure 16b: The ideal situation after programme support stops.



Source: Field research, 2012

To conclude the network part of this chapter, we will look at the link between theory and practice. The network theory argued that having ties with different actors can be of benefit for smaller companies. Is this the case with the biogas sector in Tanzania? This was the second assumption made in section 2.1. One thing that the network theory is about is the sharing of information. The actors themselves are not as important as the relationships between them. The ties that bind them together are more important to analyze. As we saw, the biogas sector is full of ties between the different actors. The biogas sector does have some similarities with the theory. According to the theory, networks are beneficial for SME's to increase their profit and increase the factor for survival. The link with SNV/TDBP and the SACCO's proves to be important for the BCE's. The sharing of information and knowledge is central in the theory, as is with the link with these organizations. SNV/TDBP share their knowledge through training rounds to help develop capacity in the sector. This sharing is important for the BCE's, as they are new to the sector and have less information than SNV/TDBP. SACCO's share things too, but the thing they are sharing are customers. They have the information that there is a BCE nearby, and use this information for mutual benefit. The SACCO delivers customers to the BCE, and in return the SACCO gets interest on more loans. The assumption that the BCE's profit from their network is correct. Though informal and mainly personal, without the network the BCE's would be in trouble.

Kamuzora and Msanjila talked about expanding peoples capacities through the ties inside the network. Through training rounds this is exactly what is happening in the biogas sector. The training rounds that are given by LCB personnel and arranged by SNV/TDBP expand the capacities of the biogas managers. Hopefully, the manager will share his information with the rest of the company so everyone benefits (most managers do this). Information and knowledge sharing is thus responsible for the development of companies and therefore the sector. The fact that social media and mobile phones have become increasingly important partly goes for the biogas sector as well; only the cause is somewhat different. Where 'normal'

companies go to the next phase of communication from 'old fashioned' communication, the BCE employees are completely dependent on mobile phones for contact. There are no computers (no email address), no Internet and no faxes to be found in the companies. The use of mobile phones is therefore not a development, but indispensable for the BCE's. Not being connected to the world via virtual (Internet) networks is seen as a downfall for companies. But in the Tanzanian case, this is not really applicable. The reason that the theory gives for the need of a virtual network is that you need to stay connected to the world to know their demands. The demand for the biogas sector is local to begin with, and no outside information is needed. The sector is operating only in parts of Tanzania and is nowhere near expanding to other countries (let alone worldwide). Setting up local virtual networks is difficult enough given the lack of computers in the sector. The third assumption made in 2.1 seems to hold up like the first two assumptions. Virtual networks are a bridge too far at the moment for the BCE's. They should stick to mobile phones, and try to get e-mail addresses. They don't have to go as far as entering the virtual world. The possible benefits won't weigh up against the costs.

The last remark about network in theory and in practice is the argument that Maskell and Malmberg gave. They said that communications between different actors will be smoother when distances are short. This was one of the assumptions on the network theory. The biogas sector has two sides in this respect. TDBP is the overall coordinator of the project. For them, it is impossible to be everywhere at the same time. They need the help of on-site actors. The IP's are taking up this role. The BCE employees are very positive about the role the IP's are playing. They are closer to the BCE's and can thus give more feedback and help. TDBP hasn't got the manpower to do this. In its turn, IP's are sharing their findings on the BCE's to TDBP. This situation works well for all parties. What doesn't seem to be working well is the relation between customer and BCE. The customers were often not happy about the lack of after sales services and the quality of the digester. Despite being close to each other, the communication between the customer and BCE are not running as smooth as one would like to see. The problem is the inadequate infrastructure. Both the physical distance as well as the lack of telecommunication affects this. It takes actors too much time to reach each other physical; the telecommunication doesn't work well either. BCE's are often not reachable on their mobile phone.

This first topic presented the first three sub questions. The topic was the sector and its ties. The sector consists of a lot of different actors with their unique characteristics. Most important players are SNV and TDBP, together with the BCE's. The first two organizations are the institutions that support the BCE's in all ways possible. These BCE's are the newest phase in the programme. Some of the BCE's encountered have started up in January of February. The BCE's consist of six employees on average, with one of them acting as the manager of the company. SNV and TDBP both have different advisors and consultants who are responsible for different parts of the sector. Examples are advisors on promotion, advisors on training and advisors on credit facilitation. Other actors are the IP's which support the BCE's in the same way as SNV/TDBP. They are closer to the BCE's (there are IP's in different regions) and can help the BCE's in day-to-day business. SACCO's are credit facilitators. They don't support the BCE's directly however. They have a large clientele who they help get loans for biogas digesters. In that way, they provide the BCE's with customers who are creditworthy at the same time. Last actor is the LCB. They can be seen as a 'mini' SNV. They help create capacity inside the BCE's. The training rounds are given by a consultant of a LCB. In that way, they support the sector and are perhaps the natural successor of SNV.

With regard to the ties there is still much ground to win. And if the sector wants to keep developing after programme support stops, it has to be able to find these new ties. Otherwise, it will be very difficult for the sector to become successful. The ties that are formed are the ties between the actors discussed in the first part of the topic. There are many ties, the one more rewarding than the other. Some ties are intense (SNV/TDBP with BCE); others are just starting up (LCB with BCE). It is stated that these ties are very rewarding for the BCE's. Without these ties, they would have a difficult time staying in the game. The SACCO's are responsible for a large portion of the customers the BCE's get. The example given were the 42 customers DANKO got from the SACCO they are cooperating with. The IP's are also doing a good job. Their support was appreciated by the BCE's. Since they are closer to the BCE's than SNV/TDBP is, they can give support faster.

Chapter five: Entrepreneurship in the biogas sector

Chapter five covers the second topic: entrepreneurship and cluster forming in the sector. The question is, whether this is present or not. The theory about entrepreneurship has been presented in chapter two. We will first give an outlook on the current situation in the sector, and link it to the theory in the conclusion. In the theory part, definitions and characteristics of entrepreneurs have been presented. At the end of topic two, these will be discussed. The second part of this chapter will touch the subject of cluster forming in the sector. We will see what kind of level of cluster forming the biogas sector has.

A feature of a well-established private sector is both the presence of knowledgeable entrepreneurs and cluster forming. These are people who know what they want, and how to get it. They face challenges like everybody else, but are always able to work themselves out of them. Entrepreneurial skills are invaluable in today's private sectors. The structure of this topic is as follows: two different viewpoints will be presented, namely viewpoint that will favor the existence of entrepreneurship in the biogas sector, while the second part will deny the existence of entrepreneurship. This topic is made up of different cases. The biogas companies are the best example whether entrepreneurial skill is present in the sector or not. During the field research, almost 50 biogas company employees were interviewed. These interviews gave a good overview of the entrepreneurial skills of these people. First we make the case that entrepreneurial skills are present in the sector.

5.1 Entering Entrepreneurs

Entrepreneurship has already been discussed in chapter two. We already saw what entrepreneurship encompasses: taking risks, seeing opportunities and create jobs and wealth to name a few things. We will compare the theory of entrepreneurship with the practice in Tanzania. Despite the low yearly construction figures in the biogas sector regarding the biogas plants, there are in fact entrepreneurs active. Some of the companies have the right people at the right places. These people know what to do and how and when to do it. Some examples are the managers of Majabimu, Oron and Kisiki. These three companies show that entrepreneurial skills are present in the sector. The three companies each show entrepreneurship, in their own way. These different traits of entrepreneurship will be discussed here.

Kisiki Biogas Company wasn't satisfied with the small area that they could reach to construct digesters in. Without proper transport they wouldn't be able to expand their work area, or their company. This was the biggest problem the company was struggling with. Many other companies are struggling with transport as well. But Kisiki wanted to do something about it. To tackle the problem, they applied for a loan at the bank to buy some motorcycles. That way, they could go further and faster as well. With the new work that they could get, they were able to pay back the loan at the bank quickly. Now, they operate with three motorcycles and are the number one biogas company in their region. This example of Kisiki BCE is a good example of entrepreneurship in the sector. He saw the opportunity (bigger reach for the company), saw the risk and took it (getting the loan), and got result with it. This is one of the rare cases that the manager of a BCE was not hesitant to get a loan. The manager saw the benefits of getting a loan for motorcycles and acted upon this view.

Oron Biogas Company is another example of entrepreneurship in the sector. They are (far) ahead of the rest. This company has already created a business plan for the company. The manager was not entirely happy with the speed of the training given by SNV/TDBP or the speed with which his company was progressing. He felt that the company could be further ahead, and decided to take up the job of making a business plan himself. With this business plan, the manager thinks that the company will develop faster. In this business plan, all the details of the company's business are stated. Furthermore, all the employees know their jobs and how to perform these jobs. This is a big help according to the employees (six of the twelve employees were present), and they thought the business plan was helping the company greatly. SNV and TDBP have the second training round in July reserved to explain the BCE's about the business plan. With the business plan, the manager has a better view on what the company earns, and what the costs are.

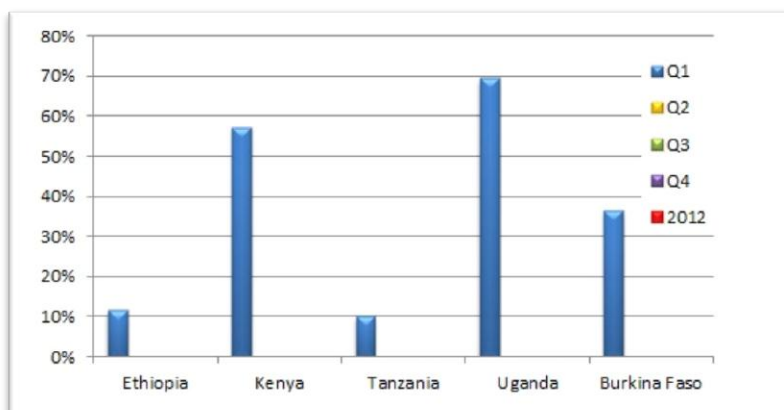
He claimed that it helped him greatly, and was worth the cost and time put into it. The manager saw the lack of progress that was hampering his company. He thought that creating a business plan would help the company forward.

Lastly, we have the example of Majabimu Biogas Company. A larger case study will be presented further one in the thesis (4.5). This part will present the case in summary. Majabimu wants to be the number one BCE for their region (and eventually the country). Already doing far above average, they are still not satisfied. The ambitions are high, and they act accordingly. They are asking SNV/TDBP for the motorcycle loan. This is a loan started by SNV/TDBP as an incentive for good performing companies. They are going after this themselves (phone calls) and don't wait for the staff of SNV/TDBP to come to them. They are acting pro-active to get what they want.

5.2 Failing Skills

There are some able entrepreneurs in the biogas sector in Tanzania, but there are more unable entrepreneurs; unfortunately for the biogas sector. There are too many companies and managers that are failing in the job at hand. This section will elaborate on the differences between able and unable entrepreneurs, but first we start with some figures from the Africa Biogas Partnership Program to illustrate the lack of entrepreneurship and development in the Tanzanian biogas sector. The two figures show different sides of the development and entrepreneurship in the biogas sector. Figure 17 shows the BCE share in total production of biogas digesters in the first quarter of 2012. This share of total production by the BCE's is just 10%. This number is too low considering that it are the BCE's who are going to be responsible for the biogas sector in Tanzania. The other 90% of the construction can be attributed to either lone wolfs not yet in a company or groups that are not yet registered. Figure 18 shows that Tanzania is last in line regarding BCE share in total biogas digester production.

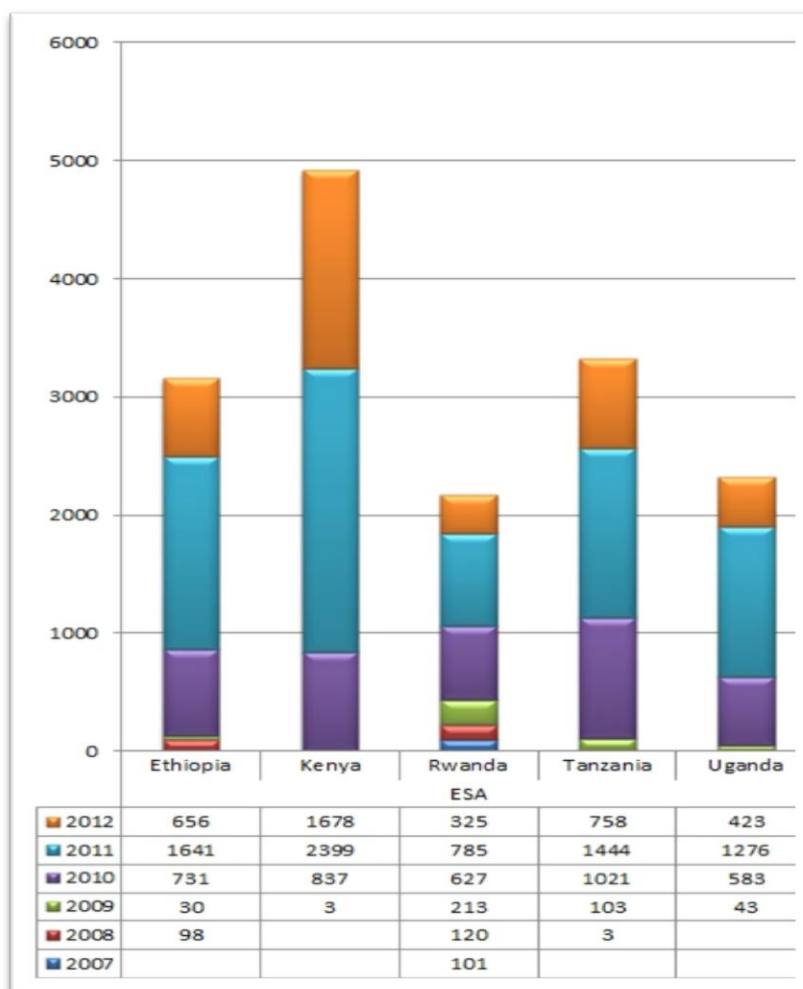
Figure 17: Active BCE share in total production, 2012.



Source: ABPP, 2012

Looking at the pictures above and below, it may seem that Tanzania is doing a reasonable job within the biogas sector. They are outperforming Uganda, Ethiopia and Rwanda (figure 18). The fact is that Tanzania started earlier than Uganda, and Ethiopia initially had better figures than Tanzania. Even more, Tanzania is in its turn overtaken in construction figures by Kenya who started a year later with the programme (in 2009). Ever since the second year of their programme, Kenya has constructed more digesters than Tanzania. The learning curve seems to be much sharper in Kenya. At the moment, reasons for Kenya's doing well are not known. Perhaps they do have more good performing people at the BCE's.

Figure 18: Biogas digester construction figures of five countries, 2007-2012.



Source: ABPP, 2012

The problem seems to be the managers of some BCE's are not doing their utmost best to make their company a success, or are unable to. Too many times the managers were complaining a lot, but doing nothing. Most of the managers encountered had excuses about many things that they could easily solve themselves. They are either unwilling to do it, or just incapable of doing it. One of the key factors of being an entrepreneur is solving problems, making the most of opportunities. The BCE managers are not doing this. They sit and wait till someone comes and helps them solve the problem. They are being anything but pro-active. This is a serious problem for the sector as lots of companies have this problem. With these under achieving companies, the sector as a whole will not develop. A possible explanation could be the lack of education. Most Tanzanian people are not educated very well, and this can hamper entrepreneurial skills.

To conclude topic 2, we will look at the similarities or differences between theory and practice. Entrepreneurship in the biogas sector is lacking, to say the least. The members of the BCE's don't seem to have the wit when it comes to being an entrepreneur. They show little to none entrepreneurial activity. Box 2 showed the traits that literature studies showed to be most important in entrepreneurship. Of those traits, almost none are applicable to the Tanzanian biogas employees. Box 3 is a combination of the theory of box 2, with the practice from the field research. At the same time, we look at the sixth assumption on entrepreneurship. It is stated that the entrepreneurs in the biogas sector don't have the characteristics that are presented in box 2. This is mainly because of the lack of education and training. If we look at box 3, we see that indeed the entrepreneurs in the biogas sector are not in possession of the characteristics.

Box 3: Characteristics of entrepreneurship and practice compared.

Self-confidence	Solving problems themselves is difficult for the biogas employees, and they often wait for others to help and fix them. Even if they can fix the problem themselves, they rather have people helping them.
Sense of urgency	Often the biogas employees are sitting and waiting (see self-confidence). Only a few of the people in the sector come up with ideas.
Comprehensive awareness	Entrepreneurs in the biogas sector are often 'blessed' with entrepreneurial myopia. They are not seeing opportunities that lie a bit farther away from their comfort zone.
Realism	Realism is a strange word for most of the companies. This is mostly regarding their future (construction) plans. Gathering information is not at the top of their to-do list (see section 7.5).
Conceptual ability	Problems are identified by the BCE's, but not always dealt with.
Status requirements	The appearance of the company is not of interest to the entrepreneur, theory states. The biogas companies haven't got a good appearance. Half of them don't have an office at all.
Interpersonal relationships	Problematic. The theory states that the company's success is bigger than personal relationships. But some BCE's are getting deteriorated by the interpersonal relationships. On numerous occasions, managers were unreachable and masons decided to quit without informing the company. This means both the success of the company and the interpersonal relationship are worsening.
Emotional stability	The level of stress is not that high perceived. Managers and members were in general calm and relaxed.
Dedication	The dedication is low. As said, members are leaving companies without telling, managers are difficult to get in touch with; this is not what dedication should be like.
Proactivity	Already stated under self-confidence: proactivity is low. Most BCE's are waiting for solutions to come to them. They do not react on opportunities, if they are even distinguished in the first place.

If this situation continues, it will be very difficult for the sector to develop itself and become successful. And not just the sector can develop itself, but the companies as well. It is time for the BCE members to really start getting more proactive and see what can be done to develop more skills. The training that SNV and TDBP are giving is the first step in the right direction. If we recall the first assumption of the entrepreneurship part, this is not true for the biogas sector. The institutions which ought to be hampering the BCE development are actually aiding them. The framework of institutions is not that big with SNV and TDBP as the most influencing actors. They set the institutional framework but at the same time are aiding the sector. It is in their benefit to make sure the institutions are beneficial. As is presented in the theory, entrepreneurs are the ones that see opportunities and react upon them. Entrepreneurs have to innovate their sector with new ideas and products. The theory on entrepreneurship isn't practiced very much in the biogas sector. There are three companies who are showing clear signs of entrepreneurial skills. They are capable not only of seeing the problem, but they can also act upon it. These companies have, through entrepreneurial skills, developed their company, expanded their reach of work or solved problems by being proactive. To finish, we recap the citations on what the relationship between being a manager entrepreneurship really is. It is stated that managers have a more 'leading the company' function. The entrepreneur is someone who is goal and action oriented and sees opportunities. The entrepreneur is also seen as being absent from the theory of the firm. With these citations in mind, it seems that the biogas entrepreneurs are more managers than entrepreneurs. They are more concerned with the business than finding new possibilities. Although this is not a bad thing per se, they should try to get more towards the entrepreneurial side. The sector is not doing very well, and good entrepreneurial skills could be a solution.

5.3 Is there sign of cluster forming in the sector?

Cluster forming is a concept in which different companies are situated together. This way, benefits are reaped from the fact that transport time is shorter, goods can be bought in bulk and other positive aspects. The forming of clusters is also a sign that the sector is developing or even developed. It takes some time for companies to be that far developed that they can think about the benefits of clustering. Cluster forming is in the definition used here both clusterization of different BCE's together, different (renewable) energy companies together or BCE's and companies that deliver the construction materials together. All of the combinations have benefits for the BCE. Originally this was one of the major questions for the research in Tanzania. The question is: is cluster forming of any kind the case in Tanzania? In short: no, there isn't. There isn't any sign of cluster forming in the sector as yet. In none of the definitions is there any sign of cluster forming. There is one thing that should be remarked: because of the relative low construction figures of the BCE's, economies of scale may not be all that rewarding. The BCE's don't build that much, and buying in bulk would just make the storage of materials difficult. So, the idea was more on the geographic clustering of different types of companies. For example, a company that is specialized in laying pipes for plumbing can be a rewarding partner. Not just to buy in bigger, but also the skills and knowledge can be shared. This plumbing company can teach masons to lay pipes (better).

The BCE managers were asked about the subject of cluster forming. Upon the question if they had ever heard of cluster forming, more than 90% of the interviewees said no. The ones that did knew the concept had only vaguely heard about it. They have never practiced it. This is not directly the sole reason for concluding that there is no cluster forming, albeit an important one. When you have never heard of clusters, it will be difficult to either enter or form one. Maybe it is an option for future training rounds to incorporate the idea of cluster forming. It is a valuable concept for companies. The training should emphasize the benefits for a company when he clusters with an array of different companies. The next question was about the clustering with different companies. It was a question that was intertwined with the questions about the network of a BCE. Some BCE's had some companies close with whom they cooperated. Mostly, these were hardware shops. The idea of cluster forming to gain benefits is not really applicable. The cooperation primarily consisted of advertising in each other's shop. There was no linking with plumbing companies or construction companies to give an example. After talking about the benefits to cluster with companies, most managers said that they would look into it. The most obvious clustering is clustering with other BCE's. The problem is that this is perhaps difficult since there is need for competition in the sector. The idea is that underperforming BCE's are replaced by BCE's in their region that are performing. The subject of this topic, the hope that cluster forming already had begun, was shot down. In the first few weeks already the main question had to be altered. After speaking with various people within SNV and TDBP, the research on cluster forming in the biogas sector was abandoned as a main research topic.

Chapter six: The future of the biogas sector and its customers

The third topic will discuss the future of the sector, along with the demand side. The different opportunities of the sector will be presented. What can still be done to help the sector develop? What possibilities do the BCE's have to up their game? The main question discusses the question of interventions to make the sector fully independent, viable and successful. That answer will be given here. On the other hand, you have the challenges and pitfalls that the BCE's and the sector will encounter. The question is how the companies deal with these problems. Secondly, in section 6.2 we take a closer look at the demand side of the biogas sector. Who are the people that are potential customers, what are their characteristics? This will be the subject for the second part of chapter six.

6.1 The future

6.1.1 opportunities of the sector...

There are still numerous opportunities that are yet to be addressed in the sector. In short, these are the main focus points where the opportunities lie:

- Bio-slurry
 - New areas
 - Linking with other non-biogas companies
 - New type of digesters
 - Professionalization
 - Sharing of experiences and ideas
 - Linking with politics/SIDO
 - Finding investment
- The biogas digester fulfills three different needs for customers: cooking without fire-wood, lighting your home and *the use of bio-slurry*. While the first two aspects are being used by virtually all the customers, the use of bio-slurry is not what it should be. This is one of the biggest opportunities for the sector. If the use of bio-slurry is properly addressed, more people will become interested. Field visits have shown that the use of bio-slurry can upgrade crop harvesting greatly, with all the financial benefits that come with it. Even households that don't have a garden themselves; they can still sell the slurry to those who have a garden, but no digester. This selling of manure to others is something that isn't yet found (much) with the people who do have a digester, but have no use for the slurry. This should be one of the things that should be addressed more in the promotional activities of the BCE's. You will perhaps extend your clientele to the people who didn't want the biogas digester because they don't have use for the slurry. Vice versa, people with cows but don't want a digester are still of value to the sector. If there are people with neighbors that have cows but no interest in a digester, they can collaborate. The manure from the neighbor goes in the digester of the other. This way, you have an entirely new market of people who were considered not potential. The BCE's should see these opportunities and incorporate in their promotion activities.
 - *New areas, that haven't got good biogas digester coverage*, are another opportunity. Now, some companies are complaining about the fact that there are already a substantial number of digesters in their region, and that hampers them to build digesters themselves and expand as a company. Also, some companies are very close to each other (see the case study on competition further on), and could do with a region of their own. The programme is focusing on North-Eastern Tanzania for the moment, but is planning to expand to the Lake Zone and the South. This brings new possibilities for companies that are having difficulties now regarding space. They also have the advantage of being an established company already, contrary to the BCE's that start up in these new areas. They know what is asked of a biogas company and should be able to materialize this head start.

- A different type of opportunity is *the link other parties*. Biogas gives the possibility to cook smoke-free, to light houses and use the slurry as a fertilizer. But the people want to watch TV, charge their cell phones etc. Biogas can't deliver that. But what can be done, is either cooperate with a company that can supply electricity for TV and mobile, or learn these techniques. Both ways will give a company more potential customers. Despite the fact that other renewable energies can compete with biogas (lighting, cooking perhaps), there are some differences. Biogas uses cows, which are omnipresent in Tanzania. It gives people the chance to get rid of the manure in an effective way. Besides that, fertilizer is a unique selling point of biogas that solar or wind cannot give the customer. Try to find activities where you can collaborate with the other. Another possibility is the collaboration with construction companies. BCE's that are having trouble with brick making or plumbing, should consider partying up with a company that is already in these professions. You will learn as you do, and benefit from this collaboration. The most important party that should be sought out is the government. With the government on your side, the opportunities for the sector will greatly improve. This is not per se the responsibility of the BCE's (maybe lower level governments), but more for SNV and TDBP. Getting the government on board on the programme will undoubtedly help the sector develop. The government has the financial capabilities to support the sector and the institutional framework to help set the rules in favor of the sector.
- A different opportunity is *the new types of digesters*. *The solid state digester (SSD)* is more suitable for arid regions, where the availability of water is a problem. Some people are potential customers because they have enough livestock, but lack the requested amount of water to be able to properly use the digester. This new type of digester (SSD) uses less water, and gives the possibility to add animal pee in the digester. The reach of the programme will be enlarged by this new technology, and already companies are building them, or want to be trained to build them. This shows the faith that BCE's have in this new digester. The BCE's that are performing well should be given the chance to build SSD, since they are already doing good business with the regular digesters. If they can manage to incorporate the SSD in their building program, the sector will benefit more than giving weak performing BCE's this opportunity. That may result in bad quality digesters, which can't be used with a new technology. A second new digester is mentioned in the feasibility study for the national domestic biogas programme in 2007: a pilot plant of 150kw is constructed in Hale. This would be an opportunity for the sector, since electricity greatly enlarges the possibilities for using a digester. People are asking whether they can watch TV or charge their cell phones with the digester. With the digester currently available, this is not the case. But if the new pilot digester that generates electricity proves successful, this can lead to more customers for the BCE's.
- The next opportunity is one that the BCE have to work on in the coming months. It regards *the professionalization of the company*. There are many companies are new to the sector. When you continue doing business, you will grow as a company. Learning new things, getting better at building digesters, getting more grip on every day business; practice makes perfect. In the current situation, companies still have questions: many things are not entirely clear to them. In time, the companies will grow and get more used to the running of the company, to the sector and everything that comes with it. Digesters will be constructed faster and with better quality, internal affairs will be worked out and the company will know its place in the sector. Professionalization of the company also means that the challenges described in the previous chapter are brought to a minimum. This is especially the case for internal problems and the financial management. These are problems that every starting business is facing, but with time these problems are less likely to come back. The current situation is one of transition. The companies are between amateurism and professionalism. Some do have tables and shelves in their office; others lack these tables or even an office. For the future and for the image of the company professionalization is important. Literature states that practice makes perfect: On the contrary, it is now well established how learning from experience, by trial and error or by repetition give rise to incremental improvements that can accumulate over time, and gradually result in new and better ways of doing things . The

costs of producing manufactured items decrease with the number of items produced (Maskell & Malmberg, 2007; Levinthal & March, 1993).

- *Sharing information* is the basis of learning. In the biogas sector (and outside of it) much knowledge is available within different actors. Experiences and ideas can be exchanged with each other, for the benefit of everybody. Think of information sharing like a General Meeting, but instead of sitting together with your own company you sit with all kind of different actors from who you can learn, and who you can teach. Perhaps start with a 'Biogas Learning Day', and invite actors with different interests, and from different levels. It will never hurt to hear the experiences that others already have, and be able to learn from them. Just like with the training, do make the most of these meetings. Take notes, ask questions and start discussions in the group.
- *The missing link with the government* is another opportunity for the sector. With the government active, things will undoubtedly run better. They have more scope and more weight to bring in than any other actor in the sector. If a collaboration with the government can be initiated it will give the sector more opportunities. One of these opportunities is to ask the government to take over the financial support. For now, the programme is subsidizing the sector a lot. The government can step in in many different aspects and functions of the sector.

SIDO is an example of the possible link of the government with the biogas sector. SIDO (Small Industry Development Organization) is a parastatal organization under the ministry of Trade, Industry and Marketing in Tanzania. The objective of SIDO is to develop the small industry sector. The organization does this via policy formulation to direct support. The biogas sector is a small industry sector, so SIDO fits in perfectly. They also support in the emergence of SME's in rural and urban areas. SIDO could also be the governments answer to the request of aid in the biogas sector. Whether this is the case we will see in chapter five when the research findings come up. But in principal, the organization is there for those companies needing help to start up or otherwise. The difficulties that have been talked about in the previous paragraphs are SIDO's to tackle. They are the arm of the government that has to respond to political and economic changes. Despite some successes, SIDO is not as far as hoped. The organization is still lacking in ICT knowledge and infrastructure, and it doesn't have collaborative business models to help it towards a stable and self-sustained network (GoT, 2012). SIDO can be very helpful in supporting the BCE's.

- A possible, but perhaps not a plausible solution to some of the problems encountered by the BCE's is to *find investors*. With the money invested in the BCE, more is possible. This will get you further developed. But, just like taking up loans this means that you accept money from someone else. Biogas managers are reluctant to do so. Furthermore, the financial gain is too low in the biogas sector to be an interesting sector for investment.

To conclude this section: there are still several unaddressed opportunities that the biogas sector/BCE's can use in their advantage. Even the companies that have already done good business are not finished developing. With addressing these new opportunities the sector can give itself a more secure base. This base is significant for the development of the sector. If these opportunities are properly addressed, the sector will stand a better chance when programme support stops. If the government can be persuaded to get on board on the programme, this will be of immense importance. They have more scope and funds than any other actor and are thus an excellent addition to the sector.

6.1.2 ... and the pitfalls

The sector has quite some bottlenecks; some of them seem to be present in every BCE. Some are major, other problems can be dealt with more easily. The challenges that virtually every BCE faces are:

- Transport
- Funds

- Promotion
 - Internal Problems
- The biggest problem the BCE's are encountering is the problem with *transport* (with only a few exceptions). Often the low numbers of digesters constructed are blamed to the lack of transport. Most masons have to walk several kilometers to reach the construction site. The time wasted on walking can be better used for building digesters. This problem is seen as a bigger problem than the lack of funds. But, both problems are related with each other. Without funds no transport, and with no transport less funds (due to a lower productivity). Without proper transport, the BCE's say they can't improve their construction figures, and cannot reach new areas to build and promote in. Renting a motor cycle costs about 15.000-25.000 Tzsh a day, which is too much money for the companies. This is a thing to think about for TDBP/SNV, but also for the BCE's themselves. As said, not all BCE's are facing problems regarding transport. A company like Kisiki got a loan for two motorcycles. With the extra distance, and shorter time to the construction sites, the extra work they got made them pay the loan for these motorcycles back already. That is the kind of attitude and initiative that will get a company further. TDBP and SNV should also think about some kind of way to support good BCE's that are capable of producing more if they have the right means of transport. A company like Majabimu is already performing well, and they asked themselves for better transport so they can improve even more. The first ideas for an incentive-based motor cycle loan are already in progress.
 - Investing in transport seems to be the solution for many problems of the BCE's, but *money* is the second problem BCE's seem to have. Most companies visited wanted more training on financial services. Bank accounts are rare, as are savings in any form. This is probably often the result of low construction numbers and thus not getting paid much, but companies that are performing well are also not always free of financial problems. It seems that the BCE's are not really looking to the future, and are more living by the day. They don't see the value of saving money, getting it to the bank etc. This is something to be taken into account for the next training round. The second aspect of money problems deals with the customers. Tanzanian people are perhaps interested in constructing a biogas digester, but lack the funds to purchase one. Although it isn't something the BCE's can solve directly, they can incorporate some ideas in their promotion. The price of a digester is high (something BCE's maybe have some influence in with regard to material and labor), but there are credit facilitators that can help people to afford a digester. BCE's should emphasize this in their promotion. Tell the people about the SACCO's, banks etc., so they know where to get the money. If the customers can get the money this way, it is well worth the little bit of extra effort put in your promotion. A company will get more orders this way. SNV/TDBP has to think about how to deal with issues regarding to funds. Apparently, both the BCE's and the customers are having difficulties to find their way to credit facilitators. SACCO's are usually the only type of credit facilitator that is easily reached, but this is more on the customer's side. BCE's should look for banks and investors to help set up their company. Oron biogas has a business plan, which helped them get a loan from the bank to help start up their business. Without this loan, they would not be as far as they are now. The business plan should be incorporated in the next training round, and its value for a company should be really emphasized.
 - *Promotion* is done in various ways. The most frequent used are door-to-door visits, meetings in a religious building like a church or a mosque, and village meetings. Virtually every BCE is using these three modes of promotion, which is good. But only half of the BCE's are using a finished, good working digester for promotional ends. This is strange, since a proper working digester is the best promotion possible. If people can see how the digester is giving households light and the ability to cook without smoke, plus the slurry that can be used, they will be better informed than with brochures, calendars and talks. Talking with different people in different locations is good, but seeing something actually working is even better. TDBP/SNV/IP's should make this clear to the BCE's. Don't lose focus on the other promotional activities, but really do emphasize that they use a properly working digester as main promotion. It has a reason that TDBP and SNV take people to see

good working digesters to get funding and attention from investors. On the lower level of a BCE, this should work exactly the same with their customers. In previous sections, we already saw some promotional possibilities. Making more use of slurry and the option of selling it (or buying manure) is something that could help the BCE's expanding their customer potential.

- When you are dealing with a group of people, undoubtedly *there will arise some problems or frictions*. The goal is not to let those issues influence the everyday business of the company. During the field research, a few internal affair problems that were ran into were non-performing managers, disappearing masons and masons that were delivering bad quality. When the company has problems internally, this will come out externally (to the customers). Bad publicity is something you don't need. If the manager of the team is not responding or not functioning well, measures have to be taken and he or she should be put out of function. The manager is the most important member of the company. He or she is chosen by the other members (or should be chosen by their own members) because they think he or she is the best qualified. The manager is head of the company, and has the responsibility for the company to function properly. Problems with fundi's are different. During the course of the field research, we came across companies that had troubles with disappearing fundi's or fundi's that are not delivering the quality that is standard for the digesters. The disappearing fundi's may have a logical explanation: the companies that experienced disappearing fundi's, were companies with low construction figures. If a company cannot make sure that there is enough work, members don't get paid much and they will probably seek employment elsewhere. In the case of missing fundi's, most of them were gone to work on the improvement of the roads in the area. From an economic point of view this is understandable, but the company is left with unfinished digesters which will hamper the image and growth of the company. Worse than unfinished digesters (you can still finish them) are digesters of poor quality. Some BCE's that were visited had problems with certain fundi's that were not as committed to the job as you would like to see. They deliver a digester, but one of poor quality. This is bad for the fundi's reputation, but also for the reputation of the company as a whole. One fundi can ruin it for all the other members of the company who will most likely see a decrease in digester applications by customers. This problem should be tackled by the manager, or discussed during a General Meeting.

This part of chapter four showed the challenges and possible pitfalls that the BCE's and the sector can run into. The challenges are great, but not insurmountable. The BCE's can tackle most problems with common sense (promotion and internal challenges) and with some more proactivity on their side. Not downsizing the problems that the sector faces, but they are less great than the opportunities that oppose them. The BCE's can really make this work: we saw the opportunities that can be fairly easily addressed. Here we have seen that the challenges can be dealt with as well. Both stories show that the biogas sector is still able to develop itself greatly. With some more effort, it is possible to get rid of the challenges and address the opportunities.

6.2 The people

The last topic is the topic of the customers, the people. As explained in previous chapters, the people were not a big part of the research. But since there is no supply without demand, they do represent an important part of the sector. The last two sub questions relate to this group. In this part, both the research findings as well as some secondary literature are used. This secondary literature is a research conducted at the same time as the research about the private biogas sector, but with the biogas users as the subject. This Baseline User Survey (BUS) targets the people who already have a biogas plant, or are potential clients.

6.2.1 Who are the customers of the biogas digesters?

This part will present the characteristics of the people suitable to get a biogas digester, or those unsuitable for a digester but still wanting one. Not every Tanzanian is seen as suitable to get a digester, as there are a

lot of preconditions that have to be met. These preconditions are: zero-grazing animals (cows or pigs) and a sufficient number of them; water to mix the manure inside the digester and the initial investment that can be high. The research area was north and eastern Tanzania for the personal research. The secondary literature studied also included the south regions of Iringa, Mbeya and Rvuma and the central zone with the regions Dodoma and Singida. The results of the secondary literature (the biogas user survey, BUS) are of great use for this research. The fact that the regions that were researched are also regions outside the original research area is not a problem. The BUS notices that 66% of the respondents come from the northern zone. This overlaps with the own research. The outcomes of both researches are presented here. We start this section with a quick recap on the population figures of Tanzania.

Tanzania has a population of over 43 million people. The country has a population growth of almost 2% per year. The age pyramid is built up with 42% of the population being 0-14 years old; 55.1% is 15-64 years old and just 2.9% being 65 or older. The average age of the Tanzanian is 18.7 years. Tanzania is still largely a rural country with only 26% of the people living in the cities, with an annual urbanization growth rate of 4.7%. Dar es Salaam is by far the biggest and most important city in the country. The official capital Dodoma is far behind (CIA, 2012).

The BUS recognized the positive and negative points perceived by the owners of a biogas digester. It seemed that the people were generally happy with the digester. The customers liked the fact that they could now cook and light their homes. No more indoor air pollution or dangerous fires where the main perceived benefits. TDBP is seen as a good organization, but the customers are less satisfied about the work delivered by the masons (BCE's). Customers are unsatisfied with mason's visitations to the worksite, the poor construction workmanship and the inability for them to select a digester size. TDBP was also targeted, saying that the after sale services were not good, the equipment was inferior, there is a lack of spare parts and inadequate project staff. These allegations are not to be taken lightly, as it will affect the overall thought on biogas. This will hamper the spread of the technology.

The Tanzanian households are primarily led by men. That suggests that males dominate the decisions regarding the biogas plants. This is despite the fact that women (and children) benefit most from the technology. Tanzania is still a largely patriarch society, where men are dominant in decision making. In the study, only 14% of households visited were led by females. The contradiction is that from all the users receiving biogas training, 77% is female. This is probably because it are the women that are responsible for the household and therefor are cooking. The women are benefitting more from the benefits from a digester than the men do. Almost 75% has no higher education than secondary education (23% has secondary education, 22% tertiary). The average household size of the biogas users is 5-6 people. Over one third of the 210 respondents to the BUS were in a household that contained 5-6 people.

The BUS showed a remarkable feature during the survey: non-potential customers also had a digester at home. These were people without any form of livestock. 5% of the biogas digester users did not have any form of livestock keeping. This feature opens new possibilities for both the owners of livestock and promotion activities for the BCE's. If you have livestock but no digester, you could sell manure to people with a digester but without livestock. This is a new way to generate money for these people and a new market for the BCE's. The users of the biogas digesters normally have a 6m³ digester (75% of the users). This is the second smallest digester that can be built (4m³, 6m³, 9m³ and 13m³). The next characteristic of the users is their income. The users have different income related activities. The main source of income is the livestock keeping and small farming activities. Other, less practiced methods are private business, formal employment, remittances and pension. The average income of a user in the research area of this thesis is presented in table 5.

Table 5: Average income of biogas users in the research area.

Zone	Household average monthly income (Tshz)	Male led household (%)	Female led household (%)	Total (%)
North Eastern Zone	1 – 70.000	19,1	4,3	23,4
	70.000 – 300.000	33,9	6,1	40,0
	More than 300.000	35,7	0,9	36,6
Coastal Zone	1 – 70.000	10,6	2,1	12,8
	70.000 – 300.000	31,9	8,5	40,4
	More than 300.000	31,9	4,3	36,2
Central Zone	1 – 70.000	25,0	0,0	25,0
	70.000 – 300.000	18,8	6,3	25,1
	More than 300.000	37,5	12,5	50,0

Source: BUS (modified), 2012

It is stated in the BUS that income is the main factor for biogas adoption. Most of the costs associated with the digester are the owner's burden after all. It seems that all the three different income categories can afford to acquire a digester. It is however more common to own a digester in the higher two income groups (around 75% earns 70.000 or more). Table 6 shows the way in which the biogas users have acquired the financial means to get a biogas digester.

Table 6: Ways of financing the biogas digester.

Way of financing	North Eastern	Coastal	Central
Own equities	37,6%	16,7%	6,7%
Borrowed money	2,4%	1,0%	0,5%
Own equities + borrowed money	11,9%	4,3%	0,5%
Support by family and friends	2,4%	0,5%	0,0%

Source: BUS (modified), 2012

Not just the biogas managers are hesitant to take up loans. The customers are hesitant as well. Almost 75% claimed to have enough money to acquire the digester on their own. Lastly, the amount of land the people have is interesting to take a look at. It seems that most people have between one and two acres of land at their disposal, followed by 2-5 acres. Larger plots of land are uncommon in the user group despite the national average being 6 acres. The small plots of land do encourage zero-grazing livestock (BUS, 2012).

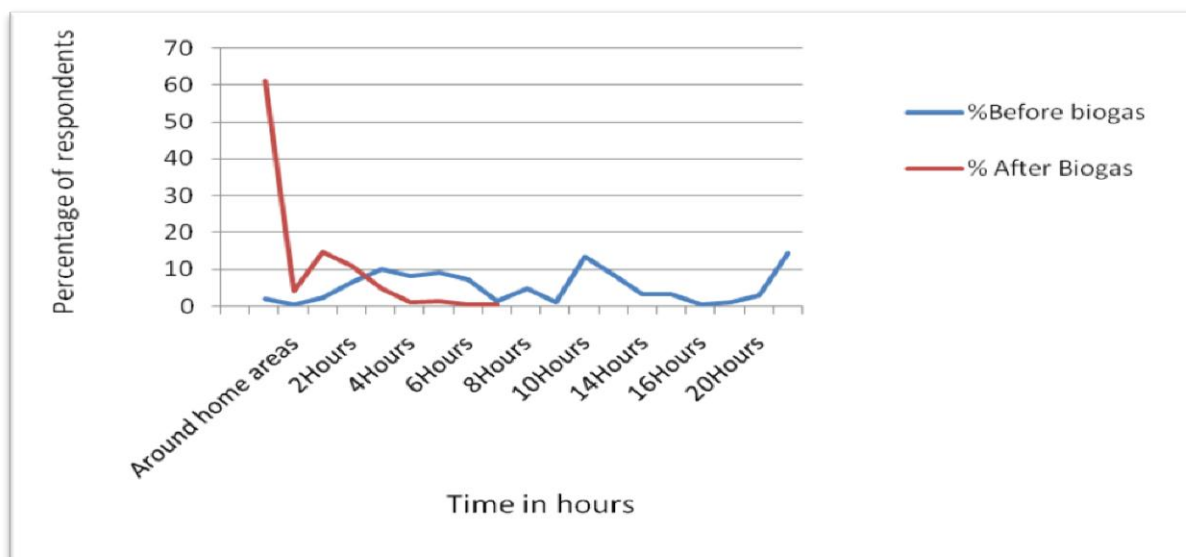
6.2.2 What is the acceptance of biogas as an energy source?

The second part of this section will discuss the acceptance of biogas. This is something that is of great importance to the ultimate goal of becoming an independent and successful sector. In this part, we will see what people think about biogas, and how the acceptance of biogas can be better (if necessary).

Biogas seems to be a form of energy that is well accepted in Tanzania. None of the people spoken to had any trouble with manure acting as a base for energy. The only problem people sometimes have is when there is a possibility of including the toilet to the digester. People are more reluctant when this possibility is discussed (BUS, 2012). They feel it is unhygienic to connect the toilet to the digester. People who own digesters are very happy with the fact that they are paying less on other energy forms. Before the digester, the people would buy kerosene, and go out for long trips to gather firewood. These benefits are greatly helping the acceptance of biogas as an energy source. It seems that at least for biogas as a renewable energy the first assumption on energy stands. These benefits should be center in the promotion of biogas. Give concrete examples of the time and money that the digester will reward you with. Of all the respondents to the BUS, 85% saw the digester's benefits as being more than the costs. The main factors that influence the installation of biogas digesters are the inadequate availability of charcoal and firewood; the urge to make cooking more convenient and the time the digester saves. With even more information, perhaps the 100% satisfaction can be reached. The time the digester saves after installation is presented in

figure 19. The time spent on firewood collection is reduced drastically, as was the distance to get it from 20 kilometers to 10 kilometers (BUS, 2012). The fact that some people are still collecting firewood could be a sign that the digesters are either not satisfying all the needs, or the digester does not function properly.

Figure 19: Firewood collection time before and after biogas digester installation.



Source: BUS, 2012

One of the collaterals of the biogas digester is the slurry that remains after processing the manure. This slurry is an excellent fertilizer, perceived even above the chemical fertilizers that are around. Many people are not using the slurry for their own benefit. They do not use it in their own gardens or sell it to other people. The slurry is mostly just lying in the slurry pit. This is something that should be addresses by TDBP/SNV. One of the benefits of slurry is that the crop yield goes up greatly. Currently, bio-slurry is not seen as a benefit that people get from the digester. The awareness needs to be raised. For the customers, the use of bio-slurry is not an important factor to get a digester. There is a big difference between the different areas: in the North Eastern zone, more than 50% of the users are using bio-slurry as a fertilizer, against just 2% in the Central zone (BUS, 2012).

If the programme raises the frequency and quality of their customer-training, the acceptance will go up even more. Bio-slurry training should be one of the priorities. Furthermore, the negative points that are pointed out should be solved as soon as possible. That especially goes for the toilet connection and the after sales service. Other challenges are described in box 4. Before the programme stops, the acceptance has to be even higher. It is imperative that the BCE's don't have to fight ignorance. The challenges in box 4 are ranked from perceived as the biggest challenge to the least big challenge.

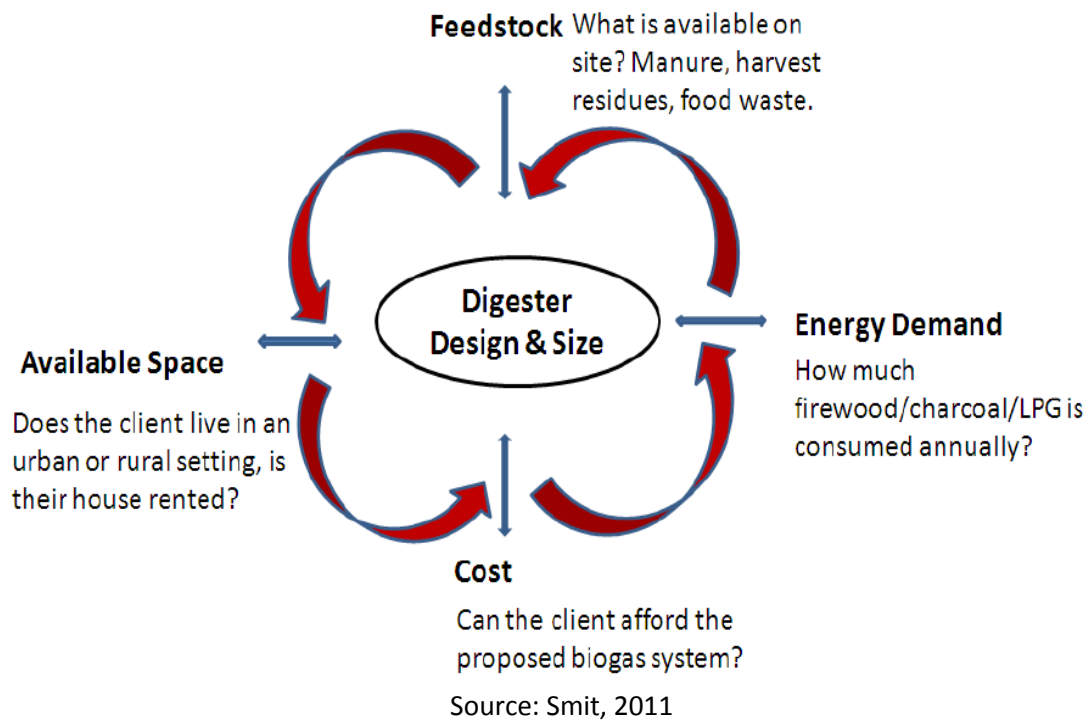
Box 4: Major challenges perceived that are a problem for biogas acceptance.

- Insufficient gas production
- Lack of spare parts/appliances
- Poor quality appliances
- Poor construction and workmanship
- Lack of after sales services
- Water clogging in gas pipes

Source: BUS (modified), 2012

It seems that biogas has the approval of the Tanzanian people. The benefits are well known (except for the use of bio-slurry) and are being put to use. The households are being led by men, despite the fact that the benefits are more for women. The women do get more user training, as they are probably using the functions of the digester more. There are still some minor challenges that can be solved to get the acceptance up. Figure 20 shows the factors that determine the optimum design and size of a biogas digester. We already discussed them: feedstock (next to animal manure this can also be biomass), financial capabilities, the space available and energy demand of a household. All these factors combined make the decision on what kind of biogas digester to get.

Figure 20: Factors that determine the optimum design and size of a biogas digester.



This last part of chapter six discussed the demand side of biogas, the people. We characterized them, and saw what the acceptance of biogas as an energy source is. The latter is the most important. Without acceptance there won't be a sector to run. The acceptance of biogas as an energy source is good. Most people acknowledged the benefits of the biogas to be higher than the negatives (like the price and no possibility to get electricity). In the theoretical part about energy, we saw that (bottom up) renewable energy solutions can mean a lot for people. No more expensive means of energy to be bought; no more diseases due to smoke inside the house. Of those renewable energies, biogas is the most easily accessible. The purchase is currently subsidized. All the benefits of a digester will eventually lead to a cleaner, richer household with more time to spend on other things. In developmental terms this is good news. The households have more money and time on their hands. With that, they can engage in new activities (more education) and invest more.

Chapter seven: Case studies

For a closer picture on the different performing types of BCE's, three different BCE's will be put under the magnifying glass for a closer look. These companies will perform as a case study on the sector. These companies are Majabimu, Oses and Hamasa. It will give a better insight in what the differences are between the three different types of BCE (good, medium and bad performing BCE). The criteria for the division are presented in table 8 and are derived from the field research:

Table 8: Criteria for dividing the BCE's in three categories.

Minimum amount of digesters constructed
Office available?
Logo available?
Organizational chart ready?
Registered as a company?
No internal problems?
Is the BCE using a large network?
Good promotional network?
Being realistic for the future?
Specialized masons active in the BCE?
Does the BCE face lots of challenges?
Is the BCE taking initiative?
Does the BCE have financial problems?

For the division of the companies, the drive of the company together with the current situation and the promises for the future has been taken into account. Besides an overview of the current situation, three possible scenarios are painted on how a company can evolve or perhaps devolve in the coming months. The three scenarios make a realistic case for the companies that are in that particular category. The last case study is a case study based on the competition in the sector. Competition is important in every private sector. The level of competitiveness is shown with an example of two companies operating just twenty minutes from each other.

7.1 Majabimu Biogas

Majabimu Biogas is located in Muheza. The company has eight members, working together on constructing the biogas digesters. It is one of the BCE's that is performing as we would like to see. Although it may not have met all the criteria that are inherent to a good performing company, they are still performing better than many of the other BCE's. During the interview, the whole company was looked into with all kind of questions. The manager was present, as was the assistant manager. The fundi were at the construction sites building digesters. Let's start by summing up the weak points of the company. Although they have been around for some time already, the company is not yet registered (they are in the process of doing so). They don't have a bank account or registration book, and have some troubles with promotional material. Lastly, they don't cooperate with a SACCO and have difficulties with transport.

All these negatives are however canceled by the positive sides of this company. Already they have constructed twenty biogas digesters, and planning to build 40 up till June. Twenty digesters is the highest number of digesters build of all the companies, and the main reason that Majabimu is chosen to be highlighted. It is also one of the few companies that seem maybe even modest about their capacities to build, especially when they start using their network of SACCO's better (maybe they can reach 45 or even 40 digesters). SACCO's can prove valuable in bringing in customers into your company. The plan of the company is to visit different SACCO's and other organizations that may help get in customers (Finka; SEDA; a VICOBA).

They share an office with another company that sells foods and drinks; it is a little store on the side of the road. This may not be impressive, but you are able to promote your company to people that may initially not come in for biogas (they have posters and calendars on the walls to show their business). This way they share the cost of an office, and get more people to see what kind of business they are doing. This will be most likely a win-win situation. The company also has the luck of being in close proximity to Tanga Cement, a company that gives away free cement to build digesters (if the pit has been dug). That reduces the price of digesters, and will increase the demand for them. Other linkages include a hardware shop, where they left promotion material for biogas digesters. Again, for both companies this is a win-win situation where they can help each other get more customers. The promotional side of the company is working well. Besides doing the door-to-door, church and village meetings promotion, they also have a network of promoters in Michungwani, Hale and Maguzuni. This gives the company a big reach. But, without proper transport they are unable to reach the potential customers in these areas. Another important aspect is that the manager (presently along with the assistant manager) was eager to learn. He wrote down the advice he got, and had some questions prepared himself as well. He knows what he wants for the coming future/training. Although the group is already performing above average (particularly in the number of digesters) he thinks that with the help of transport the company would do even better. Also, he is very interested in making solid state digesters, and is keen on joining a training to learn this.

With support, this company can easily be one of the best BCE's, at least in the numbers of digesters constructed. The negative points that this company has, can be fairly easily be dealt with. They are already in process of registering, and they have planned to meet SACCO's and other actors shortly. The lack of promotion material is something they should talk about with their supervisor in the region. To conclude, the few flaws this company has are nothing compared to the things that are going well. They are the number one in building digesters, and the things that are missing, are either in process, or should come from TDBP (piki-piki).

Scenario 1: Top performances getting better

Majabimu biogas is already performing very well, but the manager has the feeling that they can do even better. If they can get transport (piki-piki) from TDBP/SNV, the reach of the company is enlarged, and the time to get to the construction sites is greatly reduced. This will help the company grow as a business, and for the biogas sector this will be a great success story. A new company that is already performing very well with the limitations it has with regard to transport is something unique in the biogas sector. The manager already promised to work very hard if they get transport support.

The current number of digester constructed is 20 up till mid-April. They plan to build 10 more till June, but with transport, the manager thinks they can build even more. Knowing that 20 constructed digesters is already the highest number, the prospect of a company reaching close to say 40 digesters in half a year is good for the image of the sector. This isn't impossible: speaking to the managers of the BCE's, two fundi working together can build one digester in a week. Success stories are important this sector, and Majabimu is the perfect example of such a success story.

The future of this company is looking bright. Even without help, they still are among the top BCE's of the sector. However, with transport, this company will most likely be the number one BCE for the coming months (and perhaps years). With more customers comes more money, with which Majabimu can expand even further. More money means more possibilities to hire fundi's, get more piki-piki's and improve your business as a whole (perhaps getting an own office someday). It seems to be a safe bet to keep supporting BCE's like Majabimu.

The title of this scenario is top performances. It is plural, because this scenario is also likely for companies like Kisiki, Hai and Danko. These are currently the top four performing BCE's. If TDBP/SNV are considering supporting companies with transport, these are the first to consider. Kisiki has their own transport, so that leaves three companies that can really improve their business if properly

supported. Top performances getting better, if given the right support. Businesses like these are necessary for the sector, as these companies will set the tone for the continuation of the private biogas sector after TDBP has left. If these companies can support their region, and help or take over companies that are not performing, the sector has a better chance of staying.

7.2 Oses Company Ltd.

Osese Company Ltd. is a registered company based in Kikatiti area. This BCE has seven members, who have constructed four digesters up till March. That is a decent number (comparing to the average of 5.1 digester constructed and the fact that some companies have zero digesters constructed) for a BCE. They do have slight unrealistic plans for the future, as twenty digesters is perhaps too much for the next coming months. The company is registered, has a bank account, an office and an organizational chart ready. They do however lack a registration book, a logo, and have problems promoting themselves, but except for the promotion these are minor flaws.

Their network is quite extended. They cooperate with Kikatiti SACCO and this proves to be successful, as the SACCO provided them already with two customers. Also, it is one of the few companies that said that the government is visiting frequently (although this is questionable). The promotional activities are reasonable, but they do need to do more promotion to extend their reach. They are planning to do village meetings to get their company known better in the region. Apparently, speaking to the manager, the demand in the region is high. So the question is why this demand isn't translated in a larger number of digesters. It seems that Osese could be in the good performing list, but they face challenges which hamper them to build enough digesters. According to the manager the financial capability of the customers is not good enough; the biogas digester has to compete with school fees that have to be paid and a focus of spending money on agriculture. It isn't so much the awareness that is lacking, it is the problem that the biogas digester is not always the first priority among the people.

Lastly, their own financial management is not good. They lack registration to write down the payments of the customers, and have little saving possibilities. This is also one of the reasons their promotion is not what it could be, because they are lacking the funds to enlarge their reach. Regarding their small reach they should try to cooperate even more with the SACCO. It is said that this SACCO has a large reach as well as influence in the district.

In conclusion, it seems that Osese has all the criteria met for being a good company. However, they are lacking behind in a few aspects, including the most important one: number of digesters. This case shows that you can be very professional (office, logo etc.), have a good network but are still not performing as well as you could be. But Osese is one of the companies that is on the verge of breaking in the good performing list. They just have to get their number of digesters up first. This BCE is incorporated in the case study to show that a company can do almost everything right, but can still be found in the second category. This is purely because of the low digester number, and partially for the lack of promotion.

Scenario 2: The rise of a BCE	
	<p><i>Osese Company Ltd. is a company in the middle segment of the division of BCE's. Although it has some features of a good company, it lacks some key aspects. This includes the number of digesters constructed (despite high demand), financial management and not using their network to the fullest. But Osese is an example of a company that can rise up, and become a good performing company.</i></p> <p><i>Most middle segment BCE's are closer to the good performing category than they are to the bad performing category. This is good news, but the companies do need to take the last step to actually being a good company. Most urgent problems of middle segment BCE's are transport, funding and promotion (next to the fact they don't construct enough digesters to be considered good</i></p>

performing).

To solve these issues, and become a better business, first thing to do for the BCE's is that they use the network that is available better. When using your network better, you will get both more promotion and fewer costs for transport. To illustrate: SACCO's can help get customers, but also do promotion. With their large number of members, they have a reach that is probably bigger than the BCE are having themselves. So there is a win-win situation: more promotion, and less need for transport to do promotion. You still need to get to places in order to build, but it is a first step.

Funding is the second step in improving business. Making more digesters won't only get the company in the higher category; it also gives money that can be used for the company. Getting money from the bank is also a possibility. Most people are not keen on loaning money from the bank (as was found out during field visits), but it is very helpful if you can get a loan. You can improve your company, get transport, better materials; this will undoubtedly improve your performance as a BCE and thus raise your income (which you can use to pay back the loan and invest in your company).

If Oses, and companies like Oses, can find a way to improve on some aspects of their business, particularly the number of constructed digesters, these companies will find themselves in the best performing category in a few months' time. This small scenario shows what most middle segment companies have to do to improve their business. Often it are small things to do, but really important ones. This scenario also showed that a lot of the problems that companies face are interlinked: not enough digesters means less money, less money means no chance to invest in transport and promotion, which leads to fewer possibilities to construct digesters. It seems like a vicious circle but all the BCE's have to do is fix one of them and the other problems will be easier to tackle.

7.3 Hamasa Biogas

Hamasa Biogas is located in Marimba. The members of this company are veteran fundi's, so you would expect they have constructed a good amount (of quality) digesters. The truth is, that they have only built one digester up to April, with five expected in June. Although it may be a realistic figure, it is the second lowest expectation from all the companies. Only Mkombosi is doing worse with just three digesters planned. Despite the starting year of 2008 (as a group, not as a company), they are not registered, have no bank account, and no registration for customers. They do have an office, which is located next to a hardware shop, which can help them with promotion. Hamasa is an example of a low performing BCE's in this case study.

Most striking fact for this company is that they have a non-functioning digester just behind their office. The best promotion is a working biogas digester; this has to be the worst promotion. If you can't get a proper digester in your backyard, how will this look like towards the customers? They say that the attitude of the people in Marimba is a problem, but a non-functioning digester is not going to fix this. Their biggest problem (besides the ever present transport problems) is that the attitude of the people in Marimba is negative towards biogas. People don't see the necessity of getting a biogas digester. On top of that, charcoal making is a big business in the region. That is one of the reasons that the people in Marimba are not warming up for biogas (despite the fact that people are having many cows). The attitude problem could be solved by proper promotion, however their promotion is not working properly, and they need help to get more customers interested in biogas in their own region. They also try to get to other places, but the transport is difficult. It seems that the company is at a standstill, since they can't build many plants. They need to come up with some ideas. Emphasizing the bio-slurry is one example of how they can attract more customers. The people in Marimba have many cows, so also the possibility of much cow dung that can be used as bio-slurry. Emphasizing this aspect of biogas is perhaps more important than cooking and lighting in this area. A second idea is working together with possible other energy companies. The manager said that many people want to watch TV with the digester, but since this is not possible, the customers go away. It is

an idea to link up with a company that installs solar energy for example. The company has to be creative in solutions to get more customers.

Financially, the company is not doing well. They don't have any funds to invest in transport or other things, and they are not able to save money (because they are not building enough digesters). Without money to invest in the business, it will be difficult to improve. Furthermore, the members won't get salary if there are no digesters constructed. So it is in everybody's interest to construct as many digesters as the company can. Another option for them (and other underperforming BCE's) is to get stronger links with performing BCE's. Already, Hamasa has sought contact with Majabimu (which we saw as an example of a good company). This interaction can be very useful for Hamasa, as they can see with their own eyes how a good BCE is being managed, and how to get their number of digesters up. If the company won't be able to improve, they face the fact that perhaps they will be cut from support.

Scenario 3: Disappearing BCE's

Unfortunately, not all BCE's are performing as we would like to see. There are a lot of different reasons to come up with why some BCE's are not performing, but the fact is that if you don't perform, you will have to go. This means either merging with another BCE, or cease to exist at all. Hamasa is such a company. The company has an average number of members (five), from which some are in the biogas programme since the start. Veteran fundi's so to say, but sadly not performing fundi's: Hamasa is in the bottom five of the BCE list, together with Mkombosi, Oldonyosam, Biogas Innovation & Installation and Siha. These are the BCE's that should really start performing better if they are to stay in business.

The problem with these BCE's is that they are not constructing enough digesters, two or three at maximum in this year. When you don't construct, you don't get money, you don't get a chance to invest and you are definitely not going to grow as a company. These companies also share some other weaknesses: no offices, no logo, bad financial management, not the best promotion and transport problems. It seems that although not all the weaknesses may be present in every company, the problems seem bigger than the problems for middle segment BCE's. The lack of vision and construction ambitions will hamper the growth of these companies to companies that can help improve the sector.

Of course, there are some things the underperforming companies cannot do anything about. Hamasa cannot do anything about the fact that charcoal is a big business in the region. But they shouldn't use this as an excuse for just one digester constructed this year. Especially not when they have a non-functioning digester in their back yard.

In conclusion, the companies that are on this 'black list' should be careful. They have to perform in order to stay in business. Hamasa has promised to construct five digesters in June. Although it may not really seem that much, it would be a sign that they are getting better if they really reach this target. This goes for the other companies in this scenario as well. If you don't perform, you are most likely to run out of business.

These three different case studies showed the current situation of the private biogas sector. There are BCE's that are doing good, there are BCE's who are doing not so good and the inevitable medium performing BCE's. The division is based on different characteristics that are shown in table 8. If every company is matched with the criteria, most companies are in the medium and bad performing category. That is the current state of the biogas sector. In a few months' time however, the division will shift towards medium and good. This is mainly because of the BCE's having constructed more digesters, getting more professional and getting to know the sector better. The companies that aren't doing good business at the moment are not likely to improve. As we discussed earlier, these companies should be cut from support.

Another options is that they be merged with better performing companies. Those were the first three case studies on the biogas sector. The last example will be a case study on competition.

7.4 Coastal vs. Highland: a case study on competition in the biogas sector.

With the introduction of the BCE's, the biogas sector will hopefully get more competitive. After all, every BCE wants to grow and be the number one BCE for his or her region/district. Competition is a natural process for companies in a private sector; only the companies that are performing up to standard will continue to be in business. Those that cannot reach the required level, will either go out of business, or be merged with a company in their region that is performing. In this process, only the top performing BCE's will survive, which will lead to an overall better quality of the biogas sector. This is what the sector should strive for in the coming years. When TDBP leaves, there will be no backup for the companies; they will have to be able to make it on their own. In this situation competition is the only way in which the sector can survive.

In this environment of competition in the biogas sector, two companies stick out from the other companies: Coastal Biogas and Highland Biogas. They stick out because both companies operate in the Korogwe region, Coastal being based at ground level, and Highland in the mountains. Their operating areas are so close, that Highland is constructing in the lowlands, and Coastal in the Highlands. The two companies are under half an hour drive away from each other. In distance, this is even shorter if it wasn't for the mountain trails. This is the perfect case for a deeper investigation in the level of competition in the biogas sector. First let's take a quick scan of the two different companies. The two companies seem to be quite similar in almost all aspects.

Table 7: Coastal and Highland BCE's compared.

Aspect	Coastal	Highland
Plants already constructed	Not yet known (<10)	Not yet known (<10)
Plants planned for June	40	25
Number of Members	10	9
Office/Logo	Yes/Yes	Yes/Yes
Specialized Masons	Yes	No
Knowledge of the other	Average	Non
Unique selling point	Promotion	Satisfied customers, tree nursery
Internal problems	Yes, two masons not functioning	No
Other problems	Transport	Transport; Funds
Network:	No SACCO; NRCF as IP; interaction with Highland	No SACCO; NRCF as IP; interaction with Coastal and Handeni
Requests	Help with constitution	Help with financial business; Plumber training

Speaking to both companies, the most striking observation was that neither company thought of the other as being a competitor. In fact, Highland did not know about the statistics of Coastal, like number of members, plants build and where those plants were build; Coastal did knew them, or at least the manager said he knew some things. During the field visit, it wasn't possible to find out why customers went to the one company, instead of the other. The time frame was too short to visit customers as well as interviewing the BCE's. Fact is that this information is important for the companies, since they can change your promotion if they know what makes customers choose for the competition. That would be an idea for a following visit.

In a competitive environment, what the biogas sector will be or already is, you have to know the competitor (especially if the competitor is so close). This is a key factor of competition that seems to be lacking in the biogas sector. The companies maybe too new to really grasp the concept of competition, or they are unable to really act on it as for now. They are now starting up, some companies no less than three months ago. But in time, competition will decide which company is really doing good business, and which is doomed to either cease to exist or be merged with a performing BCE. That is the message that has to be clear to all the companies. To put it directly: do or die (or merge). The fact that neither company really knows the other seems to be suggesting that indeed the competition in the sector is not what you would expect from a private sector. An important aspect of competition is being different from the other company that is selling the same product. How do the two companies try to outsell each other with a unique selling point? This question was asked to both parties. The answer, or range of answers, that was expected included differences in price (being cheaper than the competition), in the time to complete the digester (being faster than the opponent), or perhaps in after sales service (customer satisfaction); instead, the answer from Coastal was that their promotion was better than that of Highland. The latter answered that the happiness of the customers was their strong unique selling point, along with their tree nursery that was recently started. Both answers were quite unsatisfying: those are not the characteristics you want to compete on. Promotion is done by everybody, so this will not be a unique selling point. Highland has a tree nursery which could be something different, but they should focus more on the biogas digesters than collateral aspects.

One remarkable thing about both companies regards the transport problem. Both companies described transport to their customers as a challenge for them. Highland needed to come down from the mountain, while Coastal was going up the mountain to build. If both companies are having difficulties with transport, this 'building in the region of the other company' seems pointless. Why isn't there an exchange between the two companies? Both companies will save money and time when Highland and Coastal refrain to build in their own respective areas. This is not really what you would expect from competition, but seeing that both BCE's have trouble with transport, this is a viable option. You save money (less fuel etc.) which you can use on other activities; you get at the building site faster, and thus the digester will be finished earlier (what is good for the image of your company). Or you can put this in the competitive aspect: 'steal' the customers from one another. It is hard to believe that you cannot be cheaper if you only have to ride a few minutes to a customer, or up (or down) the mountain which will cost you considerably more time, and thus money. It is for your own benefit to get as many clients as possible, with the lowest possible costs for your company. Then the idea of knowing each other's clients and try to persuade them to switch, isn't the craziest idea.

To conclude the last case study, the competitive factor in the sector isn't yet what it is supposed to be and should go up in the coming months. For now, since most companies have just started a few months ago, it won't be the first thing companies will go after. They first seek to establish themselves in the market, and figure out how managing a company works. This small case study therefore should not be seen as a purely negative study on the sector. It shows how the sector is working now in regard to competition, and how it should be working in the (near) future. The BCE's (and TDBP and SNV) should however keep in mind that in June/July some decisions will be made on which companies will continue to get support and which are not. For the companies themselves, they will have to incorporate a competitive attitude in their company in the coming months to be able to keep their heads above water, and not get cut off.

Chapter eight: Conclusion and recommendations

The last chapter of the thesis will discuss the questions that were drafted in the introduction. The objective of this study was to investigate the private biogas sector in Tanzania. Other objectives were to find out what the level of entrepreneurship is and what interventions are needed to make the biogas sector fully independent and successful. In this chapter, we will answer the sub questions and the main question of the thesis. Secondly there will be recommendations for the future of the sector. To make the sector independent, successful and viable interventions are needed. We start with reviewing the sub questions.

8.1 Sub questions

The questions for the thesis consisted of the main question and eight sub questions. These sub questions help answer the main question, and were derived from the conceptual model and the context. Before we start giving the main conclusion based on the answers of the sub questions, we will first look at the sub questions. After answering these sub questions, we continue with the answer on the main question (5.2).

1. *Who are the actors in the biogas sector and what are their characteristics (focus on the Biogas Constructing Enterprises, BCE's)?*

As presented in chapter four, there are different actors active in the biogas sector. The most important ones are TDBP, SNV and to a lesser extent CAMARTEC (besides the BCE's). They are the organizations that support the sector in all possible ways. Training sessions, meetings, financial and knowledge support are a few of their activities. The biggest change in the sector that has occurred since the beginning of the programme is the formation of Biogas Constructing Enterprises, the BCE's. The sector is getting more and more professionalized. With the emergence of these companies the first step to an independent and successful sector is taken. These companies were the main focus point in the research that led to this thesis. Other actors are in a supporting role around these BCE's, just like SNV/TDBP. These are financial institutions, capacity builders or actors otherwise engaged in helping the BCE's in the sector. They are the institutions that have to take over the role of TDBP and SNV when the programme support stops. There is however still a long way to go before those institutions can take over this role. They have to be helped by SNV and TDBP in order to be able to fill the gap. The people in the biogas sector are foremost males, around 30-40 years of age. Women as actors at the supply side are scarce in the sector, as are either very young (18-25) or older (50-65) people. It seems that the sector attracts the 25-40 year old males. This is not just the case for the BCE's, but in the IP's, LCB's and SACCO's as well. Proactivity is lacking in the sector. This is especially the case for the BCE's, but also present (or lacking) in the IP's and the LCB's. The supply side is more gender-equal, although the males are those that make the decisions.

2. *Are there network ties present in the sector, and if so, what kind of ties?*

The second question has to do with the link between theory and the research findings. Already in chapter four we saw the similarities between theory and practice. The biogas sector has several actors, and between them are different sorts of ties. Network ties are being seen as valuable assets to companies. The BCE's prove no different. Without a lot of the ties they are currently having, some companies probably would not exist. The ties range from financial ties and supporting ties to ties that are based on knowledge exchange. These different ties have different effects on the BCE's. SACCO's are bringing in customers; LCB's give training; SNV/TDBP gives general development support. Not all ties are as rewarding as the next. The tie with the SACCO's is proving valuable, as is the tie with SNV/TDBP. Based on the theory, networks should be beneficial for small and medium enterprises. For the biogas sector, this seems to be the case.

3. *Is there any sign of cluster forming of any kind?*

The original research idea was to investigate the cluster forming in the sector. This meant finding out whether the companies were getting together to get economies of scale, or if it meant that the companies would locate themselves close to the companies that would deliver the building materials for example. But

in the first few weeks of the research, it was clear that this research subject was not feasible. The sector is still too little developed to be thinking about cluster forming. The companies should first get a solid position in the market. As for now, cluster forming would just pose another problem in the development of the BCE's and the private biogas market. For the future, it would be an idea to cluster with other companies (not BCE's). This will get you more opportunities and hopefully financial perks.

4. What is the role of individual entrepreneurship in the sector?

Individual entrepreneurship is in theory very important in any sector. Entrepreneurs are the ones that create jobs and wealth. They see opportunities in the market and act accordingly. Unfortunately, the level of entrepreneurial skills in the biogas sector in Tanzania is low. There are just a handful of people in the BCE's that are able to really understand the market. Without these people, the sector would be even further behind schedule. Some of the most striking examples of good entrepreneurship are the acquirement of motor bikes to enlarge the reach of a company and another company that has a business plan set up well before the training on the subject is planned. Entrepreneurship could have a much bigger impact on the sector. SNV/TDBP should think about incorporating this more intensively in the training rounds. The training round that is given in the first semester of this year is not all inclusive about entrepreneurship. More training and information about entrepreneurship is definitely needed, especially why entrepreneurship is so important (see annex II for the training information). The characteristics that are attributed to entrepreneurs in theory are not really present in the biogas sector. The theory on entrepreneurship discussed mainly the different traits that people should have. Box 2 showed these characteristics. The entrepreneurs in the biogas sector don't seem to have these traits. Only a few of the traits are somewhat common in the sector, but most traits are non-existent. That is made clear in box 3.

5. What are the opportunities in the sector?

The sector as a whole is not yet performing as it could be doing. The BCE's are constructing digesters, but not nearly enough to make the target of 12.000. But, there are a lot of opportunities that could be addressed. These opportunities include the new types of digesters that are in development. These new digesters need less water than the current ones, which means that the reach of potential customers will be enlarged. This is a first and important step in the development of the sector. The need for water in the digester is a big problem for people living in (semi)arid regions in Tanzania. Other opportunities are ties that are not yet present or ties that can be strengthened. Examples are the government and other companies. The government is not yet involved in the programme or sector. That is a loss for the sector, since the government can really add something to the sector. Especially when SNV and TDBP stop supporting the sector after the programme will be ended. This place can be filled by other actors (we saw them in chapter four), but also by the government. The second type of improving the ties is to strengthen existing ties. The BCE's can be cooperating much more than they are doing presently. This will be beneficial for both parties. Finally, finding investment is something that might be difficult, but rewarding. Especially when programme support stops, you need financial support from elsewhere. If these opportunities are addressed in the right way, the sector will be better suited for the coming months.

6. What are the pitfalls in the sector?

Besides of numerous opportunities, there are at least an equal number of possible pitfalls in the sector. The biggest challenge in the sector is the lack of funds. This is a two sided problem: both the BCE's lack the funds to expand their company, and the sector lacks sufficient credit facilitators. The BCE's are low on capital, and have virtually no starting funds to help set up the company. The problem is again two folded: the BCE's are afraid to get a loan from a credit facilitator, and these institutions are not yet fully integrated in the market. The BCE's seem to be frightened to take up a loan from a credit facilitator. They feel that loaning money will be a very expensive undertaking. They do not know the rules regarding loans. But without taking the risk, they are not getting forward (entrepreneurship!). They need to be educated about the possibilities (and benefits) of taking loans. The second part of the problem is the lack of credit facilitators in the sector. As for now, the SACCO's are the only credit facilitating institutions that are really

active in the sector. But, they give out loans to customers and not to companies. They help the companies in getting trustworthy customers (with regard to payments). They don't however give loans to companies. Banks and MFI's should be the ones that are giving the loans out to the companies. There has to be done something to get these parties more involved in the sector. When programme support stops, there is still financing needed.

The second biggest problem is transport. Both the quality of the infrastructure and the means of transportation of the BCE's are a problem. Many of the BCE's that have been visited are located in remote regions (i.e. not in cities). They have to walk to their clients because they don't have a form of faster transportation. Walking on dirt roads for a few hours to get to the client and having to walk back again for a few hours is time wasted. Both the infrastructure should be better as well as the means of transportation of the BCE's. There are just a few BCE's with a motorbike. TDBP has a loan offer which encompasses the use of a motorbike. This is only available for good performing companies as some kind of an incentive to do good business. Two more minor problems are promotion and internal problems of a BCE. Many BCE's complain about promotion done by the programme. They feel biogas should be more propagated. In the same time they complain about the lack of promotion material. Beside the fact that this is true, they are free to do their own promotion. Just sitting and waiting for your materials to come to you is not the way of doing business. Most companies have an extended network to promote themselves. Most notably is the cooperation with the SACCO's. These SACCO's are responsible for giving the BCE's (a lot of) customers. This does vary per BCE, but on average they are very helpful. Internal problems are the last challenges that the BCE's and thus the sector face. This is a problem in only a handful of companies, but that is still too many. The problems are mostly non-functioning masons. These masons disappear, deliver bad quality or both. Half-done digesters, broken ones: it is not good promotion for the company or for the biogas sector as a whole. This problem should be addressed by the company during company meetings.

7. What are the characteristics of the Tanzanian people (in particular those who are most likely/suitable to get a biogas plant)?

To start with: it seems that every person/household in Tanzania is suitable for biogas. We saw that the prerequisite of having cattle isn't as necessary as one would think. Some people who own a digester don't have cattle. They get their manure from people who do have cattle, but no (need for a) digester. This opens up the sector, as more people become interesting for the BCE's. The age pyramid is built up with 42% of the population being 0-14 years old; 55.1% is 15-64 years old and just 2.9% being 65 or older. Tanzania is still largely a rural country. 26% of the people live in the cities, with an annual urbanization growth rate of 4.7%. Dar es Salaam is by far the biggest and most important city in the country. The official capital Dodoma is far behind. Tanzania is mainly a patriarch society. The men lead the households, and with that they are also the decision makers. The contrast with biogas is that it are the women operating the biogas digester and applications. They are also the ones that benefit most from the technology, along with the children. The level of education is low: 75% of the people don't have higher education than secondary education. The income is generally 70.000 Tzsh per year or higher. Only some 17-21% of the people earn less than 70.000 Tzsh per year.

8. What is the acceptance of biogas as an energy source?

Acceptance of biogas is an important hurdle to be taken towards a successful private biogas sector. If people don't accept the biogas energy as a form of energy, then the sector will not develop. Without demand there is no need for supply, as mentioned earlier. It seems that biogas is a widely accepted form of energy. People are generally positive on the technology. The fact that they could cook inside without smoke and light their homes were seen as a big plus. They are also acceptant of the fact that manure is used to produce the energy. Negative points are the possibility to connect the toilet to the digester. Most people did not accept that human excrement was used to provide energy. Insufficient gas production was also seen as a negative point for the technology. Perhaps with better training on how to use the technology, this problem can be solved. The acceptance of human excrement in the digester will take some more time getting used to. Other negative points that owners of a biogas digester had were not directed at

the technology. These issues were about the lack of spare parts and appliances for the digester. The appliances that are used currently are of poor quality and need to be improved. Poor quality of digester construction and finishing along with the lack of after sales services are problems that need to be addressed. These problems are not due to the technology, but they can seriously hamper the acceptance. The whole package should be functioning well for the technology to be accepted.

Besides the sub questions the six assumptions made were important to assess the sector. These assumptions assessed the differences and similarities between theory and practice. Of the six assumptions, four were proved correct. It seems that the fact that Tanzania is still a developing country affects the assumptions greatly. Not only the country is in development, but the biogas sector is new as well. Because of this, most theories that prove right in the developed world, are not true in Tanzania.

8.2 Main question

Now that the sub questions have been reviewed and answered, we start answering the main. With the use of the thesis and the sub questions the main question can be answered. To recap the main question:

‘What are the main characteristics of the Tanzanian domestic private biogas sector (programme), what is the role of entrepreneurship and what interventions are needed to make the private sector successful, viable and fully independent?’

The main question consists of three different parts. The first part deals with the characteristics of both the sector and the actors in the sector. The characteristics of the actors in the sector are the second pillar of the question. This part describes the different actors, and explains their functions and characteristics. The second part of the main question discusses the role of entrepreneurship. Entrepreneurial skills are presumably important in private sector development. Here, we will find out what the role of entrepreneurship in the Tanzanian domestic private biogas sector is. The last part comprises of the recommendations and interventions needed to help the private sector to develop. The private biogas sector has to develop itself to a successful, viable and fully independent private sector.

Let us begin with the first part of the main question. What are the characteristics of the Tanzanian domestic private biogas sector? The biogas sector in Tanzania in its current form exists since 2007. In that year the Tanzanian Domestic Biogas Programme (TDBP) was started. The goal of the Tanzania Domestic Biogas Programme is to improve the livelihoods of rural farmers. The way they do this is through exploiting the market and non-market benefits of domestic biogas. The aim is to get a more active private biogas sector. The sector has as a goal to construct 12.000 digesters in 2013. As for now, the companies, single masons and groups have constructed 3329 digesters. If they continue at the same pace they are doing now, the goal won't be reached. That is why the deadline has already been postponed with one year. The sector has many actors, each playing their own role. The BCE's are among the most important actors in the sector, along with SNV, TDBP and to a lesser extent CAMARTEC. Other actors are the Implementing Partners (IP's), the Local Capacity Builders (LCB's) and the Savings and Credit Cooperative Societies (SACCO's). There are other actors like credit facilitators and the government that are possible future actors for the biogas sector. They are yet to fully enter the sector. The sector has 26 Biogas Constructing Enterprises (BCE's) currently (June 2012), who have together constructed 533 digesters this year. In total, for the duration of the programme the number is 3329. The BCE's have 164 employees in total, which gives an average of 6.3 employees per company. The sector is full of different ties. The BCE's have ties with almost every actor in the sector. This network gives them more possibilities to develop the company. SNV and TDBP are the coordinating actors, who are up to date on almost everything going on in the sector. Missing actors for now are the government who is only sideways connected through different organizations; and credit facilitators like banks and Micro Finance Institutions (MFI's) who could help solve financial problems that BCE's are having. Especially the need for the government to enter is high. In a few years, the programme will end and with it the financial support (and other support). The last actor-group in the sector is the customers. We saw that the households in Tanzania are male-led; the use of the biogas digester and user training is more a

women-led operation. The user are households of different size (on average 5-6 people), with moderate income. Most of the users can pay for the digester themselves

The second question was the role of entrepreneurship in the sector. We saw that entrepreneurial skills can greatly aid a private sector to develop itself. Is this also the case for the Tanzanian private biogas sector? The answer is short: entrepreneurial skills are lacking and not really aiding the development of the sector. The role of entrepreneurship could and should be bigger. The term entrepreneurship is seen in this case mainly as being proactive, knowing what the company needs to grow and seeing the opportunities in the sector. The managers of the BCE's are not yet at the right level. Some of them do know their way around the sector, but most managers are not entrepreneurial at all. The problem with most managers is that they are not proactive. They wait until support comes from SNV or other organizations, doing nothing in the meanwhile. They are unable or unwilling to see solutions to their problems. If this does not change soon, many companies won't be able to continue doing business. The companies, who are doing well and have bright people, can be the answer. These companies (a handful) are spread across the North East of Tanzania. They can either absorb non-performing companies, or help them achieve a higher level of skills. That way, the better companies can enlarge their area due to the increase of masons. They help the sector through the training of the masons from the disappeared company.

For the last part of the main question we need to take in account different skills. Throughout the thesis, different aspects of the biogas sector have been discussed. The terms successful, viable and independent are all interwoven with each other. Without success, you won't be able to be viable. If you are not viable, you will not become interdependent from support. At the end of this part, the interventions and recommendations are presented. The interventions or recommendations are grouped to the different actors. Although the BCE's are the main subject of this thesis and they can very much improve, the other actors can also function better. Together, all the different actors can make the difference for the sector. The interventions are either small or big; either for the short term or the longer term.

A sign that there is faith in biogas is the emergence of perhaps more companies, more involvement from new partners and new ways of investment (like other biogas programmes). There are enough opportunities and good-performing companies for the sector to stay in business. Even after the programme support stops there are enough leads to develop the sector further. The companies are coming, and hopefully they will be able to turn the biogas sector into a successful, viable and independent private sector.

Recommendations and interventions

This very last part of the thesis sums up the different recommendations and interventions needed to steer the sector towards success, viability and independence. The interventions and recommendations have partly been drafted during the internship; the other part of the recommendations is derived from the theory in this thesis. Both types of recommendations are intertwined. The different recommendations and interventions are grouped per actor. Naturally, the BCE's have the most items; partly because they need the most support and partly because they were the most intensive researched actor. The most important actions that need to be taken are:

- Support the good-performing companies to even greater heights. The sector will have a better chance to become independent when good companies are supported. Support to non-performing companies should be phased out. These companies should either stop doing business, or be merged with a performing company in the area.
- Get more actors in the sector, because of SNV/TDBP leaving the sector in a few years. The government and Local Capacity Builders (LCB's) can play a bigger role in the sector.
- Expand the training rounds. Invite the biogas employees themselves to help make the curriculum of the training. The employees already had ideas and hopes about the training. If the training can be more tailored to the wishes of the employees, it will have more effect. **Entrepreneurship** should again be incorporated in the training round, but more extensive and more effective.
- Make sure people know the financial side of the sector. Both the supply side as the demand side can do with more information. The BCE managers need to understand the worth of taking up loans from credit facilitators. Currently, they are scared to take up a loan.
- The customers need to be informed on all the different benefits a digester has to offer. Making use of bio-slurry should be a top priority. This will result in more applicants for the digesters. In turn, this will aid the private sector and the programme as well.

BCE recommendations:

- The BCE's have to be far more initiative, not waiting for someone to come along to help you (TDBP, consultants etc.). See what you can do on your own before you ask help (and doing nothing in the meantime). Some problems can be fixed by trying it yourself first. Proactivity is the keyword in the biogas sector.
- The BCE's should strive for better building statistics, three digesters in three months is not enough (especially considering the average number of masons in a company). Be more ambitious, and make that known throughout the whole company. If you don't perform, you will be cut out. Most companies don't see three digesters as being bad, but that means that you constructed one digester per month, with an average of five fundi...
- Make clear what the tasks are for everyone in the company. If someone is not performing, albeit a manager or fundi, take actions and replace/fire them. You are as strong as your weakest link, is the saying. Your company's image will be negatively affected by internal problems, and they should be dealt with as soon as possible. Internal problems should never be a reason to lose customers.
- Get a computer, email-address and internet site (with contact information), so you can be contacted more easily. Not just by SNV/TDBP, but also potential customers or investors. Now, BCE's just have a phone number. This is perhaps sufficient for the business they are doing now, but when you get more professional, these are things to think about.
- Take the lessons from the training rounds by heart. The training is a good start to learn about the different aspects of the sector. Becoming an entrepreneur in the sector starts with learning the sector and how to be an entrepreneur.
- The training is an excellent place to learn, but also to ask questions! Too often during the training, people were just sitting, listening and writing what they heard. Few people asked questions. You can relate this to the point that the BCE's are not taking initiative. If anything is unclear, ask about it! The training is not given every week so make the most of it.

- Following on the previous point: during the follow ups, ask as much questions as you can during the follow ups. These follow ups aren't every day, so make your best of it when it happens. The people conducting the follow ups are knowledgeable enough to answer all your questions.
- Try going bigger in scale. Don't just focus on households; schools, hospitals etc. are possible customers. It requires a different approach, but it may be rewarding. One BCE is already constructing a 100m³ digester for a school.
- Try different methods of promotion. Not just door-to-door, church or village meetings. Expand, since most BCE's claim to have difficulties finding customers. Go outside the box, and find new, attractive ways of promoting yourself to the people. But most important: realize that your best promotion is a functioning biogas digester! If there are non-functioning digesters in your area this should be your first priority to fix (proactivity)!
- If water is a problem, try going for the new Solid State Digester (SSD). This is a digester that works better in arid conditions than the regular digester. Some companies already installed some SSD, and some companies are eager to be involved in what still is a pilot programme.
- Try to find out what the reasons are for customers to choose for a different BCE in your area (see the case study on competition). Try to be smarter and better than the competition to get customers.

BCE recommendations regarding their network:

- Make use of the whole network available to you: LCB's, SACCO's, IP's, NGO's, etc. They can really help your business, one way or another. BCE's that aren't performing well are often not using their full network possibilities.
- Government involvement is a way for the sector to be not completely on itself when the support of SNV and TDBP stops. For now, the government isn't participating. And although there is no sign that the government will step in as for now, it still is a possible strong actor to help the sector. Try it yourself on more local governments and see what they can do for you.
- Search for companies outside the 'normal' network. Keep Green Biogas is a good example. This company makes promotion via a company that has nothing to do with biogas. This way, both the companies get a larger reach, without stealing clients from each other. Search for these win-win situations. Think about construction companies (who can also perhaps teach you a thing or two), plumbing experts, livestock sellers... You think it, you name it.

TDBP/SNV:

- The top down approach is not working as it should be. Differences on the local level are too big to make generalizations. A more district level approach is better practice. Use the IP's more perhaps, since they are more aware of local conditions (and have also suggested in the meeting with the IP's at SNV Arusha). Bottom up actions are perhaps better to develop the sector. See the theory on renewable energy for more information.
- When implementing new techniques (SSD) and incentives (transport), look for the good performing companies first. They are already doing a good job, and for the sector it would be good if these companies get the support first. They can grow even further. Weaker performing companies must see this as an incentive to perform better; then they too can get support from TDBP/SNV.
- When an underperforming BCE is near a good performing BCE, try to persuade the weaker BCE to merge with the good performing one. You get rid of a bad performing BCE, while the good performing BCE gets a bigger reach, and more manpower to construct digesters. At this stage, choices have to be made on who to support. This comes at the expense of some companies, but you gain even better functioning companies in return.
- Continuing on the previous point, find out for how many BCE's there is place in North-East Tanzania. Perhaps there are too many BCE's. In Arusha and Same there is a big clustering of BCE's, but some of them are performing not as hoped. If merging the companies will help this should be the first consideration.

- Investigate whether it is possible for biogas digesters to generate electricity. According to a 'feasibility study for the national domestic biogas programme' in 2007, a pilot plant of 150kw is constructed in Hale, Tanzania. This would be an opportunity for the sector, since electricity greatly enlarges the possibilities for using a digester. If this pilot is a success, this will be very good news for the BCE's.
- Apparently, the biogas users use their own equities to buy the biogas digester. The finance support structure of the biogas digesters should be reviewed. It is costing a lot of money subsidizing the digesters, and perhaps this is not needed. The consideration should be the income of the household: lower income households should get more subsidies; higher income could do with less.

IP's:

- Keep supporting the BCE's. The BCE's are very pleased with the support they are receiving from the IP's.
- IP's do have to keep communicating with SNV/TDBP. Too often things were only discussed when SNV/TDBP was visiting the IP. SNV/TDBP cannot fix anything if they don't know what the problems are. If they know the problem before they arrive, they can do something about it.

SACCO's:

- Incorporate a biogas loan in your curriculum. There is a demand for it, and the BCE's will be greatly supported if this biogas loan is given out by the SACCO's.
- Help the BCE to promote themselves through the SACCO. There are a lot of members in every SACCO, and raising their awareness can be very rewarding for the BCE's. It is a win-win situation as BCE's get more customers, and SACCO's can give out more loans (and get more interest in return).

For LCB's:

- See where you can assist in the sector. The role of a LCB is very broad, from assisting BCE's to TDBP. The LCB meeting made clear that is the role of the LCB's is not yet entirely clear. There is much room to gain for the LCB's to position themselves in the sector. SNV is leaving, and this is an opportunity for LCB's to take.

For the next training round:

- The BCE's said they were very happy with the fact that there was a follow up after the training. So keep doing this, maybe even twice after the training.
- Many BCE's require training in the following aspects: financial management, bio-slurry education and registering/constitution. Try to fix the problems the BCE's are having first, before you teach them anything new. Entrepreneurship is something else that should be on the top of the list to teach.
- Make sure the BCE's get the fact that realism is very important! Without realistic goals (number of digesters to construct), the company will fight a battle against itself. Not reaching targets is killing for a company, especially a new one. Try to get the message across that ambition is good, but only accompanied by realism.

For customers:

- Make sure you are fully informed on all the different aspects of the biogas digester. Not just operating it, but also all the different benefits that it gives.
- Make the best of use of your slurry! It can raise the yields of your crops and earn you extra money. If you don't have crops or a garden to use your slurry on, you can always find a way to store it and

sell it. Perhaps there are people who don't own enough livestock to be able to get a digester, but they may have crops.

- Maintain your digester. If you don't maintain it, the efficiency of the digester will go back. It is a large investment, and it would be a shame to let it go to waste because of bad maintenance.

General recommendation:

- The physical infrastructure is not good. Despite investments in the country's roads, this is something that has to be addressed. If the infrastructure improves, so will the sector.

Reflection

From the first few days of being in Africa it was clear: this is going to be an adventure like I have never experienced before. Despite being in Africa twice before, in Zambia and Kenya/Tanzania, this time it would be different. 14 weeks alone, without family or friends and an important task at hand. This was new for me. Luckily, the culture shock people always talk about didn't get me. My time in Zambia teaching small children and the previous time in Tanzania already prepared me for what was coming. Adapting to a new environment and everything that goes with it (different house, different work location, different routines, and energy access) was however challenging at times. I got to experience first-hand how annoying it is when the power is cut and laptops stop functioning, lights don't work and showers won't get hot. But those are first world problems which I learned to ignore in time.

The months prior to the internship helped me get familiar on how field research is done. I've never done a similar project, so this proved valuable to me and for my research. Biogas was something I vaguely heard about, nothing more. It was something in the area of renewable energies. That was pretty much as far as my knowledge went. Getting acquainted with the subject was the first task for me. In Tanzania, I felt confident enough that I could contribute to the sector with the things I learned the previous months. The first few weeks were characterized by meeting different people, seeing biogas digesters in action and making plans for the coming weeks. The first task was to form a full picture of the biogas sector. Already the first two weeks so many different actors were met. It was a bit overwhelming, not to mention difficult to know what everyone was doing again. But in time, the picture became clearer, I got to know the actors and they got to know me. Learning a bit Swahili helped me making a good first impression, as little as it was. The fact that most people in the biogas sector spoke Swahili made it difficult for me to fully understand the things they were saying. The people accompanying me were great in translating and helped me very much; still, you miss something when you don't understand them yourself. That was the biggest limitation in the research. But, as explained, the translators did an excellent job and I got the information I needed.

Researching in Tanzania proved to be a game of patience and empathy. Tanzania is not the Netherlands, and things run differently there. In Tanzania time is not ruled by the clock, and this is somewhat frustrating at times when you want to get things done. But, the frustration quickly evaporates and the good feeling of being in Tanzania took over. Because after all, Tanzania is a beautiful country. Also empathy, for being a 'rich Western kid' means that you got to have the things that most Tanzanians never will have. So you shouldn't get frustrated about people not speaking English, don't understand something that is so clear to you but never heard of in Tanzania. That way, the research proved to be less stressful to do. The interviews went well in general. SNV made the appointments and arranged transport. It was nice to see familiar faces after seeing the managers and other actors again after weeks. This helped getting information I think.

The biogas sector in Tanzania was an interesting subject for research. The 14 weeks I spent there were filled with new insights every week. Meeting the ever-positive biogas managers and employees was always fun. After evaluating everything, how do I evaluate my own role and research? I think that after a nervous beginning, the research went well. Getting accustomed to all the new norms and values went quick, and the staff at SNV Arusha was very reassuring. During the research no problems were raised by me and this made sure that the research could continue well. I firmly believe that with the right actions taken, the biogas sector can be viable. The sector will probably not be very big (not more than 10-15 companies in my research area), but that shouldn't be the goal. The goal is to make the sector viable and successful, with BCE's that know what they are doing.

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Annexes

Annex I: Facts about Tanzania

Country name	United Republic of Tanzania
Capital	Dodoma (official), Dar es Salaam (commercial)
Size	947,300 km ²
Population	43,601,796 (July 2012 est.)
Land use	arable land: 4.23% permanent crops: 1.16% other: 94.61% (2005)
Languages	Kiswahili or Swahili (official), Kiunguja (name for Swahili in Zanzibar), English (official, primary language of commerce, administration, and higher education), Arabic (widely spoken in Zanzibar), many local languages
Religion	Mainland - Christian 30%, Muslim 35%, indigenous beliefs 35%; Zanzibar - more than 99% Muslim
Urbanization	Urban population: 26% of total population (2010) Rate of urbanization: 4.7% annual rate of change (2010-15 est.)
Labor force	24.06 million (2011 est.)
Age structure	0-14 years: 42% (male 9,003,152/female 8,949,061) 15-64 years: 55.1% (male 11,633,721/female 11,913,951) 65 years and over: 2.9% (male 538,290/female 708,445) (2011 est.)
People below poverty line	36% (2002 est.)
Gross national income per capita (PPP international \$)	1,260
Main export products	gold, coffee, cashew nuts, manufactures, cotton
Exchange rate	Tanzanian shillings (TZS) per Euro - 1,850.52 (2011 est.)
ODA received	USD 1.6 Billion-USD 1.9 Billion (2011)

Source: CIA World Factbook (2012), UNDP (2009), UNDP Aid Effectiveness (2012)

Annex II: The biogas manager training

The biogas manager training in Same, 20th till 24th of February

The biogas manager training in Same was conducted to help the biogas managers with running their companies. Present were 22 managers (some assistant managers when the manager wasn't able to join), Roseline, a PDS&Credit officer from TDBP and Zakaria Faustin from Kakute Ltd. being the consultant giving the training. The managers were in charge of Biogas Companies in the regions of Tanga, Kilimanjaro, Handeni, Same, Korogwe, Monduli, Mwanza, Ugweno, Muheza and Lushoto (BCE's from other regions already had the training round in January). The training consists of five days of lecturing different topics. The different topics of the five days were:

1. Introduction training to strengthen the institutions that are appropriate for energy entrepreneurs in Tanzanian
2. Creation, management and operation of the company
3. Management and product quality
4. Financial Management and documentation
5. Sales and marketing/evaluation

The training was composed of lectures by Mr. Faustin, and company presentations by the managers from time to time. During the last two days, Peter Bos, Mr. Shila and Mama Elda (both TDBP) visited the training, each giving their own talk (for more information, see the respective days they were in Same). The training topics were usually split up into the morning topic and the afternoon topic. The training topics had their goal and vision/mission for that day. This was the leitmotif throughout the day. After each session, the managers had to make 'homework'. For example, the first day they had to make an organizational scheme for their company where the duties of every member were described.

NB. The training was given mainly in Swahili. This draft of the training has been translated as much as possible and as fluently as possible. It may be that some sentences are a bit screw.

Monday 20th of February.

After everybody introduced him or herself (4 female managers present from the 22), Mr. Faustin started with the first day of the training. The first day of training consisted of two different topics: introducing the basic training for entrepreneurs; and the components that will maintain being an entrepreneur.

Identifying the training to strengthen institutions that are appropriate for energy entrepreneurs in Tanzania.

This topic contains the following objectives:

1. introduce the basic training of entrepreneurs
2. components that maintain civil entrepreneurship

This first part of the training is dedicated to introduce why the training is given. It states the different goals and visions of the training with deadlines. The goals range from wealth and job creation (general goals), to more BCE related goals like picking the right persons for the right job.

Mission

Designing and maintaining the impact you have on policy, laws, regulations, norms and external circumstances that affect the private sector in Tanzania.

Goals

1. contribute effectively to reduce poverty.

2. increase the quality of performance of the private sector and your business.
3. entrepreneurs setting the rules for their sector.

Vision of business training

by December 2012, the following key elements have been completed by the BCE's;

1. have a leader who has entrepreneurial skills and acts accordingly.
2. being able to plan marketing activities and business, so that the construction of biogas plants is of such status that the company is growing in the business.
3. to have a method to change the direction of the business if there are challenges.
4. be able to discuss and make business decisions.

Outcomes and objectives business training

Major objective: an increase in exchanging ideas between entrepreneurs.

1. Increase the scope of a competitive private sector.
2. Increasing income and eventually the wealth through cooperation between groups and companies.
3. Increased access to employment.
4. Contribute to poverty reduction.

The results for the business of construction biogas plants

1. Masons have been empowered.
2. Business entrepreneurship should be improved.
3. establish/maintain solidarity in the company.

Goal for the day: Preparing a company plan

- We expect groups to be able to prepare a good program that can be achieved.
- Have a plan of action after the training; you indicate the responsibilities of each member within and outside the organization.
- To break down the responsibilities of each member fully and in writing.
- Setting a clear intention and purpose of a stable organization with its entrepreneurs.

Resume of Monday 20th of February: The first day of training consisted of introducing the training and the participants primarily. The training then continued with explaining entrepreneurship and how to strengthen this. Introducing the topic of entrepreneurship is important for the managers and the sector. We have already seen that the sector needs good entrepreneurs. The training covered the BCE and its purpose and goals as well. The managers were challenged to really think about the (near) future of their company.

Tuesday, 21th of February.

This topic contains the following objectives:

1. Creation of the company
2. Management of the company
3. Operation of the company

Reason to start a company

A company is a group of people coming together to achieve specific economic targets, or a voluntary association of people who are trying to achieve certain goals.

The advantage of being a company

- Has the legal status for the owners and company
- Has a limit of responsibility and accountability
- Has ownership of the property as an individual

- Has the ability to be charged with prosecution
- Has management and administrative differences and possession

Types of companies

There are five principles distinguishing different types of companies:

- On the basis of ownership: private company and public company
- In terms of accountability: stock (unpaid) or the promise of the amount of responsibility or without limit (e.g. partners)
- On the basis of operation (e.g. holding and subsidiary)
- On the basis of the establishment: establishment by law of parliament, registered,
- A foreign company

Ownership on the basis of a private company and public company

Private company:

- Has stopped selling its shares to the public
- Does not need certificate to start a business / to work
- Prohibits the right of its members to transfer their shares

Public Company:

- A company owned by the public and not the person / individual
- The public is allowed to buy shares and to enter a party
- Has the necessary existence of at least two members of the company to start work

Formation of the company in Tanzania

- In the country, a company constituted, under the law number 12 of 2002 for Tanzania mainland and Article company (Company degree cap) for 153 Tanzanian islands.
- The law has the role of creating a company with corporate professionals (promoters) present in the office of the Registry.
- The responsibilities of these professionals (promoters) are to sign the necessary documents and to pay necessary fees to an affiliated company to the registrar of companies.

Steps to create a company

- The name of the company has to be stated
- Register the name of the company
- Submit the following documents:
 - The memorandum of the association of owners signed
 - The articles of association like the present, signed by owners

Continued

- Personal details the owners of the company
- Form showing where the company office is located
- Form the oath, the oath attorney (statutory declaration) as described in section 16 (2) of the company
- Finally, a certificate of registration and acceptance by the company (Certificate of Incorporation) will be given to the Registry BRELA

For the Articles and Memorandum of Association

- Articles of Association: These are documents containing company rules and regulations that are created with the company goals of performance management to achieve corporate goals
- Articles of Association are the rules and regulations that protect and guide the performance and benefits of the company you Operated and have administered
- Memorandum of Association are company documents describing the purpose and foundation of

Wednesday 22nd of February

Management and product quality

An introduction

Product quality is what should be important for each business.

Quality

- Which is the best product and which is not?
- You accept that a Mercedes car is the very best, and Peugeot 504 is less good, but it could mean that the Toyota small car is not good? You agree that the Nokia phone from England is better than the phone from China but it could mean that the Nokia phone from China is not good? Do you agree that you will pay more for the very best products but the quality is related to the price?

Continued

Nokia from England is better than another product. We have to pay more for better quality. We will agree as well that the quality here refers to that product that everybody would like to get it if he had enough money. But, there is still something as taste. If you have money to buy a Mercedes Benz but you want to drive a Peugeot 504, than that is possible.

So we can conclude as follows:

- Everything has a quality to be great or not great
- The quality will vary as there are differences in tastes between one man and another man
- It is important to recognize what is not quality.

Quality is satisfactory only when you have met your wishes. **You can only produce a better product if you know your customers.** Quality for low income customers is different to quality of higher income customers.

Why the quality is important:

- If the amount of quality is high enough to satisfy the customer
- Producing the highest quality products is knowing that your customers will come. This will set you in a good position in the market. Competition takes place in the market when there is another producer. Competition is really sending the same type of products at lower prices or better quality for the same price. Then again the quality is concerned.
- You will see clearly how the importance of quality management is dealt with such competition.

Leading to excellence

Quality begins on the market (what do the customers want) and ends on the market (satisfying the need). To produce the best products, the following requirements must be met:

- market information needs to be known
- you need a well-structured product
- you have to use authentic materials
- you have to know the appropriate techniques
- you have to be skilled enough (for the manager and staff)
- have a good way of marketing
- have a good after sale service

Continued

- Indicates that in order to meet quality, all aspects of production are important. Bad structure distorts the quality of the product even if the other part is good.

- Lack of after-sales service may also damage the quality of products as customer satisfaction will decrease.

Management of quality

Management of quality is the responsibility of the production department, it is a daily activity. It means that there has to be love for the quality and the product. Each day in business contributes to the production of quality products or bad products; the leadership is responsible.

About quality management in production, you must not forget where quality management is necessary:

- In the incoming inspection of raw materials
- In the inspection of goods at whatever surplus
- In the audit of existing products produced

Unfortunately the manufacturing quality management is the part of the audit of existing products produced only. This leads to lost time and materials.

Ways to interpret the quality of products

There are different ways to check depending on the type of product (if you look with your eyes, measuring weight and height).

If the product produced by wig, a way to take a sample (a few to take from the whole group) and paper measuring control chart can be used.

By using these methods of taking samples and measuring paper you can find something that causes the scattered products meet quality standards.

Entrepreneurship training and business management

Topic: Entrepreneurial business strategy and marketing

Contents - this topic

Lesson 1: Entrepreneurship

Lesson 2: The strategy of business

Lesson 3: marketing strategy

Lesson 4: Review your business

Lesson 5: Make plans for your business growth

Lesson 1: Entrepreneurship

What is entrepreneurship?

Entrepreneur is smaller than a business.

Why are you doing business?

- 'Get Money', 'Have a good life', 'freedom'.
- How to reach that goal? Outperform your competitors
- How can you get stronger than to a competitor? Add your ability to sell products
- How to increase your ability to sell? Make your business entrepreneurs
- Vision, focus and purpose.

Entrepreneurial personality characteristics (traits)

Desire to achieve higher goals

To be a successful entrepreneur

- Not discouraged
- individual impulse
- Honest & Who cares
- Faithful
- who believes

Characteristics of entrepreneur

- Diligent and self-motivation
- not in despair
- He set goals and plans to achieve
- a study of information
- He committed sacrifice
- spend much time on his business
- is looking for technical skills
- seek knowledge of running a business
- cares about the quality
- Sincerely, feels confident

Explore your personal entrepreneurial characteristics (traits)

Objective: To help participants identify their strong and weak points

Principles of Exercise (see the handout exercise):

Be honest, do not lie

read all 18 sentences

put a tick on the part of the sentence has to explain so if your character is on the same field. Otherwise put a tick in the 'not'.

Add the number of good for each square

Involved in the activity at treating

In what fields you have the power

Where you show weakness

What is your plan to deal with the weaknesses?

receive training
Share and learn from a competent

Entrepreneur and leadership

Sustainable Management Techniques (Profit) Topic 2 & 3

Your vision

In one sentence, write down how you want your business to be at the next three years (2015).

Being an entrepreneur who sell only quality products with the market

Please write in large print

Use: 3 minutes

Explain: 30 seconds

Questions / Answers: 30 seconds

Analyze your business

1. Know the reality

What, after receiving business training, will happen in your company?

2. Analyze your business environment!

- political environment

- economic environment

- community environment

- technology environment

3. Analyze your business!

4. Assess your business in the following fields

Capacity

Weakness

Opportunities

Restrictions

Thursday 23rd of February

Financial Management and documentation

Key areas of financial management in any organization is to put profit first

important books of record keeping

a) Book of the invoice/bills (Invoice)

b) Receipt Book

c) Sales ledger/book of sales

d) Control equipment company

- e) Controlling the money
- f) Controlling Debt / Those creditors
- g) Uses

- Book of bills (Invoice)

Company/business should have a book of invoices (Invoice) with numbers indicating the records of all claims made.

- Book of receipts

The company should have a business and a receipt book numbers to keep records received and handed out.

- Book of sales

The company should have a business book sales invoice shows (Invoice) all day where it will show the total sales throughout the day.

- Control equipment company

Equipment company should be listed in the book of company equipment, and each office must keep on showing the form that exists within each device, for example, how many chairs, tables, how many, how many computer, photocopy how many machines, staplers, how many, etc..

- Controlling the money

Businesses should keep a book which shows across the cash payment that about jobs, money received, money paid, and the total across the rest.

- Controlling Debt / Those creditors

All the business or company is obliged to balance between invoice and payment notices to debtors they should pay. Long-term debtors are required to be borrowed.

expenditure

Company / business should pursue through the use of payment vouchers associated with the payment of all expenditure made.

Financial reports

company/business is responsible for preparing the accounts of profits and losses at least once a year,

Friday 24th of February

Sales and marketing

Introduction

In any business there are many things happening, and in any other business is not necessarily that all things go well, and there are businesses in which all things should be going well. These things are things as production, pricing, product or factory Resounding, marketing a range of services delivery after sale, distribution of marketing research, etc.

Shop owner not involved with the production but he has to buy the products and pricing and selling. Owner has to buy hotel for example maize, rice, spices etc. and eventually creates, or producing porridge, bananas, etc. and foods sold at a price he had already planned. So in any business sale is something that is seen as the driving force that is within it.

What is sales?

Sales is the act of the conversion of products or services from the seller to the buyer at a price acceptable to both side and payment takes place simultaneously. This action causes the seller to give the buyer a product or a service, for a certain price and also receive payment for the buyer to the discharge.

It also makes the buyer receive goods or services at a price that was accepted and make payment for the sale. So in an act of a seller SALES, PRODUCTS PROCUREMENT COST PAYMENT to the practice of product from the seller to the buyer.

Life of products in the market

Any products on the market which has potential to succeed STEP big four in his life.

a) Start. This is the first time where the product begins to be sold in the market, since people are not used or to better understand the product sales that are smaller and there is no profit because sales are low

b) Growth. After the first stage, many people begin to understand and appreciate the brand. Therefore, increases sales and profits begin to be available.

c) Cessation. This is the time people are already very familiar with the product and the decline starts. So sales remain stagnant and profits often begins to decline.

d) Slopes. This is a time when the product has been sitting too long in the market and the people that have used it get bored and begin to buy new products so your sales go down and also benefit greatly decreases.

- For so the seller or producer you prepare the order of product sales is very important to know your products are located in what stage of the four mentioned above.

Sales Plan

This is the act of the seller: first recognize the market for its products and planning carefully how he

will sell it to the market; how long and for what price; and when to add the efforts of the publicity and speculation feeding.

In the determination of any matter between the above are caused by various factors such as the market itself is like to have the product, the product itself is located in what actions on the market, the market aspect is divided cost of sales, as there are other manufacturers who lead the competition, the goal of what is the factory.

Techniques for marketing

There are many techniques for marketing / client.

Assignment:

Mention and discuss techniques you use to access markets / customers.

The last day of the training was reserved for evaluating and feedback. The managers had four days of training, and could use the last day to ask their last questions. The training was evaluated by the consultant and the managers, and everybody was pleased with the training.