

# Management of Aided Construction Projects

- Case study of the orphanage center in Jua Kali,  
Arusha, Tanzania



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## **Abstract**

Tanzania is a developing country standing in front of a lot of challenges. One of the biggest challenges, that this study considers, is the development of the construction management. In a time where the infrastructure and urbanization of the world is increasing it is important for developing countries such as Tanzania not to fall too far behind. However, in spite of this the development of the construction management of Tanzania is still going slow. The development of the infrastructure and urbanization is still inefficient and there are a lot of class differences between inhabitants living in urban and rural areas.

This study is a review of the management of aided construction projects. The aim with the report is to examine the process and management of building construction in Tanzania and search for improvements and increased efficiency. The study deepens into a field study to investigate the case of foreign aid building support.

The study has been made in a systematic process and is broadly made in two parts. The first part focuses on a literature study comprising articles, books and reports. The aim is to establish and present the main factors and procedure of the construction management in Tanzania. The second part is based on the field study. The purpose with the field study is to give a perspective of the aid building management and to track eventual inadequacies in the building process. Observations and interviews were done to find recommendations how to make the building process even more effective.

The study found a lot of inadequacies in the building process such as lack of competence and knowledge, lack of communication and difficulties making time plans but despite the inadequacies, overall the aid construction project turned out successful. To expect the process only to run smoothly in this kind of project is to be a bit too optimistic. Differences of culture and working process are two things to have in mind before starting an aid project.

I found spreading of knowledge as one of the main factors to increase the efficiency of the construction management and after my experience at Jua Kali orphanage center, I believe that foreign aid projects are a great way of doing this. For example, by using local labour you both support the local employment and it is also a great way of implementing new techniques. To reach a successful aid project it is also important to be humble to the new culture, flexible and sometimes be willing to meet halfway. To do a thorough feasibility study is also something I recommend before starting the project since it simplifies the future working process, time planning and budget calculations.

To increase the efficiency of the construction management I also believe it is important that exalted organizations such as the government and other financial institutions, local and national authorities of the country, to prioritize economical support to the construction industry. By developing the infrastructure and urbanization it will promote the welfare of the whole country and at the same time decrease the dependency of foreign financial support.

**Keywords:** construction management, foreign aid support, Tanzania, construction process, efficiency, improvements

## Sammanfattning

Tanzania är ett utvecklingsland som står inför många utmaningar. En av de största är utvecklingen av hantering och ledning av byggnadsindustrin i landet. I en tid där utveckling av infrastruktur och urbanisering ökar i världen är det viktigt att utvecklingsländer såsom Tanzania inte halkar efter. Trots detta faktum, så går dock utvecklingen i Tanzania väldigt sakta. Utvecklingen av infrastrukturen och urbaniseringen är fortfarande ineffektiv och det finns stora klasskillnader mellan invånare som lever i urbana områden respektive landsbygdsområden.

Den här studien överblickar hantering och ledning av biståndsprojekt inom byggnadskonstruktion i Tanzania. Syftet med rapporten är att belysa processen och hanteringen av byggprocessen i landet och söka efter eventuella förbättringar och effektiviseringar. Studien fördjupar sig i en fältstudie och belyser på så vis fallet med utländskt biståndsarbete inom byggnadsindustrin.

Studien har gjorts systematiskt i två olika delar. Första delen fokuserar på litteraturstudier från artiklar, böcker och rapporter. Målet med den studien är att få en överblick och presentera huvudfaktorerna i byggprocessen i Tanzania. Andra delen däremot är baserad på fältstudien. Syftet med den är att ge en djupare syn och förståelse för den här typen av biståndsarbete samt att hitta eventuella brister i byggprocessen. För att samla data gjordes observationer och intervjuer.

Studien fann en hel del brister i byggprocessen, såsom brister i kompetens och kunskap, brister i kommunikation och svårigheter att göra realistiska tidplaner. Detta till trots så var dock byggprojektet ett lyckat projekt. Det är viktigt att ha i åtanke att den här typen av biståndsarbeten sällan flyter på helt oförhindrat. Skillnader såsom kultur och arbetsgång är bland annat två saker som man bör ha i beaktning innan man startar ett biståndsprojekt.

För att öka effektiviteten i byggsektorn fann jag vikten av att sprida kunskap som en huvudfaktor och här anser jag att biståndsprojekt är ett bra tillvägagångssätt. Genom att använda lokal arbetskraft stimulerar man den lokala sysselsättningen samtidigt som man på ett bra sätt implementerar nya tekniker. För att sedan nå ett framgångsrikt projekt är det viktigt att vara ödmjuk mot nya kulturer, flexibel och vara öppen för att ibland mötas halvvägs.

Att göra en noggrann förstudie är även något jag rekommenderar. Det underlättar den kommande byggprocessen, tidsplanen och budgetkalkyleringen.

För att öka effektiviteten i hantering och ledning av byggprocessen i Tanzania är det även viktigt att myndigheter såsom regeringen och andra finansiella institutioner prioriterar ekonomiskt stöd till byggnadsindustrin. Genom att utveckla infrastrukturen och urbaniseringen främjar man välfärden för hela landet samtidigt som det minskar beroendet av utländskt stöd i form av finansiella bidrag.

**Nyckelord:** byggnadsproduktion, biståndsarbete, Tanzania, byggprocess, effektivisering, förbättring

## Foreword

This study constitutes the final part of the educational program Bachelor of Science in Engineering, Civil Engineering at LTH School of Engineering at Campus Helsingborg. The bachelor thesis comprises 22,5 credits and is written in collaboration with the Institute of Housing Development & Management at the Faculty of Engineering at LTH. It is also a result of collaboration with Econef Tanzania, Econef Sweden and the Swedish architect office called Asante.

First of all I would like to express my deep gratitude to Asante for believing in my idea and letting me be a part of their project. I am also more than grateful to Econef Tanzania and to Caroline Nicholas for the care and support during my field study. I would also like to express my appreciation to SIDA and “Campus Vänner” for financial support in form of scholarships.

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Sara Elofsson

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# 1 Introduction

## 1.1 Background

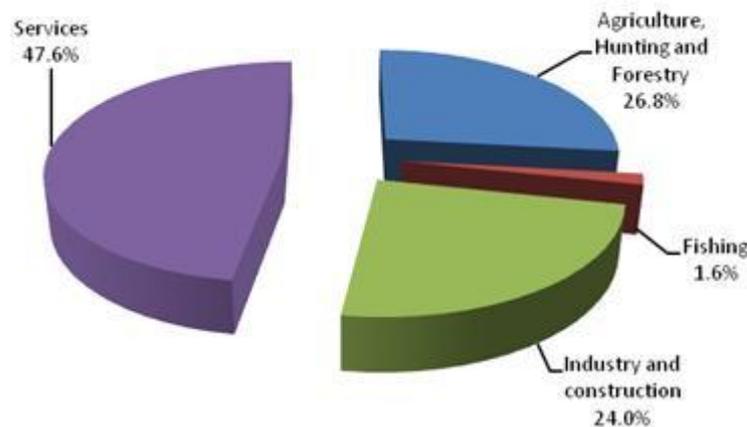
Tanzania is a developing country with a lot of challenges. According to National Construction Council (2005) one of the most important and necessary challenges is the development of the construction industry. The development of the construction industry does not only benefit the building sector, it also promotes the growth of the economy and the rapid urbanization which are important factors in the development of the country. The construction industry is defined as a sector of the economy that transforms various resources into constructed physical economic and social infrastructure that are necessary for the socio-economic development. This embraces how the physical infrastructure is planned, designed, procured, constructed or produced, altered, repaired, maintained and demolished (National Construction Council, 2005).

According to National Construction Council (2005) the construction infrastructure includes; buildings, transportation and facilities systems, structures for fluid containment and underground structure such as tunnels and mines. In turn, the construction industry consist of the following parts; organizations and persons who are included in companies, firms and individuals working as consultants, main contractors and sub-contractors, material and component producers, plant and equipment suppliers, builders and merchants.

There are a lot of reasons why the development of the construction industry in Tanzania has been inefficient. First of all, the construction industry is still young and there is limited number of professionals, low technological knowledge and poor economy. One significant factor is the lack of funds for acquiring resources essentials for implementation of construction project. The government is the main financier, but credit facilities have not been readily usable from the financial institutions in aim to support the construction industry (Chiragi, 2000). As the globalization is increasing it is also very important that developing countries, such as Tanzania, strive to competitive strategies to prevent the divergence of the infrastructure development to grow even bigger (Eliufoo, 2005).

### 1.1.1 The economic influence of the construction industry

As in most countries world-wide, the construction industry is one of the main sectors of economy. According to the National Bureau of Statistics (NBS, 2013) the shares of GDP (gross domestic product) in Tanzania in 2013 adjustment for taxes and FISIM (financial intermediation services indirectly measured) was: agriculture 26.8 %, fishing 1.6 %, industry and construction 24.0 % and services 47.6 %.



*Figure 1.1 Percentage Share of GDP (gross domestic product) 2012 (National Bureau of Statistics, 2013).*

### 1.1.2 Employment in the construction industry

According to National Bureau of Statics (2013) the construction industry accounts for more than 9 % of the Tanzanian employment and according to the Construction industry policy (2005) about 80 % of the Tanzanian population lives in rural areas. The urban population is estimated to 26.7 % (CIA, 2011) and the annual rate of urbanization is 4.77 % (CIA, 2010). This means that majority of the population still lives in rural areas which in turn leads to that the majority of the population are professionally active in the informal sector. This also affect the construction industry and means that the informal construction sector comprises of unregulated and unprotected individuals who are engaged in economic activities that include the supply of labour, materials and building components to the formal construction sector. This is in directly response to the needs of clients. It also involves works carried out by individuals and groups based on a self-help basis without contracting (Construction industry policy, 2005).

### 1.1.3 Enterprises

The size of the majority of the enterprises in the construct industry in developing countries is small or medium. World-wide the small and medium sized enterprises stand for 90 % of all enterprises and over 99% in developing countries. In January 2000, 86 % of the 1091 registered local building contractors in Tanzania pertained to the small or lower classes. These enterprises are vital for ensuring the diversity and flexibility of the economy responsibility for the creation of employment and growth. They are the only enterprises willing and able to undertake small and scattered projects, who often take place in rural areas. This is very important though it contributes to the development required to satisfy the basic needs of people such as housing, health facilities, sanitation and roads for geographical mobility (Construction industry policy, 2005).

Table 1 shows that 80 % of the 1837 registered local building contractors in 2007 were small contractors, 17% were medium and only 3% were big contractors. According to Contractors Registration Board (CRB, 1997), small contractors are those registered in class six and seven, medium contractors are those registered in class four and five and big contractors are those registered in class one, two and three.

<b>Class</b>	<b>Local</b>	<b>Foreign</b>	<b>Total</b>
<b>1</b>	33	26	5159
<b>2</b>	15	0	15
<b>3</b>	13	0	13
<b>4</b>	66	0	66
<b>5</b>	241	0	241
<b>6</b>	245	0	245
<b>7</b>	1224	0	1224
<b>TOTAL</b>	<b>1837</b>	<b>26</b>	<b>1863</b>

*Table 1. Number of registered Building Contractors in Tanzania 2007 (Ntiyakunze, 2011).*

### 1.1.4 The foreign influence in the construction industry

For developing countries, foreign aid has a significant roll within the development of the construction industry. The foreign aid providers stand for at least 65 % in terms of the money value of the market share. In Tanzania, about 80 % of the market share derives from foreign contractors and consultants (Construction industry policy, 2005).

## **1.2 Statement of the problem**

Since Tanzania is a developing country the construction industry is perceptibly affected by the poor and inefficient circumstances. At the same time, the world-wide globalisation is developing at a tremendous rate. According to these two factors ahead, it is vital to precipitate the development of the construction industry and management to avoid even bigger gaps between the developing and industrialized countries.

The construction industry in Tanzania is still young. The main factors that obstruct the development are the limited number of professionals, lack of technology and poor economy. Today the country mostly depends on foreign institutions to educate the local labour. The local contractors are not getting enough support from the government or financial institutions. According to Chiragi (2000) the construction industry is currently inhibited of the following facts:

1. Inadequate co-ordination of planning between the construction industry and other sectors of economy.
2. Heavy dependency of foreign support.
3. Inadequate motivation of workers.
4. Inadequate number of professionals and qualified labour.
5. Lack of transportation to distribute construction materials.
6. Inadequate local construction regulations and standards.
7. Inadequate consideration of the local resources.
8. Lack of consideration given to the economic support and how to take advantage of it.
9. Inadequate planning management.
10. Having the government as main investor constrains the development and independence of public consultants and contracting organizations.

## **1.3 Objectives of the study**

This study focuses on the process and management of building construction in Tanzania and searches for improvements and increased efficiency. According to the slow development of the infrastructure, the study focuses on one hand on the building process and on the other hand on the weaknesses of the construction management. The study is also normative as it tends to give recommendations on how to make the building process more effective. As the study deepens into a field study of a building collaboration between two organizations in Sweden and Tanzania, the study also objectifies the case of foreign aid building support. The purpose with the field study was to give a

view of the building management and to track eventual inadequacies in the building process.

#### **1.4 Scope and limitation of the study**

The study presents the aid construction management and the process of building in Tanzania. The study focuses on the construction process and therefore, it does not focus on social departments, government or financial institutions performance. Due to time and financial limits, only one building project was selected as a case study for this report.

The case study took place in Kingori in the northern Tanzania. The project consisted of building a prototype house as a pre-study to an even greater building project of a children center. The project is an aid project founded by architects at a Swedish architect office called Asante and run by their own organization called Econef Sweden. Me myself were both physical involved by working at the construction site, while I also did researches and interviews beside the case study.

## **2 Method**

### **2.1 Research approaches**

Research approach has been defined as a systematic and logical procedure for solving a problem with the support of facts (Yin 2003). Social science studies identify two principle approaches to research; quantitative and qualitative approaches. According to Creswell's theory (2009) there is a third approach which he calls the mixed-method. Although, this study will only discuss the quantitative and qualitative approaches.

#### **2.1.1 Qualitative research approach**

A qualitative research is exploratory and should be used to explore a topic where the variables and theory base are unknown. It is used when the research problem best can be understood by exploring a concept or phenomenon. In some cases this means understanding and exploring the meaning individuals or groups ascribe to a social or human problem (Creswell, 2009). Simplified qualitative research approaches are used while the research method is based on interviews or non-numerical facts (Ejlertsson, 2005). Characteristic factors for a qualitative research is that it takes place in the natural setting, relies on the researcher as the main objective for data collection, is inductive, employs multiple methods of data collection, is based on participants meanings, is emergent, often involves the use of a theoretical lens, is interpretive and holistic (Creswell, 2009). In summary it focuses more on the individuals and organizations in a holistic manner rather than isolated variables and hypotheses.

Creswell (2009) also mentions that qualitative data provide depth and details through direct quotations. Yin (2003) highlights the fact that the qualitative method gives the respondent opportunity to speak freely, which can provide important data that would not be obtained by the quantitative method.

#### **2.1.2 Quantitative research approach**

The quantitative research approach is meant for testing objective theories by examining the relationship among variables (Creswell, 2009). It measures quantitative variables into numerical measured value. Examples of quantitative variables can be age, length and number of family members (Ejlertsson, 2005). The data is often measured with instruments and can be analyzed by using statistical procedures. The most common strategy to indentify the purpose is by using survey research (Creswell, 2009). This

explains the relationship between numbers and variables. The advantage of a quantitative research approach is that it can measure data from a lot of people in a limited set of questions which facilitate the comparisons and statistical treatment of the data. This means the research result can be generalized (Phoya, 2012). The final written report is more structured than a qualitative report (Creswell, 2009).

## **2.2 Method adopted by this study**

While the data collection of this study is based on a field study and interviews the report is based on a qualitative research approach. The field study took place in a small village called Kingori in the northern part of Tanzania during February-April 2014.

While the circumstances before the field study were unknown the assignment was to explore and collect as much data as possible while being at site. Because of some language comprehension deficits the interviews eliminated misunderstandings since the interviewer could describe the questions even more detailed if needed and also get more detailed answers if requested. A quantitative research approach based on a survey research would have disabled this opportunity.

## **2.3 The research design**

The aim with the research design is to consider how to link the research questions with data collection and analysis of the results (Nachmias and Nachmias, 1996).

This study has been made in a systematic process and is broadly made in two parts (see figure 2.1). The first part focuses on a literature study comprising articles, books and reports. The aim was to establish and present the main factors and procedure of the building construction industry in Tanzania. The second part is based on a field study which also highlight the case of foreign aid building support. The purpose with the field study was to give an in-depth view of the building management and to track eventual inadequacies in the building process. The given information was used to find recommendations on how to make the building process more effective.

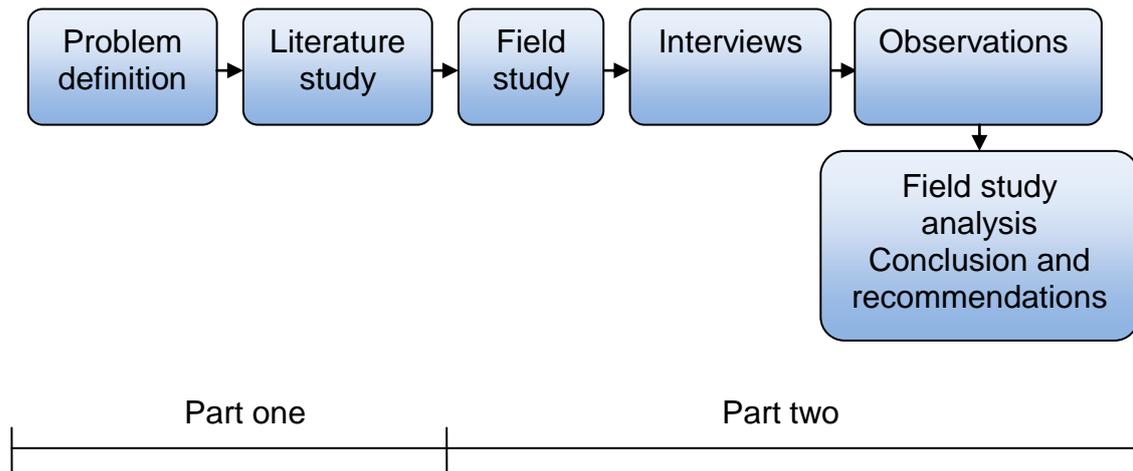


Figure 2.1. The research design of the study (Author's view).

### 2.3.1 Field study

An ongoing building project was reviewed and followed during the field study. The building project was situated in a village called Kingori, 60 kilometers east from a larger city called Arusha in the northern Tanzania. The region is a rural area without any access to electricity or running water. It is a sparsely populated area mostly consisting of crop fields and vegetation.



Figure 2.2. Map of Tanzania (African Overland Safaris, 2014).

The project consisted of building a prototype house as a pre-study of an even greater building project of a future orphanage and children center. The project is developed in collaboration between an organization in Tanzania named Econef and a Swedish architect firm named Asante based in Stockholm.

Today the institution Econef is running an existing orphanage in Tanzania about 20 kilometers from where the new children center is taking place. The problem is that the orphanage, due to the increasing number of orphans in the area, is too small and need to be expanded. The economic resources of Econef are limited why the institution got sponsored by the Swedish architect firm Asante. To be able to run the project, Asante created a Swedish version of Econef, called Econef Sweden which is an aid organization working with collecting funding to the building project. The architects of Asante are the founder of the project and they are responsible for the design and construction work.

This case study was exemplary as it deepened in the Tanzanian construction culture combined with foreign building support.

### 2.3.2 Observations

A qualitative case study researcher spends the majority of the time personally in contact with the activities and operations of the case (Stake, 1995). Therefore, observation method was used during the field study since this is a qualitative research.

I was introduced to the initiators and the head leaders of the project. I also got introduced to the site and the staff and got a detailed review of the ongoing building process. There are different kinds of observations, and in this case, I had full participation at the construction site. This gave me full insight and opportunity to get a good sense of the project. The observation was made in two months in order to describe the working procedure, building site organization, collaboration and communication between workers and leaders and between the Tanzanian and Swedish organization, labour standards and work setup. Recording of observations was made by writing field notes and taking photographs.

### 2.3.3 Interview survey

An interview survey was made with the approach to find out if the regulations and procedure of the building process theorized in the literature also applied at the Tanzanian construction sites. To fairness and quality, all interviews were conducted by myself. A sample of key participants in the building project was chosen for the interviews; civil engineers, workers, foreman, architects and initiator to the project. Altogether six persons were interviewed.

The nature of the interviews was exploratory and unstructured which means the interviews did not have fixed questions. This makes the interviews

innovative and gives the researcher the opportunity to develop ideas and hypothesis compared to standardized interviews (Oppenheim, 2004). Due to language barrier an interpreter was used to translate from Swahili to English when needed.

Example of interview questions:

- What kind of building requires calculation of construction strength?
- What kinds of permissions are necessary before a building takes off and how is the process?
- What is your overall impression of the building process? (Question to local builders of the prototype house.)
- Have the job assignments been clear? (Question to local builders of the prototype house.)
- Do you think that you and the other builders have had influence in decisions and procedure? (Question to local builders of the prototype house.)
- How was the communication and collaboration with the people from the Swedish Econef? (Question to local builders of the prototype house.)
- Do you think there is a problem with the standard of buildings in Tanzania? Especially due to the, sort of “free building restrictions”.
- Do you have any suggestions how to spread the knowledge?

#### 2.3.4 Validity and reliability

There are many reasons to be critical to different types of research. The quality should always be in consideration. Issues that are important to reflect on are if obtained results are correct or not and with which accuracy the measurements have been made. Two significant concepts regarding to this are validity and reliability.

Validity is concerned with whether the research findings are generalized beyond the specific research context. Reliability means how well the data collection procedures can be repeated with the same results. A question with high validity should have none or a very small systematic error and a question with high reliability should have a small randomly error (Ejlertsson, 2005).

This study ensures the validity and reliability of the research in various ways. By using different approaches as field study, interviews and discussions, the researcher was able to cross-check one result against another and thereby increase the reliability of the collected data.

## **3 The building construction industry in Tanzania**

### **3.1 Key participants and their role in building projects**

Building construction is a teamwork, which demands high performance from all participants. It is important with high capability of cooperation and ability to see the importance of the small details as a part of the whole building process.

The construction industry in Tanzania is mostly based on the traditional procurement which includes: sub-contractors, design team consisting of one or more architects, engineers (structural-, civil- and electric engineers), quantity surveyor and mostly often also a project manager (Frank Maiki, 2014). These parties together create an organization while they undertake a building project during a specific period (Ntiyakunze, 2011).

In my case study the architects, and also founder and initiator, of the project were the ones responsible of the whole building process. With some guide lines and restrictions from Swedish engineers they designed the house and was the ones leading the project at its place in Kingori. Since the house were built in a rural area and only consisted of one floor, no quantity surveyor was needed (Frank Maiki, 2014). As far as I could understand, this was an established assumption appropriate to construction works in rural areas.

#### **3.1.1 Client/financier**

The client is the owner or developer of the building project. The client is the one leading and stating the requirements and when the client employs a contractor the client is also the financier of the project. The client is responsible to ensure that funds are available, that health requirements and restrictions are followed and to set up with a contractor that can fulfill the requirements of the project. According to the traditional procurement the client enters a contract with the design team for design and supervision works and then a separate contract with a general contractor for construction works (Phoya, 2012).

In Tanzania the client/financier can be the government through its different ministries and institutions, local government through municipalities and district councils, private organizations and individuals (Ntiyakunze, 2011).

In Kingori Econef was the client and financier by a donated fund.

### 3.1.2 Architect

According to The Architects and Quantity Surveyors Registration act in Tanzania edition 2000 (AQSRA) every building should be undertaken by a registered architectural or quantity surveying firm. The architect is appointed by the client and is also normally the one leading the building design team (Royal Institute of British Architects, 2007). The scope of the work undertaken by the architect can be divided into two phases, the pre-contract and post contract-phases. During the pre-contract phase the architect based on the client's requirements, formulates the project idea in terms of size, function and appearance and then transforms these into plans that can be used for construction. During the post contract phase, the architect is involved in supervision and administration of the project to provide the client's satisfaction of the building project (Ntiyakunze, 2011).

The architects of Asante were responsible of the prototype house project.

### 3.1.3 Quantity Surveyor

The quantity surveyor shall, according to The Architects and Quantity Surveyors Registration act in Tanzania edition 2000 (AQSRA), provide professional services in connection with construction costs advise, preparation of bills of quantities, valuation, planning, administration and project management of the building or construction project. The quantity surveyor is then, the one responsible of preparing tender, contract documents and making a valuation of various aspects of the project (Frank Maiki, 2014).

The quantity surveyor may be directly employed by the client or by the design team leader. The quantity surveyor can also be employed by contractors to work on project matters related to cost and contract (Ntiyakunze, 2011).

Since the prototype house is a residential building and a private project no quantity surveyor was needed. Econef was the one responsible of evaluation, planning, administration, budget et cetera.

### 3.1.4 Engineers

A building project requires different types of engineers. The most common disciplines are civil-, structural-, mechanical- and electric engineering. The engineers are, according to their areas of specialisation, responsible for the design, technological solutions and supervision of their respective areas of expertise (Frank Maiki, 2014).

The engineers are often, as in the case of quantity surveyors, directly employed by the client or by the design team leader to work on behalf of the client. The engineers can also be employed by the contractor to work on their behalf in particular to supervise and manage construction works (Phoya, 2012).

Since the prototype house was an aided project several engineers from Engineers Without Borders and other voluntary engineers were involved during the project. Specially two engineers were involved during the planning of the construction work.

### 3.1.5 Contractor

The contractor is the one in the building project who carries out the actual physical construction works of the structure. Depending on complexity of the project, there may be a general or main contractor who has a contract with the client. The contractor is fully responsible for undertaking the project works within time, cost and quality stipulated in the contract. However, depending on the complexity of the project there may be some parts of the construction that require expertise skills. In these cases a specialist or sub-contractor can be needed. For example it can be required for electrical, plumbing and air conditioning installations (Ntiyakunze, 2011).

To accomplish the task the contractor has a number of actors on the construction site. One of them is the construction site manager who is responsible for coordinating the work schedules and deliveries, making sure the building site is run efficiently and including health and safety management. The supervisors are working with workers to make sure all tasks are accomplished on time and the workers have the duty to perform the actual task (Phoya, 2012).

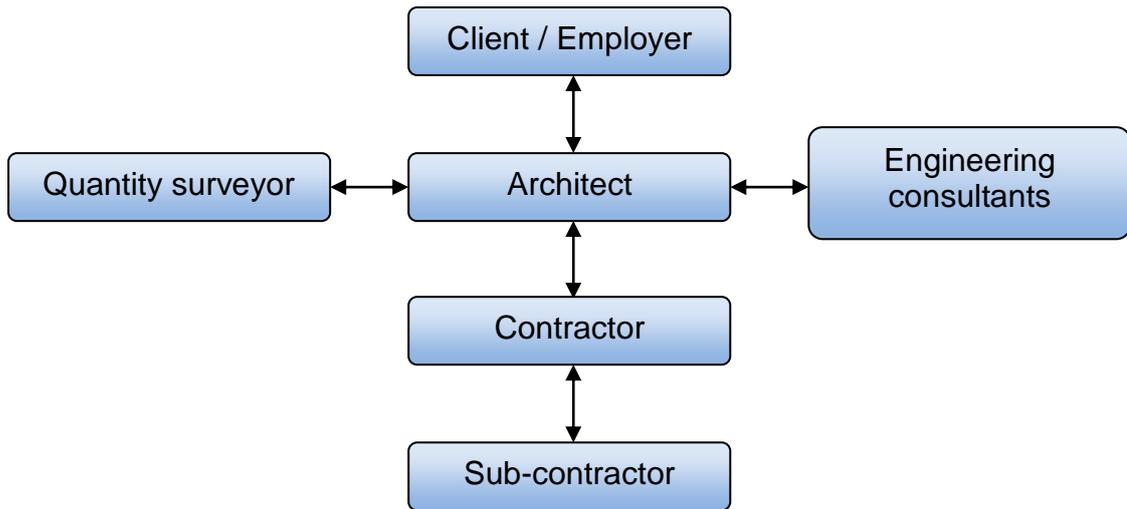


Figure 3.1. The relationship between the key participants in the building process in the traditional procurement of building system (Authors view).

Figure 3.1 is my conclusion on how the network of actors in the construction process at Jua Kali Orphan is managed. First of all the client/employer prepare a proposal sketch of the building while using an architect. This can be in cooperation with engineering consultants and/or quantity surveyor or made step by step. Either way, there is almost always some kind of collaboration between the architect and the engineering consultants. While being aware of the scope of the project a contractor is hired for the project. In some cases specialist or sub-contractor can also be needed.

### 3.2 The construction process

The building construction process in Tanzania was inherited by the British system. This involves a number of stages that are distinct or overlap depending on the project. Basically, it is based on a traditional procurement where the construction process is divided into four main stages: briefing, design and procurement, construction, operation and maintenance (Phoya, 2012). Figure 3.1 presents the procurement stages.

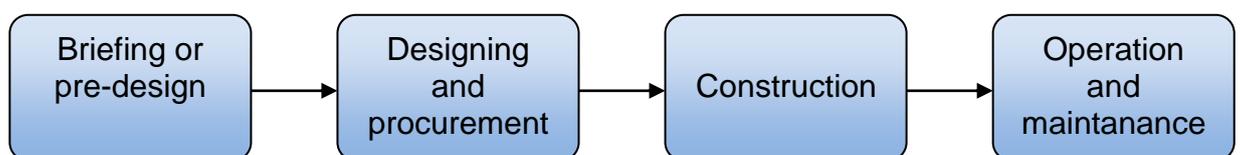


Figure 3.2. The traditional procurement stages (Phoya, 2012).

The briefing stage is often regarded as the early stage in the building process. This is when the client's requirements are written down in a formal document. The briefing provides a fixed idea of the design and purpose of the building. Next step is the design and procurement which is the stage where the architect produces the design of the building and the engineers makes the constructional design. All regarded to the clients requirements. Meanwhile, at the same stage, the quantity surveyor is preparing a bill of quantities and cost estimates to deliver tender to contractors. At the construction stage the contractors are responsible to produce a building according to the cost and drawings from the designing and procurement stage. At last, at the operation and maintenance stage the building is completed and ready to be used (Phoya, 2012).

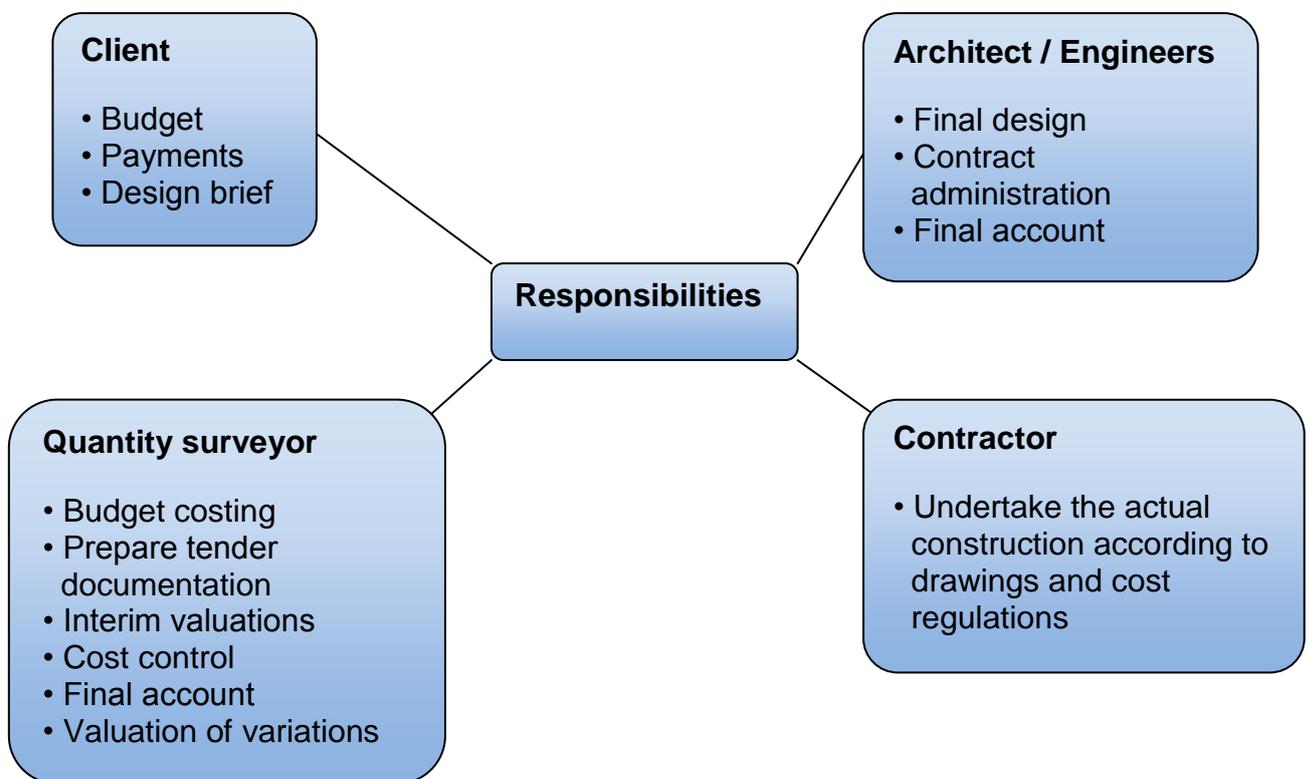


Figure 3.3. The responsible of the key participants in the traditional building process (Phoya, 2012).

In Jua Kali the architects of Econef Sweden (Asante) and the client, Carline Nicholas from Econef Tanzania, had a close teamwork during the whole project – from planning to finish the house. Together they made a budget while the architects were responsible for the construction and Caroline assisted with labour. Basically the architects also espoused the role as a contractor. As mentioned in chapter 3.1.5 no quantity surveyor were needed since the prototype house was a resident building and a private project .

### **3.3 Regulatory systems in construction industry in Tanzania**

Regulatory systems is a main factor in the promotion of the construction industry. It supports the development in right directions and simplifies the building process.

The main institution in the construction industry in Tanzania is the government. The government is represented by ministries which are responsible for works, promotional and advisory government institutions and councils. Each of them has its own role in the promotion and regulation of the construction industry. The main regulatory systems of the construction industry in Tanzania are Contractors Registration Board (CRB), Architects and Quantity Surveyors Registration Board (AQRB), Engineers Registration Board (ERB) and National Construction Council (NCC). All these institutions operate under the ministry responsible for works in Tanzania (Ntiyakunze, 2011).

#### **3.3.1 Contractors Registration Board (CRB)**

The Contractors Registration Board was established in 1997 to register, regulate and develop contractors, consultants and individual professionals in the construction industry (National Construction Council, 2005). According to the contractors registration board (1997) a contractor means any person who reward or undertakes a construction, installation or erection, for any other person, of any structure situated below, on or above the ground or any other work connected therewith. According to the act (part 5:2), any person or firm who is not registered or proclaims to be is liable to pay fine as stipulated by the board.

The registration act recognizes five types of contractors: building-, civil works-, water works and sewerage-, mechanical and electrical works- and specialist contractors. Each of these five types are categorised as local or foreign contractors (part 3:2). According to the act local contractors means a person who is citizens of The United Public of Tanzania or a company whose majority shares are owned by the citizens of the United Republic. Every person or company not achieving these criteria is registered as a foreign contractor.

As mentioned in chapter 1.1.3 the contractors are classified into seven classes. A majority (67 %) of the building contractors are registered in class seven which is the lowest class while those registered in class one, the highest class, only represent 3 % of the total amount of contractors. All foreign contractors are registered in class one and represent 56 % of the total class. Although the foreign contractors are minority they share a high value of registered projects.

In fact they serve more than 70 % of all the registered projects while local contractors only serve 30 % (Ntiyakunze, 2011).

The prototype project was registered in class one.

### 3.3.2 Architects and Quantity Surveyors Registration Board (AQRB)

The Architects and Quantity Surveyors Registration Board (AQRB) was established in 1997 to provide for qualification for registration, rights and privileges of architects and quantity surveyors.

More specific the function of the board is to register and maintain registers and sub-registers of architects and quantity surveyors and their companies. The board is responsible for monitoring and regulating architectural and quantity surveying activities and conduct of the individual architects and quantity surveyors and their companies in Tanzania.

According to the board it is illegal for any architect or quantity surveyor to act professional without being registered with the board.

Since the prototype house is a private house and a resident building no registration of architects was needed.

### 3.3.3 Engineers Registration Board (ERB)

The Engineers Registration Board was established in 1997. The board is responsible for monitoring and regulating engineering activities in Tanzania. The registration comprises all registered and authorized engineers in the country. Any other not registered engineer or engineering company who practice the profession is illegal and will be liable to pay fine as stipulated by the board.

Since the prototype house is a private house and a resident building no registration of engineers was needed.

### 3.3.4 National Construction Council (NCC)

The National Construction Council is a government institution established in 1979 and became operational in 1981. The purpose with the institution is to promote the development of the local construction industry. While promoting and providing strategic leadership for growth, development and expansion of the construction industry of Tanzania the mission is to develop the local

capacity for socio-economic development in the changing global environment (National Construction Council, 2009).

It is also aimed to provide services and technical assistance to construction industry stakeholders on all matters related to the construction industry including promoting and monitoring the development and implementation of standards, regulations and codes of practices related to the construction industry (Ntiyakunze, 2011).

### **3.4 Considerations before starting a building aid project**

When working with aid projects, according to the Swedish Mission Council (Åstrand, 1994), there are some things that are important to consider before starting the project. This section summarizes some of the considerations.

#### **3.4.1 Culture and social behavior**

While arriving to a new culture a lot of people experience the phenomenon clash of culture. The experience is of course very personal and varies from country to country. It can be hard to face the poverty and get frustrating when things do not turn out as effective as people are used to. The climate can also be exhausting and lack of communication is often a recurring problem.

Me, myself got overwhelmed by the poverty. Even if I thought I was prepared it took some time to acclimatize to the new surroundings and living conditions. Next to that I found it really hard to get used to the slow process and obstacles that could occur for even the simplest things. I learned quickly not to plan to strict or take anything for granted since I never knew what the day had to bring. The stress and pressure of being effective that can be found in a developed country such as Sweden, does not nearly exist in Tanzania. For me the knowledge of being behind schedule first got me frustrated and stressed out but after a time I learned that this was something I had to deal with while being a part of an aid building project. You have to get acclimatized to the culture and be willing to meet halfway.

To work with aid it is important to understand and meet the culture of the country, religion, social behaviors and economic conditions. I believe this is the key elements to a successful aid project. It is also important to be receptive and humble though it mostly only brings positivity to the communications with the local inhabitants. Such things as clothing can be decisive if you get

accepted or not. It is very important to check up the local dress code, since showing too much skin can be found as disrespectful and some clothes can be considered as swank. It is also important to get to know the local traditions how to greet (Åstrand, 1994).

### 3.4.2 Buildings

Buildings are valued and used different in different countries depending on climate, traditions and religion. It is important to find out what is central in the living functions in different cultures. In some countries the patio has a central function as it serves both as an area for work, social relations and cooking. The design and placement of kitchen and toilets can also be a sensitive issue which should be handled with care. It is important to introduce and discuss new solutions with the local population so they get aware of the functions and benefits compared to the traditional functions.

In some countries you sit down at carpets and do not use benches in school. This can also appear at home which is important to take in consideration since it affects the design and need for space.

Cleaning routines is also one other question to take in consideration. In many countries a lot of water is used to clean the floors. This puts heavy demands on water-resisted floors and at lower parts of walls (Åstrand, 1994).

Overall, in Kingori and Jua Kali, most buildings were built with low standard. Many buildings had no electricity or running water. Many houses were built by natural resources such as mud and straw. The standard could also vary greatly in the neighborhoods. Sometimes a great house with high standard could be placed next to a house with very low standard. To me it was very clear that economic conditions of people were in directly proportion to their living standard. Poor people still cooked their food over open fire and ate the dinner at floor of soil. Other people with good economy lived in houses with standards comparable with a general Swedish house.

The prototype house was built in a modern way that also appears in modernized Tanzanian resident buildings. The house is supposed to serve as a guest house for volunteers and teachers and consisted of two bedrooms, one kitchen, one toilet, one shower room, one wash room and one storage room. The design of the house is not like a typical Tanzanian house. Instead it has quite a brave Scandinavian look but with self sustainable needs adapted to the Tanzanian requirements and climate.

It is very important to understand that architecture and buildings have huge impact on people's life. It is significant to reconsider the needs and the priorities in each building project.

### 3.4.3 Building traditions

There is a lot to learn from traditional construction techniques. It uses local building materials and local labour which, among other things, due to shorter transports leads to lower construction costs. The traditional construction techniques have been developed through centuries and got shaped by way of living, climate, access to material and handicraft.

Buildings built the traditional way often require more maintenance than modern buildings. However, this is mostly not a problem since the maintenance material is locally available. If new building materials are used the risk not being able to maintain the building are high which in meantime lead to destroyed buildings. Due to this, it is important to find the balance when introducing new construction techniques and materials to traditional building techniques (Åstrand, 1994).

A typical traditional method used at the prototype house for the orphanage center was using stones as foundation under the inner walls to save material and cost. Another one was cleaning the bricks with a mix of linseed oil and coffee.

## 4 Case study – Orphanage house

### 4.1 Description of the project

The case study took place as a field study in Kingori which is a small village approximately 40 kilometers from Jua Kali where Econef and the current orphanage is based. In turn, Jua Kali is placed approximately 20 kilometers from the larger city called Arusha in the northern Tanzania.



*Figure 4.1. Map showing the location of the current orphanage based in Jua Kali and Kingori where the new children center is taking place. The closest larger city is Arusha with a population of approximately 450 000 inhabitants (Landguiden, 2014) (source: Google Maps, 2014).*

The project consisted of building a prototype house as a pre-study to an even greater building project of a children center. The project is a collaboration between a local NGO (non-governmental organization) called Econef, and a Swedish architect firm called Asante based in Stockholm. To run the project, Asante created a Swedish version of Econef, named Econef Sweden which is a foundation working with fund raising of the project. The architects of Asante are the founders of the project and the one responsible for the design and construction work. The project is an aid project dependent on financial support of private donors.

Since the number of orphans is increasing in Tanzania the need for orphanages gets bigger. Today, the founder of Econef is running an orphanage at her home but since the space is limited the need to expand is essential. With help from

economic aid, supported by sponsors and private donators, Econef has the ability to offer security and everyday necessities for the orphans of Jua Kali. Econef ensures that every child has somewhere to live, something to eat and that they have access to education and hospital care. The current orphanage consists of sixteen children with all different history but the most common reason is the loss of parents due to HIV.



*Fig. 4.2. The children of the orphanage visiting the prototype house (Econef, 2014).*

The project consist of building a new orphanage center including a primary school, houses of living, houses for staff and guests, a dam and play grounds. See figure 4.2 for site plan.

Since it is a first time experience for Asante and Econef Sweden to be involved in this kind of project in a developing country such as Tanzania, the partners decided first to make a prototype house which is aimed to be a guest house for volunteers and other guests. This gives a lot of knowledge about the building process in Tanzania, building materials etc., for the future process.

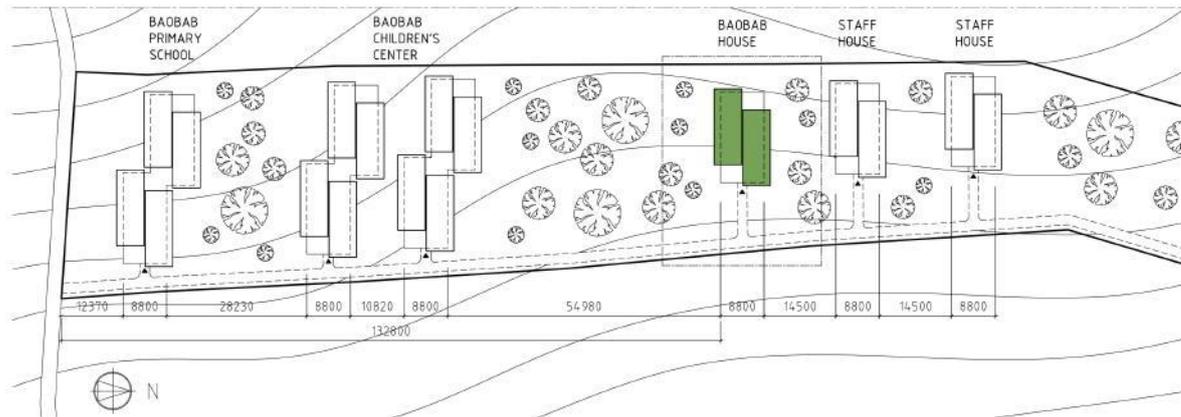


Figure 4.3. Picture showing the site plan of the upcoming children center. The house marked with green is the prototype house that was built during the case study (Asante, 2014).

The aim of the children center is to increase the independence of Econef and reduce its reliance on private donations. One way to support this is that the new buildings will be sustainable and largely maintenance free. The center will produce its own electricity through installation of solar panels, have an integrated system for rainwater collection and natural ventilation and areas for livestock such as chickens, cows and vegetables will be connected to the buildings. The center has also been designed to be acclimatized with the natural surroundings and to minimize the need for outsourced building expertise. To achieve this, the use of local materials and traditional building techniques has been prioritized.

Briefly, this is the objectives and expected results of the prototype house:

- Develop a sustainable house typology that is adapted to the local climate, cultural and economic conditions in a northern Tanzanian context. For example it is important to consider the hot climate and how to get a comfortable indoor climate without using any type of electrical air conditioning. It is also important to consider dry- and rain season, especially in this case since the house is supposed to be a self-sustaining building.
- Integrate sustainable low-cost techniques such as rain water harvesting, solar panels, solar water heater and ecological compost toilets in the architectural design.

- Promote and spread knowledge on sustainable construction methods by creating an exemplary house typology and documenting the process in building manuals.
- Increase respect for the local building tradition by using low maintenance techniques.
- Increase the access to clean water by using rain water harvesting solutions.
- Increase environmental engagement and awareness.
- Reduce dependency on private donors.

While building a self-sustaining building you reduce the need and the dependency of other external supplies that may not be available in the rural area. Examples can be running water and electricity. This means the children center could be an excellent example and bring a lot of knowledge of new sustainable building solutions in the area but also broadly in Tanzania.

The design of the house has been simple but still with a brave touch. It is not a typical Tanzanian house, though it rather got influences of the Scandinavian design with strict shapes mixed with playful solutions. The function has been number one priority but still, even if it is not a typical Tanzanian house, it acclimatizes really well to the surrounding environment.

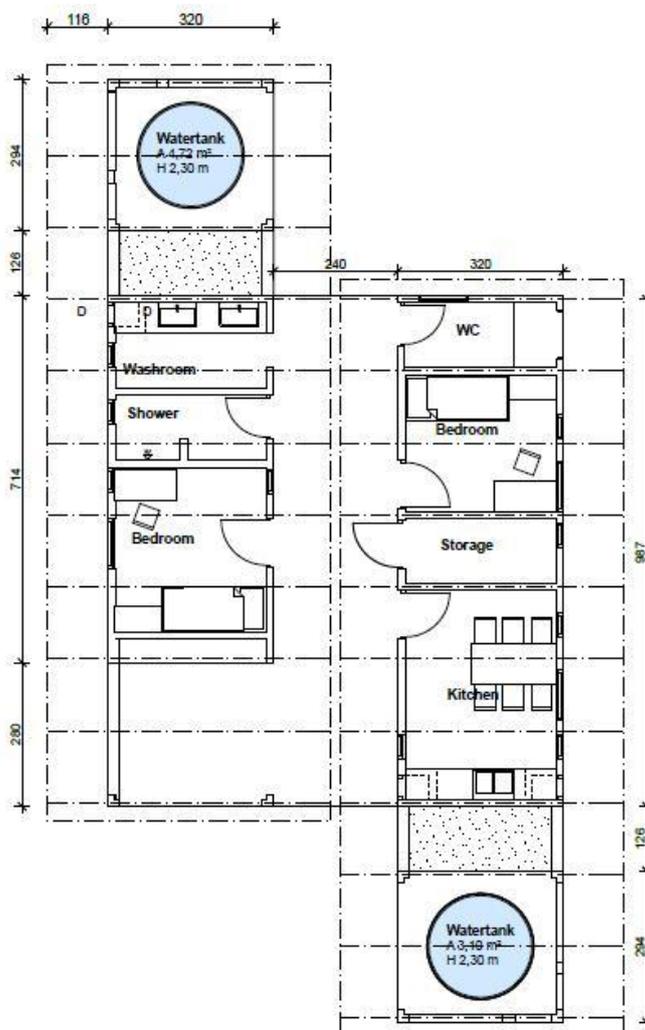


Figure 4.4. The picture shows the floor plan of the prototype house (Asante, 2014).



*Fig. 4.5. A model showing different perspectives of the prototype house (Asante, 2014).*

The construction work of the prototype house started in summer 2013 and was finished in March 2014. This study was connected to the building project in the final phase of finishing the prototype house. The main parts such as foundation, walls and roof was settled but there was still a lot of finish work to do such as painting, plumbing, ventilation, paving stone settlement around the house and installation of solar cells and solar panels.



*Fig. 4.6. A sketch showing a view from the dining and company area from the upcoming children center (Asante, 2014).*



*Fig. 4.7. A sketch showing the inner courtyard from the upcoming children center (Asante, 2014).*

## **4.2 Financial actors**

As described in the previous chapter 4.1, the project is run by the Swedish fundraising foundation Econef Sweden. By economical support through private donors and enterprises Econef Sweden got the ability to both contribute the current orphanage with everyday necessities and starting the construction of the new children center. Due to dependency of money support and limited budget the construction process has been gradual. To collect money to the foundation Econef Sweden has, for example, arranged art exhibition, golf tournaments and featured the project at different arrangements.

## **4.3 Actors in the construction process**

### *Head leader*

The main person in the project is Caroline Nicholas who is the founder of Econef and the one running the current orphanage based in Jua Kali. She is the client of the project but since she also is very involved and got high active participation in the building process she can also be declared as the head leader.

### *Econef Sweden*

Econef Sweden is the one who is responsible for the construction of the building. Econef Sweden includes, among some other persons, of a few architects from Asante who are the ones, according to head leader's requests, who made the design and drawings of the building. The construction of the prototype house has been made gradually step by step and while in process there has always been someone from Econef Sweden at site to follow and lead the construction work. Econef Sweden is the one possessing the construction knowledge and the one planning the building process.

### *Labour*

The workers have consisted of local labour. The variation of competence has been wide since some of the workers had some kind of building education while some of them had no building qualifications and/or previous experience of building construction.

### *Foreman*

In the early stage of the construction there was a local foreman involved in the project. He was not at the site at daily basis but made regular visitations. The foreman had no specific building education but was self-taught in the construction industry. During the roof construction another local man

contributed with expertise and advises but except from that there was no specific foreman at the site at the rest of the time. The participants from Econef being at site was the one leading the project and while in need of guidance and support they were asking for assistance from local people in the business. When not being able to be at the site (maybe out for errands buying building materials) the woman appointed as head leader was the one being in charge.

### *Volunteers*

There have also been several volunteers involved in the project. Many of them with different backgrounds such as; engineers, architects, students and people without any construction background just willing to give a hand. Some of the volunteers have been members of aid organizations such as Architects – and Engineers Without Borders who are two worldwide spread NGOs (non-governmental organizations) and non-profit associations. The organizations works for long-term sustainable solutions and to create better living conditions for people living in rough environment or in emergency situations (Arkitekter Utan Gränser, Ingenjörer Utan Gränser, 2014).

## **4.4 The construction process**

This chapter gives a short glimpse of the construction process of the prototype house. It only highlights the main parts such as foundation, walls and roof construction.

Before the construction started Econef Sweden was in contact with other building companies with previous experience of construction work in developing countries. They were also in contact with a local architect bureau in Tanzania who inspected the drawings and gave useful feedback.

### **4.4.1 Foundation**

In March and May 2013 a group from Econef Sweden went to the site to do the last preparation before the construction work could begin. In July 2013 the construction was in process and the first phase consisted of digging to remove soil to make the ground stabile. When this was done the process continued with reinforcement and bricklaying of concrete blocks to finally implement casting of concrete. The knowledge of local building techniques from the local foreman, Barnabas, was a great benefit during the process. Extra time was proposed to strict measuring precision in order to follow the drawings precisely.

Below is a more detailed list of the working schedule of the foundation construction:

1. Excavating for foundation
2. Foundation footings with reinforcement
3. Concrete block foundation walls
4. Compacting of soil in between foundation walls
5. Placing reinforcement beams for floor slab
6. Termite spray on top of the compacted soil
7. Formwork for floor slab
8. Casting the slab

*Process in pictures (all pictures from Econef, 2014).*



1. Fig. 4.8. Excavating for foundation.



2. Fig. 4.9. Measuring of the foundation.



3. Fig. 4.10. Foundation of stones was settled under the inner walls to save material and cost.



4. Fig. 4.11. Foundation footings with reinforcement.



5. Fig. 4.12. Compacting the ground.



6. Fig. 4.13. A wooden board was used to level the concrete.



7. Fig. 4.14. The concrete foundation is ready.

#### 4.4.2 Walls

In August 2013 another team from Econef Sweden continued with the work with the walls. The chosen material was bricks who was told to be burned by using briquettes of sawdust but later on it was found that they actually was burned by using industrial diesel oil as fuel. This was a big disappointment since the purpose was to use as ecological building materials as possible. Otherwise, the work with the walls proceeded smoothly. A brick string and a level were used for the first layer of bricks to make sure the walls were straight. A measuring stick made by wood was used to make perfect one centimetre joints. Every sixth bricklayer was strengthened by reinforcement bars to make the walls strong and stable.

In Tanzania using a ring beam is more the rule than the exception. The purpose by using a ring beam is that it stabilizes the building against earth

quakes, but since earth quakes actually are not that common in the country the function in general is stabilizing the building rather than stabilizing from earth quakes (Frank Maiki, 2014). The ring beam of the prototype house is made of reinforced concrete and leads around the house.

*Process in pictures (all pictures from Econef, 2014).*



**1.** *Fig. 4.15. A brick string and a level was used to get the first brick layer right.*



**2.** *Fig. 4.16. A measure stick was used to get the right distance between the bricks.*



**3.** *Fig. 4.17. The walls were put in place.*



**4.** *Fig. 4.18. Simple methods were used to bend the reinforcement bars.*



5. Fig. 4.19. First layer of reinforcement in the walls.



6. Fig. 4.20. The reinforcement of the ringbeam was established.



7. Fig. 4.21. The concrete of the ring beam got watered to avoid cracks in the concrete.

#### 4.4.3 Roof

When starting with the roof construction again another team took over. This time the team only consisted of volunteers and before taking over they got a detailed update of the building process and instructions for the continuing work. The foreman was not able to lead the construction work this time, instead another local man was the one with the expertise.

The supporting construction of the roof consists of trusses made by wood. These were attached in custom-made attachments that are connected to the ring beam. Since the building periodically is exposed by hard wind the trusses

were also attached to the foundation by using reinforcement. On top of the trusses a final layer of roofing sheet was placed. Overall, the construction of the roof went smoothly except that it got interrupted and delayed by the final work with the rain gutter.

*Process in pictures (all pictures from Econef, 2014).*



*1. Fig. 4.22. The trusses were put in place. The inward slope design support the rain water collection and leads the water to the two water tanks placed on each side of the house.*



*2. Fig. 4.23. The roofing sheet was attached to the trusses.*



*3. Fig. 4.24. Sisal poles were placed to fill the gap between the walls and the roof. They look natural to the house and also give good ventilation. The picture also shows the construction of the rain gutter that leads across the roof.*

#### 4.4.4 Finish work

Left to do to accomplish the prototype house was to connect solar panels and solar cells, paint the walls, cast floor finish, connect grey water- and sewage system, make a brick wall and paving stones around the house. This time two responsible participants from Econef Sweden were at site to lead the work including a great group of volunteers.

Since a great number of participants were involved this time a lot of work could be done paralleled. The painting, floor finish casting, brick wall and

paving stones went really well but the installation of solar panels and solar cells was more complicated than expected. The solution planned beforehand was a simple plan, aimed to be developed while at site, but turned out being more complicated and expensive than estimated. Different consultants were used to get expertise and quotations but due to money and time limit it was decided to postpone the installations. Except for that, the prototype house is now finished.

*Process in pictures (all pictures from Econef, 2014).*



*Fig. 4.25. Simple methods were used to find reference points before casting the floor.*



*Fig. 4.26. Reference highs of concrete were placed to help the casting.*



*Fig. 4.27. Casting the floor.*



*Fig. 4.28. The last finish of the floor casting.*



*Fig. 4.29. The floor got watered to avoid cracks in the concrete.*



*Fig. 4.30. One of the water tanks got painted.*



*Fig. 4.31. The brick wall around the house is taking place.*



*Fig. 4.32. Fire was used to make the material soft before connecting the pipe lines for the plumbing.*



*Fig. 4.33. A ground vibrator was one of few machines that was rented. Almost everything else was made by hand by using simple tools.*



*Fig. 4.34. The process of the brick wall around the house.*



Fig. 4.35. Paving stones around the house.

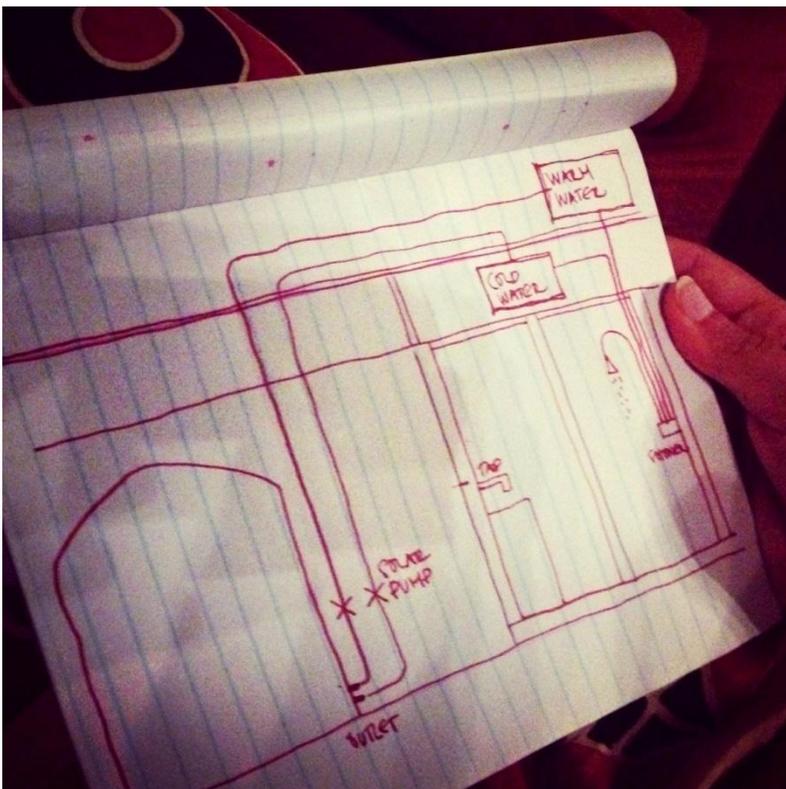


Fig. 4.36. A simple sketch of the solar panels from the brain storming stage. Since the water tanks are placed on the ground the complicated part was how to get the water on top of the house. A need of water pumps were necessary but then there was another problem; were to place the cold water tank (need shelter not to get heated up by the sun) and how to link the plumbing to both hot and cold water? Since most of the plumbing already was done the installation of solar panels had to be adapted to the already existing plumbing system. Although, different consultants were used to get expertise and quotations it was decided to postpone the solar panel installation to find the optimized solution for the house.



A.



B.



C.

*Fig. 4.37 A, B, C. Pictures showing the final result of the prototype house (Econef, 2014).*

#### 4.4.5 Budget

The estimated budget was set to SEK 250 000 and the total cost ended up at SEK 300 000. The main reason to the exceeded budget was:

- Lack of experience of making building calculations.
- Salaries and transports were not included since it was considered too difficult to estimate on beforehand.
- The brick wall around the house was not included. The decision of making it took place at site while discovering that the ground needed to be processed.

- The project with a prototype bed for the sleeping areas was not included.
- More small unforeseen costs than expected.

#### 4.4.6 Time plan

The time plan has been changed many times during the project. In one of the first time plans from 2012 it was estimated for the prototype house to be finished in August 2013. Later on the estimated finish line was set up to spring 2014. The limited opportunity to plan beforehand while still in Sweden made it difficult to estimate the duration of the project. This especially since the construction process in Tanzania is rather different compared to the process in a developed country such as Sweden.

The last part of the construction process included installations of solar cells and solar panels. This turned out more complicated than expected. This means the construction of the house was finished in time according to the second time plan but the last installations to make it a livable house is still not completed.

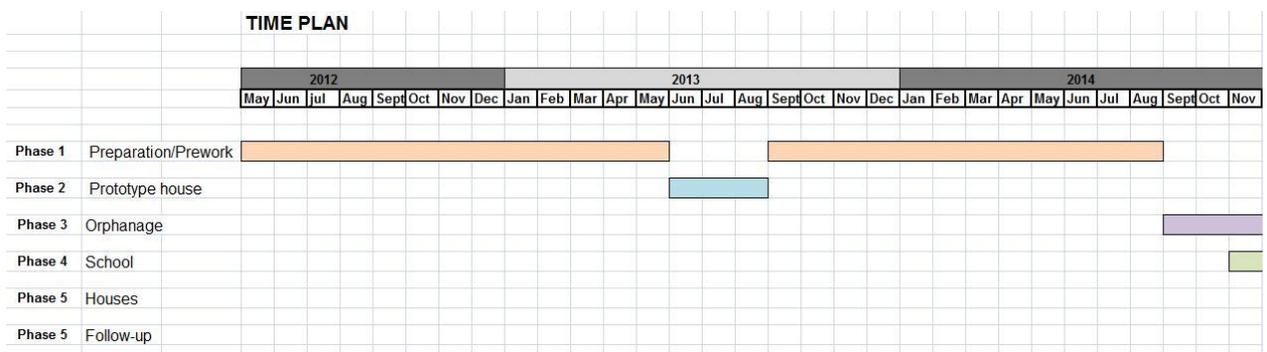


Fig. 4.38. An outline of a time plan proposal in the early stage of the planning work (Asante, 2014).

#### 4.5 Summary of weaknesses in the case study

As mentioned in chapter 1.2 I found some weaknesses in the building process of the prototype house:

1. Frequent delays which put the building process behind the schedule.
2. Deficits in the communication – both between the Swedish and Tanzanian organization and the local workers.

3. Unrealistic time plans.
4. Problems how to implement the Swedish technological solutions in the Tanzanian construction industry.
5. Differences of building and social culture.

Every point of the found weaknesses will be more deeply evaluated in the following sections.

#### 4.5.1 Delays

More or less almost every specified stage got delayed somehow. Mostly the delays appeared in the beginning of a phase and sometimes it was possible to catch up the lost time but sometimes the delay was a fact. As often, a delay of time is not only a loss for the current stage, it also affects the whole continuing process, which it also did in this case. Mostly the delays were due to problems and difficulties by preparing and coordinate upcoming work. Some work was prepared before the trips to Tanzania by using e-mail communication with responsible persons at the construction site but sometimes the message did not reach or was not clear enough. Things that were supposed to be prepared at site by the arrival of the responsible persons from Econef Sweden were sometimes not arranged at all.

There are numerous more reasons why frequent delays appeared in the project. Econef Sweden was the organization organizing the construction work which also means they were the one responsible for the time plan, but since the construction process is rather different from in Sweden it was difficult to estimate the timescale of different stages. Resources of material, road availability to the site due to weather and rainfall, availability of transports, number of professionals and qualification of the labour are some factors that affected the process.

Below is a list that shows the most common reasons that causes delays in construction projects in Tanzania (Mansfield and I Sasillo, 1990).

Problems by priority:

1. Lack of funds, local and foreign.
2. Shortage of building materials, spares and fuel.
3. Disbursement procedures.
4. Lack of co-ordination during execution stages.
5. Lack of proper establishment and mobilization of equipment at early stages of contract.
6. Poor performance of contractor.

7. Bureaucracy.
8. Donor's policy requirements.
9. Increased quantity of work.

#### 4.5.2 Deficits in communication

Deficits in communication occurred during the whole building process. First of all the language barrier was a recurring phenomenon. It did not always have to be a problem but the need of someone interpreting between the Swedish group and the Tanzanian labour was sometimes problematic and time-consuming (Frank and Abu, 2014). Using interpreting was also a risk of losing information when the communication could not be used directly. It also opened up for misunderstandings and risk takings.

The language barrier was not the only cause to deficits in the communication. Also misunderstandings occurred between the indigenous workers. This is something we cannot get rid of because of the human factor but since the work sometimes stumbled into obstacles it gave room for own solutions.

#### 4.5.3 Unrealistic time plans

As mentioned in chapter 4.4.1. it was difficult for the responsible participants of Econef Sweden to estimate the time of the construction process since the process is rather different from the one in Sweden. It was not only the practicalities that were different, even the way of thinking and prioritize differed a lot. It was also difficult on beforehand to know what kind of stages in the process that needed extra time. For example, in Sweden we are used to use machines while in this project almost all work was made manually by hand.

#### 4.5.4 Problem how to implement technical solutions

The knowledge of construction differs a lot between the local workers and the aid workers. Both have knowledge but the knowledge itself how to construct, is very different since we live in different climates with different preconditions. Since the project is an aid project the budget was limited. Because of this and the will to show respect, local building techniques were prioritized during the construction. Despite this, some effort was made to implement developed technical solutions – sometimes with great response and sometimes less successful. The lack of electricity (a generator was used but with limited resources) made it difficult and sometimes even impossible. The limited budget also constrained the opportunity of buying and renting technical machines or other developed construction tools. While at site it was

also far to the closest hardware store which sometimes led to other, more simple, methods was used instead. The time limit also sometimes, constrained the opportunities to implement new solutions. When the project were under time pressure it was more important that the work could be done in time, rather than how it was done. Sometimes old techniques had to be used since it often takes some time to learn new techniques.

#### 4.5.5 Differences of culture

Being a part of an aid project does not only show the practical differences, it also shows the differences of culture. In this project the participants got in touch with both the building and the social culture. The building culture maintains a lot from the preconditions of the country when the social culture is more deeply rooted in the history of the country.

In Sweden we are used to keep a high speed in our society and also in our working climate. During this experience I found a totally different attitude in Tanzania regarding to time and stress. Of course it is wrong to apply a broad brush approach to the whole Tanzanian population but over all they do not have the same time pressure as we do in developed countries. In developed countries time is money but the philosophy is different in a country such as Tanzania.

Then how did this affect the project with the prototype house? Overall the work went smoothly but in times when an error occurred in the construction process the local participants did not see the problem as alarming as me and the other participants from Sweden did. Their thought was more that it could be fixed tomorrow or the day after tomorrow while we, the Swedish participants, wanted it to be fixed as soon as possible to keep up with the time plan. When doing orders from hardware stores the salespersons often delivered wrong items even if they got detailed instructions and admitted that they understood the specification. It is hard to say if it only was unforeseen mistakes but since it happened repeatedly in different stores it seemed like the lack of carefulness was a part of the Tanzanian culture. For example, once wrong paint color was delivered to the construction site and it took almost a week to coordinate despite several visits to the paint store to make it right. Also if I set up a meeting with someone local it was more the rule than the exception to expect them to be late. Briefly, the time has not the same value in Tanzania as it has in Sweden and this has, in my opinion, been the biggest differences of culture during this project.

## **5 Discussion**

The aim with the study was to improve and increase efficiency of the construction management of Tanzania. According to slow development of the infrastructure, the study focused on the building process with the aim to find out the weaknesses in the construction process. A field study was made as a case study. The case study deepens into an aid building project why the study also highlights the case of foreign building support.

### **5.1 Discussion of the Orphanage Center Jua Kali**

As mentioned in chapter 4.5 there were some weaknesses found during the case study. Below the weaknesses are presented again:

1. Frequent delays which put the building process behind the schedule.
2. Deficits in the communication – both between the Swedish and Tanzanian organization and the indigenous workers.
3. Unrealistic time plans.
4. Problems how to implement the Swedish technological solutions in the Tanzanian construction industry.
5. Differences of building and social culture.

The study revealed frequent delays as one of the biggest challenges in the construction process. The obstacles that caused the delays often occurred in the startup of a new phase. The reason was often the limited opportunity to plan and prepare the work on beforehand. Even if instructions had been given to prepare the work there were often doubts and confusion. The reason to this may be caused by the lack of communication. E-mail was sent to the local workers in Tanzania but since the access to internet still is limited in the country the communication was restricted.

Even the direct communication was restricted by the language barrier. Having workers not speaking English, or the opposite; leaders not speaking Swahili, made the work a little bit more complicated. Being relied on using an interpreter is both time-consuming and increase risk of misunderstanding and risk taking.

The study revealed the time plans to be a little bit too optimistic sometimes. It was hard to estimate the timescale of different moments since they got high dependency on factors like material resources, transport access, road and weather conditions.

The desire to use developed technological solutions was tempting but inhibited by the poor circumstances at the construction site. The aim with the project was, except from contribute with money and leadership, also to implement and teach the indigenous workers about new construction techniques. Though, due to time and budget limit, simple methods were often used instead. The main target with the project was also, as mentioned in chapter 4.1, to build a sustainable building with as ecological solutions as possible. This often led to the use of local solutions rather than new, developed solutions.

While doing the field study I found the differences of culture as the biggest obstacle during the process. It was definitely not only a problem but when the way of thinking and how to solve problems are completely different it easily leads to frustration and dissatisfaction. In Tanzania the working environment is much slower and the construction projects do not have the same pressure of time as they do in Sweden.

## **5.2 General discussion**

While participating in an aid building project you can never expect it to run without any complications. Rather, you have to be patient, flexible and open minded to try new solutions. The working procedure is also often rarely different and it can take time before you acclimatize to the new working process and time schedule. I personally found the hardest part was to acclimatize to the flexible way of planning and handle problematic situations. In developed countries we are used to time pressure and hectic working environment. While arriving to Tanzania I immediately found out that they have a different perspective of time and that stress rather is something unusual. Of course, stress is never good or something to strive after in a construction project but while being aware of the timescale you can instead use the parameters of time and work load to be as effective as possible. Without almost any pressure of time, I believe it is hard to see the benefits of being effective.

Although, efficiency does not only relate to time. To reach effectiveness you have to look at all factors in the process. What you can serve is time and time is money considering costing of labour, renting machines etc. In aid building projects it is significant with international cooperation. First of all there is a large profit if the receiving country shows interest and a general will to maintain foreign support, and in this case building aid support. I only got in touch with governmental institutions a few times during the project but I

found a bit of suspicions and unwillingness from their side. Apart from that, I found the Tanzanian inhabitants more than grateful for our work.

Considering how to spread knowledge it is also important with cooperation between aid supporting countries. I believe it is significant to promote aid projects and let others take part of them. This improves the spread of knowledge but also the awareness of aid projects. We must not forget that most of these projects rely on economic support.

I have already mentioned the importance of spreading knowledge and the most significant receivers are the local inhabitants. Today the development of the local knowledge is prohibited by poor circumstances and lack of technique. The poor circumstances are widely spread in rural areas where a lot of people cannot afford education. Although, according to that, this is why aid construction projects in this kind of rural areas are extremely important. The projects do not only contribute with a physical part of, for example a building, it can also, to a great extent, contribute with construction and technical knowledge. By using local labour you support the local employment and increase the knowledge.

Speaking of knowledge it is also important not to forget the professionals in the developing countries. In Tanzania there is a shortage of professionals and most of them are located in larger cities. Due to community partition the development increase faster in urban areas of Tanzania, while development in rural areas still is very slow. To prevent this I would suggest professionals of the construction management to focus more on development in rural areas. Of course it is good to develop and expand urban areas such as cities but, if the development in rural areas not follows, the partition will only get bigger. I believe spreading knowledge is the main part in efficiency of the construction management of Tanzania. For example, self-sustainable buildings like the one in this case study, is one example of construction that I believe could make big differences for people living in rural areas. Since the living conditions are poor it is important to use the resources of the environment such as sun light and rain water.

One other central issue in the efficiency of the construction management is the economical matter. Foreign support is an important contribution in the development of a developing country such as Tanzania. Though, it is important to try to keep a good balance between self-sufficiency and foreign support. Today the construction management has high dependency on foreign economic support and it is important not to forget to try to decrease this matter. It is also significant that the government and other financial institutions put attention to the development of the infrastructure and

especially in the rural areas since many people in Tanzania live under poor living conditions.

## 6 Conclusions and Recommendations

This study aimed to ascertain the process and management of building construction in Tanzania and search for improvements and increased efficiency. As the study deepens into a field study the study also objectifies the case of foreign aid building support. This chapter finalizes the report with conclusions and recommendations based on the findings of the study.

### 6.1 Summary of conclusions and recommendations

- Before starting a construction work make sure you do thorough feasibility studies. In aid projects it is important to make sure that all participants agree upon the aim and performance of the construction work. It is also essential to do careful surveys of the surrounding environment. Proper aspects to consider are the access to running water and electricity. If there is no access to running water it can be needful to inspect the access of groundwater.
- Do not underestimate the value of communication. In an aid project mostly a lot of people are involved, who in turn comes from different backgrounds with different construction knowledge. First of all it is very important to find out the needs and specifications from the recipients. This simplifies the working process and the final result. During the process it is also very important to give continuous information not only to the recipients, but also to all participants of the project. This prevents unforeseen surprises and sense of exclusion. To give information also supports educational purposes. Language barriers are also a critical factor that increases the importance of communication since it can be an obstacle and create misunderstandings.

While participating in an aid construction project abroad, culture differences is something you cannot avoid. I believe the key to a successful aid project is to get to know the culture of the country. Doing this you understand how to discuss and deal in certain situations. You also avoid misunderstandings and get a sense of feeling for the working process. You should demonstrate interest of the culture, be humble and strive for gaining trust from the local workers and community in general.

- Before starting the project it is important to make a detailed time plan. Not only to know the estimated timescale, it also simplifies the budget calculation. In this stage it can be difficult to estimate the need of time for

the project. If possible it can be helpful to take contact with other persons with experience from former projects. I would suggest always making a generous time buffer since I experienced the risk of unsuspected occurrences to be very high. Speaking of time it is also important to consider that the rate of work might be totally different between countries.

- During an aid project I would recommend to have a local organization who is deeply involved in the project. This simplifies both the planning before and during the construction process. If local labour is used and there are deficits in the language communication I recommend having a foreman speaking both languages.
- If possible use local labour since it is a good way of exploiting local technique and different approaches. It is also a good way to exchange and spread knowledge while supporting the local employment. While the receivers participate in the process it also increases the satisfaction of the final result.
- Just like local labour I also believe it is good to use local material and working techniques. Of course it is good to use more developed techniques since it is a way of spreading knowledge of new construction techniques and often saves time, but due to budget it is a good way of keeping the costs down.
- Since almost all aid projects rely on economic support it is important with promotion of the projects, which in turn also increases the awareness of aid support. It also opens up for border-cross collaboration which is good since aid work is a global issue.
- To spread knowledge among the professionals in the sector of construction management I suggest workshops. This between professionals established both in urban and rural areas. Today most of the infrastructure development is taking place in bigger cities and I would like to highlight the situation and the needs in rural areas.
- To improve the living conditions for a lot of people in Tanzania and to accelerate the urbanization of the country it is important with economical support from organizations such as the government and other financial institutions. Today, not enough financial measures are selected to the construction management and there are deficiencies in the co-ordination of planning between the construction industry and other sectors of economy. There is also a lack of consideration given to the economic support and how to take advantage of it. I believe the exalted financial institutions have

to make a much clearer structure how to support the construction management and urbanization of Tanzania. The country gets a lot of economic support from foreign countries but misses the ability on how to optimize it.

- Structure and strengthen the local construction regulations and standards. This makes the whole construction process more consistent and increases the quality of construction works.

## **6.2 Recommendations for future research**

The construction management in Tanzania is still young and under improvement. There is a lot to develop in the construction management of Tanzania and this study mostly focused on how to improve the construction management and construction process with help by foreign support. Because of this I recommend further research to deepen into exalted organizations role in this matter, such as the government and other financial institutions. It can also be interesting to study on how to decrease the gap of construction knowledge between urban and rural areas. I believe it is also an important matter to look into how to increase the urbanization of the rural areas since this is where the majority of the population lives.

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