Building Construction Industry in Tanzania

Case study: Youth Sports Centres Complex at Mwananyamala, Dar-es-salaam

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Abstract

Among the problems hindering the development and sustenance of the construction industry in Tanzania is the lack of funds for acquiring resources essential for implementation of construction project. Credit facilities have not been readily available from the existing financial institutions to support contraction Industry. An efficient construction industry is vital for socio-economic development of Tanzania for the past three decades, construction has been the largest sector in the country's investment programmes accounting for 50% of total capital formation. The governments main objective is to develop a self-sustaining construction industry that is capable of meeting the diverse needs for construction, rehabilitation and maintenance of all building and civil works efficiently and effectively.

In this paper, youth sports centre complex is taken as a case study. The project is in Kijitonyama- Mwananyamala, Dar-se-salaam. The client is African Medical Research Foundation (AMREF), which is a non-goveronmental organisation. The consultant who designed the complex was NTM Architects, Quantity surveyors and Engineers. The contractor who excuted the work was J&L Co Ltd. The beneficiaries of the project are the residents of Mwananyamala area and the youths ageing between 14 to 25 years old. The complex is used for different social activities such as medical consultation, meetings, show rooms, play- grounds and offices. This pepper looks into the project the construction process, starting from the briefing, designing, production and property management stages. It also makes comparison with the Swedish construction process so as to recommend the measures to be taken in the project. The project ends at giving experiences to be used in future in Tanzania and other countries.

Introduction

The project of youth sports centre complex at Mwananyamala (Dar-es-Salaam) is the result of the Compain of African Medical Research Foundation organisation towards Youth cancelling. The organisation started to seek for the plot for developing the complex, and they decided to buy the plot, which encounted delays in title deed transfer. The project consists of briefing stage, designing stage, production stage and property management stage. The consultant prepared the bills of quantities for construction work. The contractor priced the bills of quantities, and the contract figure was 72,767,630 Tanzanian shillings, the contract period was six months. The construction work was not completed in the given time. The contractor

requested revising the uncompleted works/outstanding works. The consultant prepared the bills of quantities, coming up with the sum of 55,274,805/-Tanzanian shillings. The client found that the construction work was too slow, he suggested to sub-contract the external works. And this costed about 14, 982,200/-Tanzanian shillings.

In this project one can see the problem of poor construction management, which resulted in delays and increased construction cost. The final figure for the project was hence 133,024,000/-Tanzanian shillings, which are about 182.8% of the contract figure.

Aim of the paper

This paper is the result of an individual work for the ICM 2000 course Lund University, sponsored by SIDA. It gives a real picture of the local construction industry in Tanzania. Is aimed in giving full picture of the whole construction process-taking place. The paper explains what is done from the project organisation up to the production stage and ends at the property management stage. And also will show the experiences to be used in future projects.

Thus this paper will try to give advice on how to minimise delays and reduce the cost in the construction process and get better quality of the product.

Background of the construction industry

In Tanzania the construction industry is still young. There is limited number of professionals, low technology and poor economy. There has been no government goal towards the development of construction industry. The country as a whole depends mostly on foreign institutions to train her indigenous professionals and contractors and consultants to execute big projects, for instance highway construction and complex buildings. Local contractors are not getting support from the government or financial institutions to make them develop and thus compete in the industry. Currently construction industry is hindered by the following facts:-

- Inadequate co-ordination of planning between construction industry and other sectors of the economy.
- 2. Heavy dependency upon foreign resources such as technology and materials.
- 3. Inadequate incentive and motivation of workers..
- 4. Inadequate members of suitable and qualified experienced personnel.
- 5. Transport bottlenecks to the distribution of construction materials.
- 6. Inadequate relevant local construction regulations and standards.
- 7. Inadequate consideration given to the local resources.
- 8. Lack of consideration given to the concept of cost of maintenance as component of investment
- 9. Inadequate co-ordination of planning management and control of public projects by various public institutions other than the ministry responsible for works resulting in confusion of works and activities.
- 10. The government as main investor is relatively having few public consultants and contracting organisations.
- 11. Inadequate working capital, at family firms capacity, and building sub-sectors.

The government's main constraints is lack of capacity for effective and efficient management of construction and maintenance programmes and projects; shortage of competent local consultants and contractors; use of inappropriate technologies; deficient procedures and inadequate financial resources. The government's main objective is to develop a self-sustaining construction industry that is capable of meeting the diverse needs for construction, rehabilitation and maintenance of all building and civil works efficiently and effectively.

Table 1 Construction Professionals 1996–1997

Class	1996	1997	Change %
Civil Engineer	724	747	3.2
Architects	124	132	6.5
Quantity Surveyors	50	54	8.0
Electric Engineers	116	120	3.4
Mechanical Engineers	141	153	8.5
Total	1,115	1,206	4.4

Geographical, National, Cultural and Political Conditions

Country: The United Republic of Tanzania.

Location: Tanzania is located in the Eastern Africa between longitude 29–41° East Latitude 10–12° South

Most Westerly point: Kigoma 29° East of the Greenwich. Most Easterly point: Mtwara 41°East of Greenwich. Most Northerly point: Bukoba 1° South of the Equator. Most Southerly point: Mtalika 12° South of the Equator

Boundaries

North: Kenya and Uganda. West: Burundi, Rwanda and Zaire. South: Zambia, Malawi, and Mozambique.

East: Indian Ocean.

Size: The United Republic of Tanzania covers a total area of about 883,739km².

Mainland is 881,289 km², Zanziba is 1,477 km², Pemba is 973km².

Population: 33 millions to year 2000 (projected).

Climate: Tanzania because of its geographical location has a sub-Tropical climate, which divides it into three zones.

The temperate zone (uplands), Hot and dry zones (lowlands), Hot and humid zones (coastal).

The main rainy season on the coast is from march to may but there is a second season between October and december. Total rainfall increasing towards the north around Lake Victoria. Rainfall is well distributed throughout the year but the peak is during March to may.

Political: Tanzania is a socialist country; initially there was assignee party democracy, but nowadays has changed to multipartism system. And His Excellence William Benjamin Mkapa is the president, coming from the ruling party Chama cha Mapinduzi (CCM).

Culture: People in this country are dived into the following groups: The Bantu group (indigenous) and The Nilotic and the hamitics.

National economic: The construction industry is among the main contributor to the national economy, this can be seen in the table below:-

Table 1: I Share of Construction industry in Total fixed capital Formation (GFCF) in %.
II Central Government Gross Fixed Capital Formation at Current Prices

Assets 19	88	89	90	91	92	93	94	95	96	97
Construction										
I. at 1976 prices	26.5	28.7	33.6	40.5	49.0	54.8	56.2	-	-	
II. at 1992 prices	62.2	50.2	50.4	39.8	44.0	41.3	40.8	37.4	42.9	48.0

Source: Bureau of statistics.

The table above shows that construction industry plays a large portion of contribution to the national economy. For example in 1994 its contribution was 40.8% to the Central Government Gross Fixed Capital Formation at 1992 prices.

Actors in the Project

Client: African Medical Research Foundation, a none Governmental Organisation.

Contractor: J & L Co LTD. Consultants: NTM Designers. Sub-contractor: Kubbun contractors Beneficiaries: Mwananyamala residents.

Design

The construction process stages are as follows:-

- 1. Briefing stage,
- 2. Design stage,
- 3. Project organisation,
- 4. Procurement and contracting,
- 5. Project planning,
- 6. Project financing,
- 7. Budget and budget control,
- 8. Information technology,
- 9. Conclusion.

Briefing Stage

In briefing stage the designers found that functions needed in the project were as follows:

A two storey building and mezzanine, which will be composed of the following rooms:-A doctor's office used for counselling youths, girls and boys changing rooms, toilets, a cafe, basketball-play ground, a room for table tennis and the stage for cultural group show.

The client also said that he was cost consious due to limited funds available.

Design Stage

The client contacted consultants for design work that was NTM Architects and Planners-based in Dar-es salaam. The designers prepared the drawings required for the project i.e-architectural drawings and structural drawings. Also the planners a quantity surveyor prepared the bills of quantities for the project.

Project Organisation

The project organization chart looked as the figure below:-

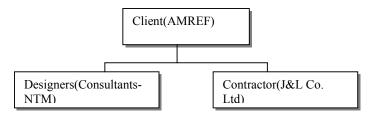


Figure 1: Project organisation chart

Procurement and contracting

It was an open-competitive tendering for the whole contract price by advertisement. The client initiated the architect to advertise the tender on local News paper to invite the contractors to apply for tender documents and to tender in competition for carrying out the work, the main characteristics of which are given. A deposit of ten thousands Tshs. was required in order to discourage frivolous applications, the deposit being returnable on the submission of a bona fide tender. The lowest bidder was selected i.e J&L co.LTD.

Tender documents consisted the following:

Condition of contract (obligation and rights of the parties)

Bills of quantities(two copies to the contractor)

Drawings (working drawings)

Form of tender (in letter form:-name,address,&sum of tender figure)

Return envelope (pre-addressed).

Project Planning

Project planning is to forecast and describe future events and stages of the project construction process. The planning logical steps are as follows:

- 1 Identification of the objective,
- 2 Expression of the objectives in terms of time,
- 3 Assessment of resources available,
- 4 Establishment of economical method to achieve it,
- 5 From the method the allocation of responsibilities.

Stages/Actors	Client	Consultant	Contractor
Inception			
Briefing			
Design			
Tendering			
Construction			
Commissioning			
Operating			

Figure 2: Responsibilities allocation

Project Financing

This project was funded by a non-governmental organization known as African Medical Research Foundation (AMREF). This section deals with prevention of transmitted diseases (STD). The objective of the client was to give advise to the Youth, how they can prevent or avoid such diseases.

Contract form was schedule of rates or bill of approximate quantities. This leads to the schedule or rates or bills of approximate quantity method of pricing under which a schedule or bill is prepared covering each of the items which it is anticipated may be met during the course of construction. The contractor priced the bill and is paid at those rates for the amount of work actually carried out, irrespective of the quantity shown against the item in the schedule or bills of quantities.

Budget and Budget Control

To this stage there was a budget of using the contract sum of money equal to 72,767,630 Tshs which was submitted as the lowest tender and thus the contract sum. The project duration was estimated to be six months. In this project there was no proper budget control from the beginning .

Information Technology

J&L Co. LTD is a local contractor with little information technology. Like many third world contractors as compared to foreign contractors from developed countries. The information technology is not readily available in the country. The plants and modern equipment can not be reachable by the contractor who has such low-capital.therefore the technology used here in this particular project was done manually, especially in tender document preparation and the project execution was labour intensive with a majority being un-skilled labour.

Conclusion

The client was ignorant in construction work and he did not use experts intensively, thus he could not control the time and money from the first stage of the project. The time given to that execution of construction work could not be met without close supervision. Also the selected contractor have no modern equipment and have no enough knowledge in pricing bills of quantities, which might have been the course for getting the lowest tender figure that resulted in additional amount of money in future, production stages. The client was required to plan and control the budget from inception stage of the project.

If the client had a good project manager, could have done the following for proper execution of the construction project:

- 1 Knowledgeable adviser in building technology and economy
- 2 Control the frames of economy and time in the project
- 3 Support in procurement of consultants and contractors
- 4 Response for technical control of the project and
- 5 Better administration in tendering process.

For smooth execution of this construction project the project manager needed could have the following knowledge:

The policy and procedure of the authorities engaged in construction industry, design of building works, construction technology, and cost estimates including annual costs. Also the project manager should have knowledge in, tendering procedure and building management and ability to cooperate.

Production Stage

This is the actual construction work when a contractor commences the work. The contractor who was awarded the project contracted to complete the project within six months only.

Tendering and Contracting

Under the law of contract, when a party makes an offer to provide goods and services for some certain consideration and the party to whom the offer is made accepts it, then, it does not involve an illegal act, a contract exists which is enforceable by law. This is no less the case in the construction business or Industry. The offer is made by the contractor who tenders to carry out specified construction work in return for a money payment and upon the acceptance of that offer by the client promoting the project, a binding contract come unto being. It is desirable that the client acceptance should be in writing and that it should be given as soon as possible after receipt of tenders (not later than two months). The number and the nature of the contract documents will normally correspond to the tender documents i.e. form of contract, bills of quantities and the drawings.

Immediately after the execution of the contract, the contractor should be given a certified copy of the articles of agreement, the condition of contract, the contract drawings, and the contract bills.

Production Planning

Cost planning

The cost planning of this project was done as follows

Table 2: The cost planning

Description	Tshs
a. Preliminaries	150,000
b. Preambles	-
c. Measured work	53,237,480
d. External work,Fence and gates, and water reservior	14,528,450
e. P.C. and provisional sums	3,877,500
f. Allow for cost of insurance against injury	100,000
g. Allow for insurance against property	100,000
h. Allow the provisional sum as instructed by the Architect	500,000
j. Allow for the cost of insurance against fire damage	100,000
k. Allow for the cost of surety bond of 10 percent of total sum	
TENDER FIGURE	72,525,930

Work Schedule (Gantt charts)

No	Month		JAN	JUL	AUG	SEP	ОСТ	NOV
	Activity							
1	Site clearance	I						
2	Fdn. slab, column, &beams							
3	Outer walls &roofs							
4	Plumbing and installation							
5	Finishes							
6	Extern works							

Figure 3:

Quality Management: Budget Review and Reconciliation

Quality Management

Quality management is an aspect of the overall management function that determines and implements the quality policy. And the quality policy is the over all quality intentions and direction of an organisation as regards quality.

Quality costs:-

- a. Failure costs (controlled)
 - Forgotten construction details, misplaced construction elements, wrong measurements, and exceeded tolerance.
- b. Prevention costs (controlled)
 - Professional education, Information about requirements, and drawings.
- c. Inspection costs (controlled)
 - Checklists and measurement control.

In that project there were drawbacks, such as failure costs (uncontrolled), the client became too tolerant regardless of a long time exceeding the contract time given.

The budget of the project is based upon the basic conditions as mentioned below:-

- Known costs (decided/occurred). This is known as the project goes on more and more of the costs.
- Calculable cost, these are those possible to calculate. Examples are taxes, cost of financing which is based upon the sum of all other costs and the time schedule.
- Comparable costs, which mean the costs that can be expected to be proportional to the gross area of the building. This can be used for estimating the costs directly related to the actual building.

In this project basic conditions used were known costs and calculable costs. The bill of quantities was a contract document for controlling the project budget. But later on the Contractor claimed to review the bills of quantities because the work was not yet completed. And the bills of quantities were reviewed for outstanding works/ uncompleted works. This gave a total amount of 55,274,805 Tshs and the delay had

already occurred. The client was advised by the consultant to terminate the contract due to the delays and the low quality of the work of the contractor, but he was reluctant. Therefore in order to save time the client suggested that the external works should be sub-contracted. The bills of quantities for external works was prepared and gave total amount of 14,982,200 Tshs, this was excuted by another contractor.

Conclusion

In the production stage there was no smooth running of the project because there were no close supervision. The client was far from the site, and there was no clerk of works at the site neither the Project manager. Poor supervision and the selection of the lowest bidder resulted in delays and increase in project costs. The estimated bills of quantities could not be met; instead the construction cost doubled the contract figure. Also the client avoided the cost of re-advertising tender again and to retain his good public relation, thus had to bear the cost encounted. The estimated time was to be six months but the construction work took duration of more than two years.

The quality management was not taken into consideration, such that in a lobby the architect required sawn formwork to the concrete wall, but the contractor used wrought formwork. This resulted in plastering the wall instead of leaving it as it would be constructed by using sawn formwork. Every project actor at her/his position, starting to the beginning of work assures the quality of product. If any of the actors go astray or will not observe it results in low quality of the product. For example the client is supposed to know what he wants, what type of the product depending on the functions required. The designers need to know the structures for the functions to be performed there and produce exactly what the client needs. The contractor is supposed to execute the production work according to the specification given by the architect. This project shows that the contractor did not complete the project in a given time, or contract period. There was no close follow up. Close supervision would be done by the project manager, but was not emplyed. In some of the project the client avoids to engage fully the architect due to the cost of supervision incured. This makes the client to make the supervision of unknown profession to him or her. Sometimes the client conspires with the contractor and become on the some informal reement. This may lead to antagonism between the consultant and the contractor and sometimes between the consultant and the client.

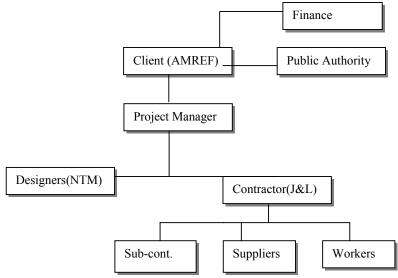


Figure 4 Project organisation chart

Property Management

Property Management

Property management means to manage property or real estate. The owner of the property is required to manage it in such a way that it gives him the best possible

economy and quality in short and long view. The following are the conditions, which affect the property:-

- Financing (conditions for the loans e.g. interests and time),
- Running costs (electricity and water),
- Maintenance costs (elements of the buildings),
- Tax regulations (subject to change),
- Building techniques and economics, this is the use of new technical solution.

Taking into consideration a multi-dwelling building:

- The owner has to set the rent depending on quality of building,
- How to increase the income by adding beauty and improving the surroundings to the building.

Design	Production	Property management

Figure 5 A schematic view over the property management

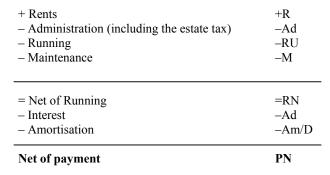


Figure 6 Tableau of property management

Life-cycle Economy

The property can generally be seen going through two different cycles of life.

- The life-cycle which starts when the building is erected and ends when the is demolished (objective) and
- The life cycle depicting the property to the owner (subjective).
 - New construction,
 - Maintenance,
 - Reconstruction, and
 - Demolition.

As time passes on the uncertainty grows. The investor can think the computations are useless but on contrary if you use methods that control insecurities and a series of analysis to understand the sensitivity, this is the best way to give a good ground for decisions.

Maintanance Planning

Maintenance encompasses actions aimed to restore the function in an objective. Planning is proper resource allocation in a given time for a particular project. It is the best way of property management to plan in regard to the life cycle of the building.

Types of maintenance:-

- Preventive maintenance,
- Immediate maintenance (running maintenance)
- Periodical maintenance ((building, installation and land)
- Small rebuilding projects,
- Extreme maintenance (malicious damage).

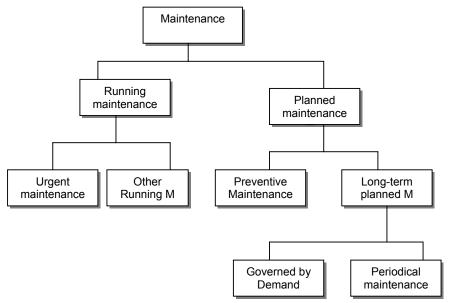


Figure 7 Account for maintenance

Connection to the Design Stage – Feedback

The use of annual outflow assessment is for analysing choice of solutions in the design stage, selection of the building materials, technology and cost can determine the extent of maintenance required in future. The basic calculation scheme for investment evaluations can be used. Evaluation schemes have generated the general formula for investment evaluation as follows: -

1	Present value method	$1/(1+i)^{n}$
2	Compound interest	$(1+i)^{n}$
3	Future value of investment at regular intervals	$(1+i)^{n}-1/i$
4	Sinking fund	$I/(1+i)^{n}-1$
5	Present value of amount payable at regular intervals	
	(Inverse annuity)	$(1+i)^n-1/i(1+i)^n$
6	Annuity	$I(1+i)^{n}/(1+i)^{n}-1$

Model for Analyses of Property Management

Diagnoses

This is the first step in property management, used to determine the current status and to make a diagnosis on both of managerial information and from official bookkeeping records (income and expenditure, payments and estimated values) constitute the basis for calculations.

Prognosis

The second step is to formulate a prediction on the basis of the diagnosis. Such prognosis takes into consideration the organisations prerequisites, limitations, and structures and the objectives of the organisation. Also estimated additional factors, internal and external.

Decision

The decision-maker's last step is to review the calculations and make a final decision. The final decision will base on, to invest capital or refrain. And if to invest on which project among the given alternatives, in order to make benefits in exchange for future. This is why capital investment is defined as a sacrificing of immediate and secure benefits in exchange for higher future benefits.

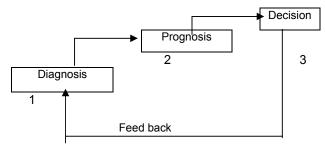


Figure 8 Model for analysis of property management

Property Management in the Project

In this particular project of Youth sports centre complex at Mwananyamala, Dar es Salaam, The NTM practice consultant firm was not engaged in the property management tax. The firm was limited to design stage up to production stage only. And this is the way consultants firm does in my country.

Property Management in Construction Industry in Tanzania

- 1 The limited funds to the property owners.
- 2 The ignorance of the property management tools for planning.
- 3 The environmental, economical, cultural and political factors.
- 4 The government's lack of funds
- 5 The government's shortage of property managers
- 6 The poor responsibility of the decision makers/poor property management planning
- 7 The property managers/Estate managers/Valuers are mostly engaged in property valuations only
- 8 The National Housing Cooperation had no property management, rather left to the tenants, i.e operational and running maintenance.
- 9 The government's ignorance of the change of the environment, e.g. the market, inflation and time factor.

Conclusion

Property management is a very important part in construction process, because in design and production process takes very short time, could be one month, or one year or three years, but property management stage goes up to fifty years or more than hundred years depending on the life cycle of the property. The existence of the property or building depends mainly on the proper property management planning. Could be operational, preventive, or planned maintenance to make it have long live and hence more profitable, by generating income. On this particular project, I would suggest the owner to look on this part so as to make it livelong. Because up to now, nobody is concerned with the maintenance of the complex, even operational maintenance is done when the Youths want to play games there. This is because property management was not taken into consideration from the beginning of the project.

Experiences to be used in the Future

Experience from the Course, which can be used in Tanzania

- 1 Economical control of the project during design stage.
- 2 The need of the Property manager from the design stage up to the property management for every construction project.
- 3 Sufficient feedback in the construction process.
- 4 The need of the designers to be involved in production stage.

- 5 To improve the cooperation and decrease the antagonism at the construction work
- 6 Integration of the participants earlier in the construction process
- 7 The use of property management tools from the beginning of the design process.
- 8 Delegation of power to the labourers in the construction process to improve the individuals motivation to do a good job.
- 9 To let information technology into the construction process.
- 10 Good training of labourers in theoretical subjects.
- 11 The need for a complete programme for property management.

Good Experiences from Tanzania Useful in other Countries

- 1 The National Housing Cooperation, which is a Government parastatal, has established policy, whereby 35% of the revenues from tenants will be used for building maintenance purpose.
- 2 The ministry of works has building brigades in every region for government building maintenance.

The government of Tanzania, through the ministry of works has recognised the importance of the construction industry and has therefore formulated a National Construction Industry Development Strategy (NCIDS).

Objectives of NCIDS:

- 1 Establishment of adequate capacity in government to effectively plan and monitor the activities and development of the industry.
- 2 Promotion of the economic and efficient utilisation of existing local capacities.
- 3 Ensuring increase efficiency, productivity and economy in design, construction, manufacture and distribution of construction materials.
- 4 Enhancement of the quality of design and workmanship compatible with existing economic and social conditions in Tanzania.
- 5 Promotion of research into all aspects of the industry and ensuring the optimum documentation, dissermination and application of research findings.
- 6 Streamline the composition and activities of all advisory and regulatory bodies to ensure their optimum level of performance and relevance in terms of the construction projects cycle,involving,planning,and design, contraction, commissioning and maintenance,there is a need to ensure adequate local capacity in design,contracting,and maintenance.

References

2000	College Publishers Ltd
	The East African Building and Construction Directory.

2000 Jan Söderberg
The Construction Process. Lecture notes, International Construction

Management Course 2000, Lund University.

J. M. Lusuga Kilonde
Land Policy Option for Urban Tanzania.

Land Policy Option for Urban Tanzania.

2000 Jan Aldoson

Lecture notes, International Management Course 2000, Lund University.

National Construction Council
 Basic statistical Information for the construction sector 1996–1997.

1997 Journal of the National Construction Council of Tanzania, Construction Business; volume 2; no 4/5.

J.W. Ramus Contract Practice for Quantity Surveyors.

1981 Terje Bodoegaard Climate and Design in Tanzania (Guidelines for Rural Housing).