

Construction Process in Kenya

with reference to Hazina Housing Estate

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Abstract

Throughout history man has tried to harness the forces of nature for his own comfort. In no other sector are these deliberate efforts best seen than in the construction industry. From the early day pyramids in Egypt that still exist to the modern day suspensions bridges that are ever increasing in span and in complexity, man has exhibited this desire to conquer nature with what nature has offered him. The fact that the industry is one of the major consumers of natural resources today reinforces this fact.

The construction industry is, therefore, an important sector of any economy and a necessary tool for development as it provides infrastructure facilities that support all other sectors of an economy. The number of industries that are within the umbrella of the construction industry are many and varied and governments are known to have cured economic slump by injecting money to the construction industry.

With the foregoing the necessity of understanding the dynamics of the construction industry with respect to sustainability, efficient use of natural resources, measures to save guard the environment and maximisation of utility from construction projects cannot be overemphasized. The report has briefly analysed various aspects of the construction process such as design and construction of projects in Kenya being the study country.

Introduction

Aim of the Paper

The aim of this report is to analyse the construction process in Kenya by using Hazina Housing Estate in Nairobi South B as a reference project. Various aspects of the construction process from design to project closeout shall be reviewed and compared to those adopted for the Estate. Conclusions shall also be drawn as to the effectiveness of the aspects taking into consideration the local conditions and the state of the construction industry in the Kenya. A brief comparison of the construction process in Kenya and the host country, Sweden, shall be carried out and analysed. Recommendations for the improvement of the construction process in Kenya shall be proposed .

Method

This paper has been written as a desk study based on the author's experience in the construction industry in Kenya having worked as a consultant in Nairobi for the last ten years. Relevant literature has been reviewed and advice sought from experienced professionals at Lund University.

Organisation

Chapter 1 introduces the topic and gives brief background information on the study country and reference project while Chapter 2 gives brief general considerations in respect to the subject. The main aspects of the subject matter are given in Chapters 3 to 4 whereas Chapter 5 briefly describes the observations in regards to the subject and the construction process in the Sweden. Chapter 6 gives reference to the relevant literature reviewed in writing the paper.

Description of Kenya

Geography

Kenya is located in the Eastern Coast of Central Africa and lies between latitudes 5°N – 5°S and longitudes 34°E – 41°E. The country covers an area of about 583,000 square kilometres of which only 4% is arable.

Geographically Kenya can be divided into four distinct regions from the east to the west namely:

- i. The Coastal Plains with regular rainfall land tropical vegetation.
- ii. A sparsely populated inland strip with little rainfall. The strip extends towards the north and northwest
- iii. A mountainous zone linked to the eastern end of the Rift Valley with a climate tempered by the altitude, and volcanic soil fit for agriculture. Most of the main economic activities are concentrated here
- iv. The west, which is covered by an arid plateau part of which benefits from the moderating influence of Lake Victoria.

Population

Rapid population growth is the bane of economic development for Kenya as it has lead to a high dependency ratio and a large growing youthful population. Two important aspects of population which elaborate how population considerations have affected economic development are:

- i. regional population densities are remarkably diverse because of different climatic conditions
- ii. Kenya has a rapidly urbanising population that is expected to reach 23% by the year 2001 up from 17% in 1989.

The population of Kenya currently stands at 28.8million (1999 Census) with about 20% urban. It is worth noting that due to lack of adequate arable land in the rural areas the only viable alternative for many rural communities is urban migration with a bid to improve their lives (Josef Gugler 1988:74). However this has led to surplus labour in the urban centres, hence unemployment and very low wages. The population of Nairobi, the capital city, currently stands at 2.8million (1999 Census). This is about 10% of the national population in an area of about 600km² and works out to a population density of about 5000 persons/km² against a national average population density of 50persons/km².

Culture

Kenya lacks a cultural uniformity due to the varied nature of its people. In total there are about 42 tribes in Kenya each with a different cultural background. Add to this figure the influence of the colonialists in and around Central Kenya and the Arabs at the Coast and the cultural picture gets more complicated. Suffice it to say that Kenya has a rich and varied cultural background.

The Economy

Economically Kenya relies heavily on agriculture which accounts for about 81% of the labour force despite the fact that only 4% of the land is under crop (see figures 1 and 2). Cash crops such as tea and coffee are grown extensively much to the detriment of the farming for cereals for local consumption resulting in Kenya being a net importer of cereals although, interestingly, this is a legacy from the colonialists who were not interested in the welfare of the local communities.

Many Kenyans in the rural areas practice subsistence farming with the bulk of the produce being consumed and the surplus sold in the urban centres while huge tracts of land are under cash crops in commercial firms. In recent times floriculture has

taken root in Kenya and sites of flower farms in areas that were erstwhile under coffee are common. This has been brought about by decreasing coffee prices in the world market as opposed to flowers, which are popular in European markets during winter.

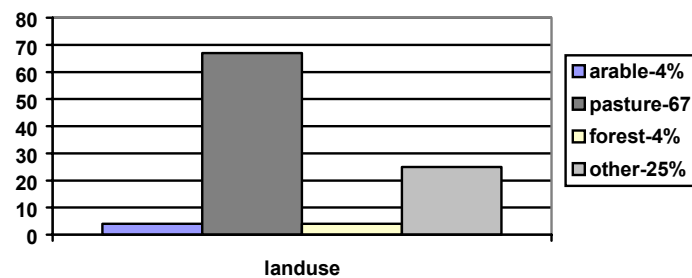
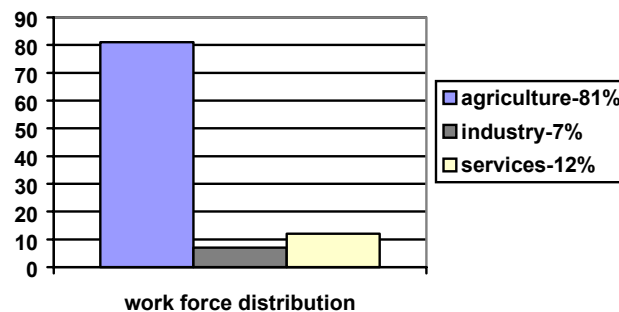


Figure1: Land use in various sectors of the Kenyan economy. (Instituto del Tercer Mundo-1997/98)



Figures 2: Distribution of workforce (Instituto del Tercer Mundo-1997/98)

Besides agriculture Kenya has a vibrant manufacturing sector and petroleum products are among the major export commodities from Kenya especially to the landlocked countries of the Great Lake Region. This emanates from the fact that Kenya has a fully-fledged petroleum refinery plant at the port of Mombasa and a multi-product pipeline all the way to the Ugandan boarder. Plans are underway to extend the pipeline to the capital city of Uganda, Kampala. However Kenya is a net importer and depends heavily on importation of goods such as farm machinery, motor vehicles, medicine etc. An import/export analysis for Kenya for the years 1987-1992 is shown in fig.3. Tourism was the second highest foreign currency earner for Kenya after tea but has been unable to maintain this position in the last 5 years due to decay of the infrastructure, declining global economy, political interference and emergence of other tourist destinations within the region. Subsequently income from this industry has been declining.

In summary the Kenya's economy has been on a downward trend and has been registering insignificant growth for the last five years. This, needless to say, have impacted negatively on the construction industry as indicated by the industry's market indicators such as profits posted by mortgage and cement companies. The construction industry contributes about 5% of the GDP on average and is therefore an important sector of the country's economy. The unsatisfactory performance of the industry is mainly due to the cuts in donor funding and reduced Government expenditure in construction. Unfavourable weather conditions experienced in the last quarter of 1997 and in early 1998 further slowed down building and construction activities.

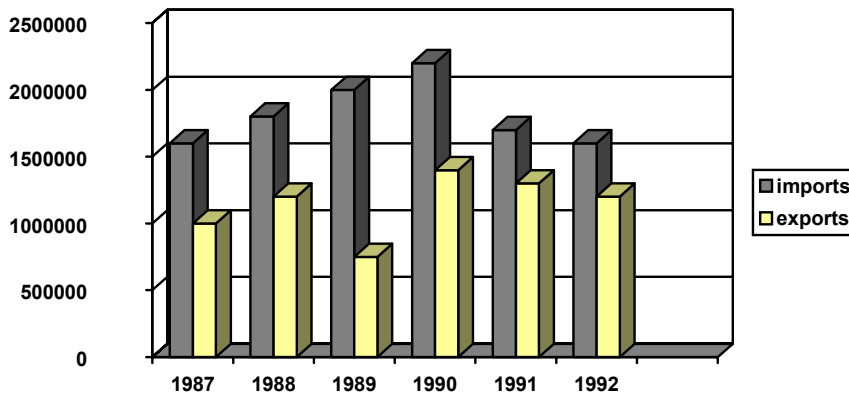


Figure 3: Showing an import/export analysis for Kenya for 1987-1992 in US\$ (Instituto del Tercer Mundo-1997/98).

Reference Project Background information

Hazina Housing Estate project was initiated by the National Social Security Fund (NSSF) in 1993 and comprise 540 housing units in mixed development of flats and maisonettes, a shopping complex, nursery school, private members club and the related civil works such as roads, storm water drainage, potable water reticulation, river training and foul water disposal system. The success of the project lies largely in the aspects of reclaiming land formally used as a garbage dump and putting it to good use and provision of shelter to more than 3,000 people in a country where decent shelter for many is a dream.

To the north the project site borders a river, which occasionally burst its bank during heavy rains. As a result considerable river training works were carried out to contain the problem. A gravel access road of about 1km connecting the site to the nearest bituminous road existed. However the road had to be upgraded to bituminous standard to be used as a bus route so as to provide transport for the residents of the Estate.

The total cost of the project including professional fees was US\$ 27.5million and took 3.5 years to complete against a programmed period of 2.5 years. It was financed by the client, NSSF, which is a public pension scheme and, therefore, needs to invest in long-term capital projects. NSSF is a major player in the construction industry in Kenya and through its initiative thousands of Kenyans have been housed. The firm is currently undertaking a housing project comprising 5,000 houses in mixed developed targeting middle income earners in the country.

This project has been chosen for use as a reference project because of the breadth and depth of the services provided by the consultants. The construction process adopted for the project also is representative of a typical project in the Kenyan construction industry.

The Actors in the Industry

The construction industry in Kenya consists mainly of the following actors:

Clients

The client may be a government parastatal, local authority, an individual, a private company such as a bank, an industrial organisation or an institution such as school or hospital, a capital investor or a speculator. Pension funds and insurance companies are also involved in the construction industry as clients. The government of Kenya, however, has been for a long time the major client for the construction industry constituting about 60% of the total value, which currently stands at 4% of the GDP. The client normally initiates the project and provides the design team with a project brief based on his needs and budgetary constraints and therefrom the design team undertakes to propose solutions to the client's needs.

Consultants

Project Managers

The concept of independent project managers is fairly new in Kenya and is the process of taking root. Previously one of the design consultants used to act also as a project administrator and would provide the necessary liaison between the client and the design team. The disadvantages of such a set-up are many. Such a person may lack objectivity as a project administrator and favour his team leading to unnecessary conflicts between the various consultants and the contractor in a project and affect the implementation of the project. Indeed this has been the case in Kenya unto a point where the market has lost confidence in the industry so . Hopefully project managers will help restore this confidence.

Architects

The architect designs the form of the building providing space to meet the client's needs and also incorporating aesthetics based on cultural and regional trends and environmental aspects. Kenyan architecture is quite varied and interesting due to a number of factors. The multi-cultural aspect of the Kenyan history is seen in the country's architecture too as different cultures have imparted on Kenyan architecture differently. Currently there are two Universities in Kenya offering architecture namely the University of Nairobi and Jomo Kenyatta University of Agriculture and Technology and most of the architects from these colleges do post graduate studies abroad bringing with them back to Kenya different architectural experiences from different regions of the world.

Engineers (Civil, mechanical and electrical)

Engineering is a well-developed profession in the Country as three of the four Kenyan universities offer engineering courses up to doctoral studies. The Kenyan engineer is well trained by any standards and this has added value to the construction industry in the sense that engineers are readily available for the industry. In most building projects the engineer works in collaboration with an architect providing essential services such as structural, civil, mechanical and electrical engineering designs.

Quantity Surveyors/Building Economists

It is common practice in Kenya to incorporate bills of quantities in the tender documents. The advantage of this is that all the tenderers have the same project parameters and therefore make it quite easy to analyse the bids and also ensures responsiveness of the tenders. As a result building economists provide an invaluable role in the construction process. Ideally the building economist is not part of the design team but provides staff input for the architect or project manager. Building economists are readily available in Kenya although they have traditionally been termed quantity surveyors; a term they don't readily accept.

Environment Experts

In the earlier days projects were constructed without much regard to the sustainability of the construction industry or care for the environment. Construction projects require huge amounts of the Earth's natural resources and it is, therefore, necessary to protect the environment from the vagaries of the industry.

Environmental experts assess projects and draw environmental impact assessment with a view to minimizing the negative effects while enhancing the positive ones.

Social Scientists

Social scientists analyse projects and come up with recommendations appertaining to gender and other social issues thus incorporating a social dimension to projects. This helps in maximising the benefits accruing from a project. For example building of a factory in a certain location may appear to be a good idea considering the number of jobs that will be available to the local populace but on the other hand if not carefully implemented this may lead to growth of slum areas in a bid to provide shelter and social amenities for the labourers in the factory. Demographic effects of the project need to be, therefore, assessed and results incorporated in the design.

Contractors

Contractors for construction projects are readily available in Kenya. One may find contractors of all categories ranging from labour based contractors for simple jobs to those with the most advanced equipment in the market today and a capital base of millions of US dollars. There are also foreign-based contracting companies who have invested in Kenya such as John Gleeson and Mowlem from UK. The government sometimes carry out construction works for its own projects by using the Ministry of Public Works and Housing which is also the custodian of all government owned properties.

Material Suppliers

There are enough construction material suppliers in the country at the moment to satisfy the demand. Materials such as paints, glass, cement, steel, plastic and ceramic wares are all manufactured locally. However there is a dire need for increased prefabrication to minimize wastage and improve on the quality of the finished product and delivery time. This is an area where the suppliers can capitalise on as the players are quite few at the moment. Maybe when the number of prefabricators increase the cost of prefabricated products will reduce making such goods more attractive to contractors as opposed to site fabrication and, therefore, making construction cheaper to the clients.

Local Authorities

The local authorities are charged with the role of regulating and controlling development. They serve also as providers of infrastructure services such as maintenance of roads and corresponding furniture, trunk sewers, garbage collection and water. In recent years, however, the local authorities have fallen short of the expectations of the citizenry. Uncontrolled development has sprung up almost everywhere, and provision of services that only the government can provide, has been found to be lacking by many taxpayers. This lack of concern has been attributed by many to the interference in the running of the local authorities by politicians and many are calling for a revision, if not total overhaul, of the local authorities act with a view to making them more autonomous.

Building standards and regulations in Kenya are in five documents namely; the Public Health Act (1972), Physical Planning Act (1996), the Building Codes (1968), Local Government Act (1977) and the Revised Building By-laws (1995). The revised bye-laws are also known as Code 95, and are an improvement on the others which were found to be out of touch with local realities as they favoured imported materials and technologies which pushed up the cost of housing. The local authorities are supposed to enforce these by-laws.

Financiers

There are various finance institutions from which investors may get financial assistants such as banks, mortgage companies, non-governmental organisations, public and private pension funds, financial and insurance companies. All these are organisations that need to invest for long terms. Of particular interest to the building industry are mortgage companies which are created purposely for the building industry. World Bank, African Development Bank and bilateral aid agencies also finance projects through loans and grants to the government and non-governmental organisations.

Property Managers

Once the facility is complete and has been occupied property managers take over to ensure that the value of the facility is maintained by putting in place proper maintenance and operation procedures for maximisation of the utility and profits accruing from the facility.

Project Design

Project Organisation

Normally the client is the head of the team since he makes all decisions regarding the project. Before the onset of project management architects and engineers were the *de facto* project administrators for building and engineering projects respectively despite being involved in the design. In such a set-up problems do arise since the architect or engineer may lack objectivity and favour his team. Incidents are rife whereby the architect delays his design and orders the engineers to complete their inputs in two days! This sometimes causes unnecessary conflicts much to the detriment of the project and the construction industry as a whole. Considering these facts the role played by project managers as objective project administrators is vital for the sustainability of the industry.

The Hazina Housing Estate had a set-up whereby the architect served as a project manager. The organisation structure showing the communication channels for the project is shown in figure 4. This is a standard organisation chart for a project of this magnitude in Kenya the only variance being the number and nature of the subcontractors and the project manager who has replaced the architect/ engineer in contract administration. The environmental experts and social scientists that are common in projects today are also not shown here because the project did not have them on board. Note from the figure that the quantity surveyors provide staff input for the architect. The local authority, Nairobi City Council, provided staff inputs for the architect too being a regulatory body.

The civil/ structural engineer's supervision team is also included in the chart. It is usual in Kenya for the engineer to have a team at site depending on the nature and size of the project.

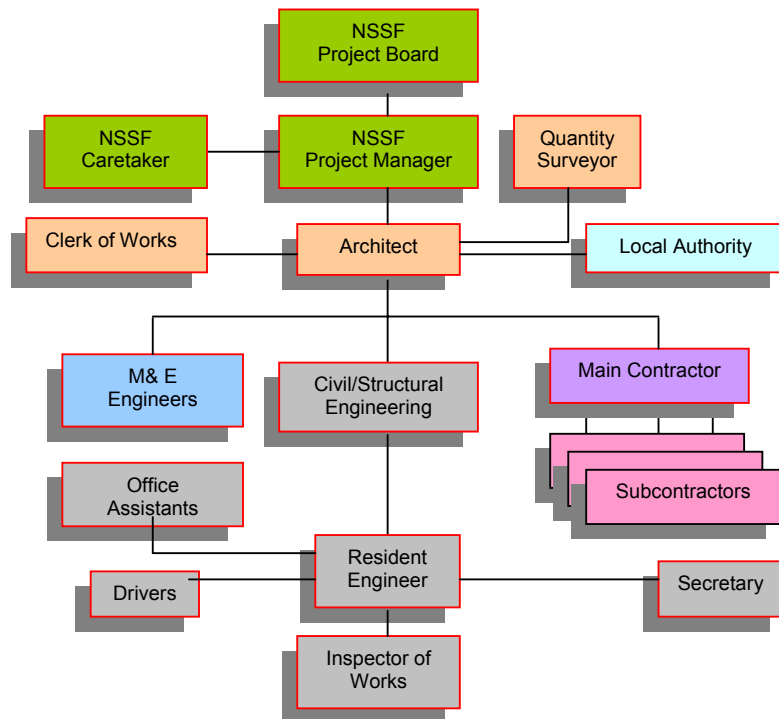


Figure 4: Organisation chart for the design and construction of the Hazina Housing Estate.

Procurement of Consulting Services

Normally the client does not have the necessary technical expertise required for successful design and supervision of the project and it is common practice to outsource. The aspect for outsourcing by the firms has become more popular in recent years as the firms have realised the need to concentrate on the core business.

NSSF is such a firm despite its size and involvement in the construction industry for a long time it still prefers outsourcing for the consultant services.

The consultants for Hazina Housing Estate were appointed by the client because of the leading roles they play in their respective areas of operation in the market. The architectural firm is well known for innovative designs especially in the field of housing. The civil/structural engineering consultancy was provided by one of the leading local engineering consulting firm in the country with an experience spanning over 25 years. This method of procurement by appointment is popular and applies particularly to consulting firms with long experience and a commendable track record in the industry.

Experience has shown that different projects require different procurement procedures depending on the client, financier and the nature of the services to be provided. For public funded projects transparency is always the overriding factor and in this case open tendering is always preferred. This may entail advertising in the local newspapers or inviting a few consultants already registered with the authority in question to tender for the provision of the consultancy services. Questions have indeed arisen as to whether this method of procurement is corruption free as it is intended to. Many feel that the method is used to dupe the public but the actual procurement is riddled with corruption.

Some private investors prefer working with consultants who they have used over the years and have, therefore, built a good working relationship. Incidents are common whereby a client stay with a particular consultant for years on end. Whether the client gets value for his money by using this method is questionable as the consultant may lose objectivity after serving the same client for a long time. However this method of procurement is quite common in Kenya. The procurement by selective tendering is, also, widely practised by many private clients and this method of procurement is perhaps the best. It gives the client an opportunity to engage the consultant best suited for the work and at a competitive rate without having to spend too much money and time as in the case of open tendering.

The professional fees payable to various consultants in the design maybe worked out using the various guidelines available such as the Ministry of Public Works and Housing and the Association of Consulting Engineers of Kenya Scales of Fees for Consulting Services although negotiations of fees is common. The fees are assessed by either considering the cost of the time-inputs of the consultant teams or as a percentage of the total project cost. In case of Hazina Housing Estate the fees were based on the Ministry of Public Works and Housing scales of fees.

Project Planning

Usually project planning is done during the bidding stage for provision of consulting services in most cases whereby the consultants give tasks and manning schedules for various work items and time-inputs of the team members proposed respectively. These schedules may be used during the design stage although variations may occur especially if the terms of reference did not adequately address the services to be provided. These variations may have a financial implication that the client has to meet. Consultants, however, usually play safe by pointing out that the time-inputs may change if the work-inputs vary from what is specified in the terms of reference. Where consultants are hired by nomination without going through the bidding process then the planning for the design is done soon after the client's brief. This applied to Hazina Housing Estate since all the consultants were nominated.

Depending on the time frame construction of a project may start before the completion of the design in which case drawings are issued to the contractor in stages starting with the foundations. Usually this method is applied in fast track projects where time is of essence and project delivery period is usually much shorter than when all the design has to be completed before the tendering process.

Being a fast track project and considering the number of consultants involved a lot of coordination was essential to ensure timely delivery of the designs for Hazina Housing Estate. A general production plan for all the consultants was prepared and then each consultant prepared an in-house plan so as to meet the design deadlines for the project. Meetings were held under the chairmanship of the architect on regular bases to monitor progress and coordinate the design inputs of the various consultants.

Project Financing

More often than not the client have to borrow money to finance a project and sometimes the project manager is called upon by the client to advise on project financing depending on the nature of the client and the project. For a commercial venture he advises the client on the financial viability of the project and the returns expected. Banks, insurances companies and pension funds sometimes do sponsor their own projects using own capital since they have funds to invest for long terms and may, therefore, not borrow. Such an arrangement was used for financing Hazina Housing Estate. These institutions may also serve as lenders to other entities that may want to invest in the building industry.

In many instances projects are financed by local borrowing from local financial institutions but due to the high interest rates (currently the base rate stands at 25%) offshore borrowing is gaining popularity for those who have access to finance institutions outside the country. In some cases the client may have some money to invest in a project but not the whole amount. In such a case he may take a loan to bridge the deficit or may look for other investors with money to invest. Joint venture projects are common in Kenya. The normal mortgage period is between 10 and 15 years.

The government do finance projects through loans from World Bank or any other international development bank and/or by grants from bilateral donor agencies. In the last few years , however, the popularity of World Bank as a financier of government's projects has been waning due to strict conditions which, according to the government, are more often political than economical. Of course this is short-sightedness on the part of the government given the fact that there is no way you can draw a line between the two especially in developing countries in Sub-Saharan Africa whereby bad politics have stemmed any meaningful development for years on end.

In many instances problems have been experienced during project implementation due to the client's failure to organise proper financing for the project, and therefore, affecting contractor's cash flow adversely and sometimes causing project stoppages for long periods. This has not augured well for the industry. The biggest culprit is the government whose project completion ratio stood at about 5% for the year 1999. There are many unfinished projects worth millions of Kenya shillings scattered all over the country which are holding money that could have been put to other use.

Budget and Budget Control

The client during the briefing stage may give an indication of the budget to the architect and normally the architect prepares the scheme design with this in mind. Project budgets, however are drawn once the design is complete and the tender documents ready. The estimate for the works are prepared for comparison with the client's budget and if found in excess the design for the scheme may be repeated with a view to reducing the cost. With experience and by use of computers it is possible to come up with fairly accurate cost estimates during the early stages of the project for the purpose of setting the budget. Other times the investor may not specify the amount of capital to be invested but only the type of project in form of a brief and the budget is drawn after the completion of the scheme design.

Information Technology

Most professionals have realised the advantages of using the information technology . Nowadays it is normal to find a consulting office, architectural or engineering, with fully computerised processes such as design, detailing and data processing. **AutoCAD** and **ArchiCAD** software are widely used by consulting offices their high costs not withstanding. Various structural analyses programs such as **STAAD**, **PROKON** and **LUSA** are locally used by engineers.

Microsoft Project and **Primavera** are popular amongst project managers both consulting and in-house and the big contractors.

However information technology has not been embraced by all with the same fervour, in particular the small firms who are in the majority. The reason for this may be that most of them are single person establishments with low turnover and few employees. They may, therefore, resist use of computers simply due to the cost

factor. Needless to say, most people including clients are unwilling to deal with such firms and it is evident that information technology awareness is driving a gap between those that are willing to accept change and those resisting it.

In case of Hazina Housing Estate all the consultants involved are large and major players in the industry. There was, therefore, extensive use of computers in all facets of design and data processing. This ensured timely delivery of the designs and all the consultants were able to keep up with the design programme. It would have not been possible for any consultant to do this without the use of computers. Sometimes this fact may serve as a limitation to the size of project a design consultant may handle and hence stifling growth.

Conclusions and recommendations

Consultancy services for the building industry in Kenya are readily available and competent enough to meet the market needs but there is a need, however, to increase the role of project managers in the industry as this provides a viable alternative to having members of the design team administrating building contracts because this has been seen to bring about unnecessary conflicts which do harm the industry. A project manager may also give the client more objective advice regarding the project than a member of the design team.

More money and time should be spent during the design stage as good design is very necessary for a successful project. The clients should be made to understand that money spent on design is not wasted.

Social aspects of projects must be analysed and considered in the design to ensure that projects benefit societies at large and not just individuals. Also projects need to be very sensitive to environmental issues regardless of the cost as this is necessary for sustainability of the construction industry.

The advantages of information technology are many. Consultants can reduce overheads by using computers in their design processes as this it reduces projects delivery time and hence lower cost to the clients. It will, therefore, be a worthwhile venture to increase the use of computers in the industry despite. The best way to do this is by lowering the cost of computers and their consumables and this could be done by the Government's reduction of tax on the equipments.

There is a need for improvement in project financing and budget control for Government projects to avoid runaway project budgets and ensure a higher projects completion ratio. This could be done by eliminating political interference and giving building professionals more freedom in implementation of the projects.

Production

Tendering and Contracting

Tendering process may entail preparation of tender documents and selection of the contractors to be involved in the tender in case of selective tendering. Experience gained with different contractors and the nature of the project, construction period and the type of contract desired are usually the criteria for the pre-qualification of tenderers and the tendering process adopted. Tendering procedure may be initiated after the design drawings, specifications, bills of quantities and estimates are complete and the client has agreed on a working budget when time is not of essence. A variation to this is whereby the time for design and tendering is short and does not allow for this type of procedure. Consequently the tendering is done way before the completion of the detailed design and in such a case the tenderers are required to give schedule of rates that are used for valuation of work during construction.

For a project to be successfully completed it is necessary to have a good contractor who has the resources and the necessary infrastructure to carry out the works competitively. The main objective of the tendering process must, therefore, be geared towards identification of such a contractor. In Kenya sometimes this objective is overshadowed by other motives and tendering process is carried out for the sole purpose of hoodwinking the public regarding the transparency of the procurement process. There are cases where a contractor is awarded a contract way

beyond his capability resulting in unfinished projects or ridiculous time and cost overruns especially in the public sector.

After the tenders have been returned the project manager or lead consultant carry out analyses of the different tenders and recommend to the client the tenderer best suited to carry out the works. Usually such a tenderer is the one with the lowest tender.

Various forms of contracts are used and suitability of one form or another is usually determined by prevailing circumstances such as time, nature of works and the client. The most popular form is whereby the consultants carry out the design and a main contractor builds with the help of subcontractors. Subcontractors appointed by the client are termed nominated subcontractors and those appointed by the contractor domestic. It is usual for the contractor to be paid a fee for attendance to nominated subcontractors such as provision of access, power, water, security etc. This type of contract was used for Hazina Housing Estate.

The client may decide to breakdown the contract into small subcontracts in order to get the best cost for the works from different subcontractors. In such a set-up there is no main contractor. The tendering procedure for this type of contract is quite involving and close monitoring may be required during implementation due to the relatively large number of subcontractors involved in the process. This type of contract is not common in Kenya and is only used when the bulk of the works require different specialists subcontractors.

Depending on the nature of the works a client may opt for a design and build contract whereby the contractor is responsible for design and construction of the project. This type of contract has been gaining popularity due to loss of confidence by the clientele in the contracts where the design and construction are handled by different parties as explained earlier. However in design and build contract the contractor may lack objectivity when it comes to designing of the project. Also most contractors in Kenya do not have design teams in their establishments and , therefore, have to outsource for these services. Since the contractor's aim is to maximise profits he may not go for the best designers in the market and, therefore the client is not assured of value for his money. Unless the client has a project manager who is able to ratify the contractor's design it is not recommended especially where the contractors are not known for honesty.

Labour contracts are commonly used for small projects and whereby the client has the capacity to supply materials to the labour contractor. However this type of contracting is not popular with consultants because it lacks the mechanism to enforce good workmanship. For example in a normal contract the consultant is empowered to order demolition of work not done to his satisfaction and the cost of such demolition and rebuilding is met by the contractor which is quite difficult in a labour contract since the contractor may not have the capacity to meet such costs.

A contract may also be defined by the mode of payment to the contractor. If the total price of the contract is fixed at the beginning then it is termed *fixed price contract* which may either be lump sum, schedule of prices or measure and value contract. *Lump sum contracts* are usually suitable for small projects where all the project's parameters are known and the construction period is short and, therefore, the contractor's rates are not affected by inflation throughout the entire construction period. *Schedule of rates contract* is normally used when time is short and the contractor has to start work long before the designs are complete. In such a case stage design approach from foundations up is adopted and, therefore, the total project period is shortened. This type of contract is not popular in Kenya and is not usually practised. The most popular form of contract is *the measure-and-value contract* whereby the contract documents include specifications of the works to be done, complete bill of quantities and drawings. The finished work is measured at intervals usually agreed on in the contract and the contractor paid for the approved work done. *Cost reimbursement contracts* such as *fixed fee, value-cost and target cost contracts* are not common in Kenya.

Production Planning

Production planning entails allocation of various resources such as time, labour, cash, plant and equipment to ensure efficient use of these resources and timely completion of the project. A production plan may, therefore, include time, manpower, plant, equipment and materials schedules and cash flow.

The contractor submits his programme for carrying out the works based on the programmed time to the project manager or the lead consultant for approval. The main construction tasks are usually analysed by use of standard software such as *PRIMAVERA* or *Microsoft Project* and the critical path determined. Usually the critical path is used to control the operations because most of the eventual time related claims by the contractor could be linked to these activities. However it is worth mentioning that only a small number of contractors in Kenya have these programs or are able to use them and most of them usually hire consultants to assist them in planning on per job basis. Other schedules from the contractor such as deliveries, equipment and manpower are also reviewed to determine their adequacy and documented in appropriate formats in order to be used in following the progression of construction capacity and supplies throughout the contract period.

After the approval of the contractor’s production plan it is used for monitoring of the works during production. The aspects of monitoring involve reviewing of progress and proposing of remedial measures when the achieved progress falls below the expected. Bar charts are normally preferred at site because they are much easier to use for monitoring purposes and can be interpreted by even the unskilled labour.

In the Kenyan market it is common to see projects especially public funded projects with time overrun of many years. In most cases this is brought about by lack of proper financing arrangements by the client or diversion of project funds to other areas. Currently the completion ratio for government projects is very low and there are unfinished projects scattered all over the country.

Quality Management

The aspect of quality management is necessary to ensure that the final product conforms to the design requirements and it is an ongoing process from the beginning of the project to the end. It is, therefore, necessary to set-up quality control procedures and draw up a project quality plan at the beginning of production. Quality plans are used to give details of the duties of monitoring and supervising the construction works and their allocation. Quality management audits are performed at intervals to monitor the efficacy of the quality plan and propose remedial measures when the targets are not achieved. A normal task schedule for quality control is shown in figure 5. A similar schedule was used for Hazina Housing Estate for the civil and structural engineering works. A very small number of contractors use the ISO9000 guidelines on quality management and the degree of usage varies from

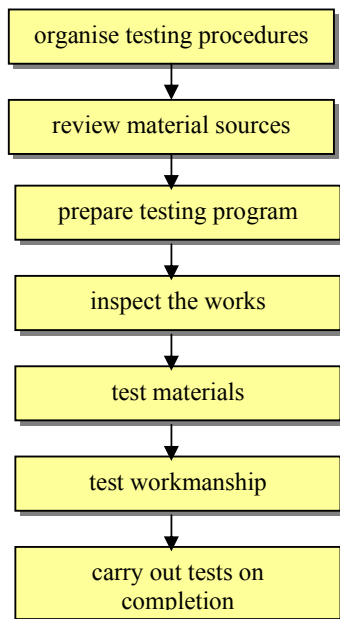


Figure 5: Task schedule for construction quality control

firm to firm depending on the size and nature of the firm just like for the consultants. Most of them lack clear quality policies or plans. Working with such a contractor is a nightmare for many consultants as they have to be monitored very closely to ensure adherence to specifications and sometimes this close monitoring is not part of the consultant's responsibility especially if there is no site supervision team.

Economic Control

Once construction of the project has started there is a need to put in place measures to control the cost of the works so as not to exceed the budget. In Kenya this is usually done at regular intervals and is usually in form of financial appraisals. Any discrepancies are corrected early enough or if inevitable reported to the client for allocation of funds. Monies saved from one area of the project may be set aside to be used to finance other aspects of the project such as increased scope of works. Also as a cost control measure any change that may have a financial implication is first assessed and the client is usually notified and his concurrence sought. The contractor is not allowed to take any instructions directly from the client but through the project manager or the lead consultant. This way the client is always made aware of the financial implications of changes made and his obligations and he can, therefore, make informed financial decisions.

The secret to good project economic control is good design and project pre-construction activities which guarantee that all parameters are taken into account and the project budget drawn is realistic. It is also necessary to involve the client fully in the design and making sure that he understands the design before starting to construct. It is usual for clients not to understand the design until the project takes shape during construction and only then does he start to introduce changes which cause variation to the contract and costs increase.

Ridiculous cost overruns have been experienced in many public projects leading to their abandonment before completion when the cost goes way beyond what the investor can afford.

Conclusions and Recommendations

Production planning is necessary to ensure efficient use of resources and realisation of the desired product to the right quality, in programmed time and within the budget. There is a need to take all factors that may affect the final product into consideration early enough to avoid unpleasant surprises.

More elaborate project production planning is required if the perennial cost and time overruns experienced currently in the Kenyan construction industry are to be stemmed.

It would be worthwhile to train contractors on matters appertaining to quality control. Professional bodies such as architectural and engineering associations could take the initiative and organise seminars and workshops for contractors. It may also be worthwhile to consider making use of ISO9000 as a requirement for pre-qualification of contractors for large projects.

Property Management

Life Cycle Economy

Life of a property is the last stage of a project cycle. A project normally starts with an identification of a problem or a need by an entity after which the same entity initiates a development study with a view to confirming the existence of the problem. The next stage, feasibility study, analyses different alternatives of solving the problem in order to identify the best-suited solution for the problem in terms of cost and technical viability. Once this has been done designs can be embarked on and finally the implementation of the project.

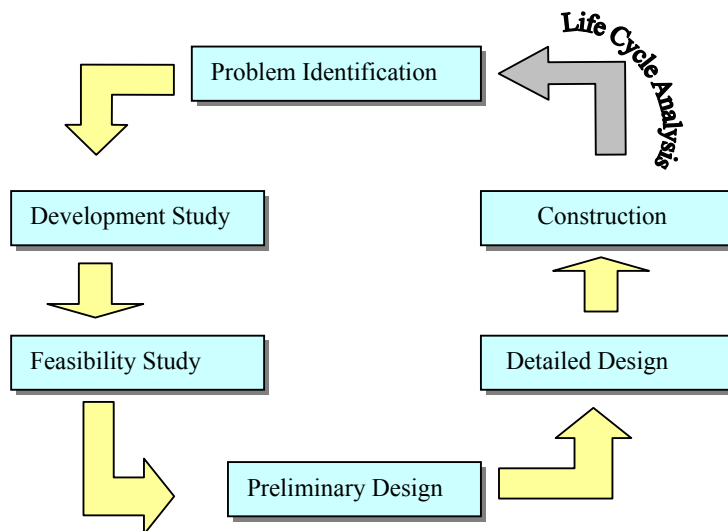


Figure 6: Project cycle

Life cycle analysis for a property considers the period from the end of the project construction up to the demolition of the property. Life cycle analysis can be used as a tool for comparing different investment options by assessing and evaluating the returns accruing from each option throughout its life. The beauty of life cycle economy as a projects evaluation tool lies in the fact that it offers an opportunity to carry out long term economic analyses of capital projects themselves being long term in nature.

There are numerous variables and uncertainties that may affect the economy of a property during its entire life and this renders it quite difficult to assess a property's economy over a long period accurately. To take these variables and uncertainties into account a property should be analysed on a continuous basis to determine its sensitivity to various factors such as change in ownership, inflation, political climate and decrees, change in property and money markets etc. By so doing one may be in a position to forecast and make tangible decisions regarding a property.

Maintenance Procurement and Planning

Structures not maintained will cease to fulfil their intended functions. Wear and tear will set in immediately after construction. Also deterioration due to exposure to a variety of natural forces occurs from the moment the structure is constructed. Regular maintenance, attending to defects while they are still minor, is the most cost-effective strategy for providing well functioning buildings and will reduce operating costs.

Maintenance can be defined as: work done to keep an existing structure in, or restore it to, a condition where it can perform its intended function.. Maintenance can be divided into three distinct forms.

- i. Preventive maintenance – carried out to a predetermined plan to reduce the risk of failure. It can be done as:
 - a. scheduled maintenance or preventive maintenance done at regular intervals
 - b. condition-based maintenance, preventive maintenance done when deemed necessary through regular inspections.
- ii. Corrective maintenance, carried out after failure has occurred.
(Björn Carlqvist, 1998:5)
- iii. Emergency maintenance, necessary immediately to avoid serious consequences.

Condition-based and corrective forms of maintenance are widely practised in Kenya for privately owned residential houses and most rental residential houses. However for upmarket rental houses the need to keep the facilities attractive the clientele may be an overriding factor and, therefore, scheduled maintenance is preferred.

A client may have a caretaker or a full maintenance team on full time bases depending on the size of the property in question and the number of facilities a client may have. Hazina Housing Estate being a rental property has a caretaker who is

based at the Estate and is answerable to NSSF's head of the maintenance department. Rapid response to maintenance issues is necessary for marketability of a rental property and this is the reason why the caretaker is based at the Estate. Some clients, however, prefer to engage private property managers especially for very large commercial and office buildings due to the large number of tenants and accounts to be run and complexity of the maintenance procedures to be carried out. For industrial facilities the preference is to have in-house routine maintenance departments. The in-house maintenance department carries out the minor routine repair works, e.g. painting and fixing of fittings, but all the major repair works are subcontracted. The maintenance of public buildings is the responsibility of the Ministry of Public Works and Housing.

Connection to the Design

Property managers are usually better placed when it comes to advising on matters that may affect economic operation and maintenance of properties by virtue of their experience in this area. The aspect of property management also provides a strong tool for enhancing designs since it allows various participants to study the functioning of properties with respect to their response to the market conditions, suitability of the designs and in particular performance of different construction materials or equipments. The knowledge of most designers in the field of managing properties is quite limited and is usually in form of second-hand information from users and property owners.

In Kenya property managers are usually not involved in the designs and only appear during project closeout to take over the facility. At this stage they may realise so many aspects of the design that may not agree with what they know best about properties but it is usually too late for anything to be done.

Conclusions and Recommendations

Property managers should be incorporated during designs so as to use their experience to come up with better and more economic building designs. It would also be prudent to have a more holistic approach to projects by considering the entire project cycle (see figure 6) as opposed to a piecemeal approach whereby the participants concentrate on their own areas of operation without considering how the decisions they make will affect the project in the next stage. Such an approach will ensure that investors end up with better properties that guarantee value for money and also longer life and low maintenance costs.

Observations

The Swedish construction process is characterised by high level of use of computers throughout the entire process. Also the tendering and contracting are based on specifications and drawings only and bill of quantities do not form part of these documents which is the case in the Kenya.

Mortgage periods of between 40-50 years in Sweden are about three times longer than those in Kenya which currently stand at between 10-15 years. There are no tenants associations in the Kenyan property market as the law permits people to buy flats individually without consideration of the land the property is built on. The flat owners usually agree on a scheme of maintaining the common areas but it is not mandatory.

During construction there is heavy reliance of prefabricated goods in Sweden as opposed to the situation in Kenya. Construction in Sweden is also dominated by a few very large contractors such as Skanska, PEAB and NCC whereas in Kenya there are all sort of contractors competing in the same market and there are no dominant players. This could be an indicator on the level of the maturity of the industry as over time small players are usually phased out of the market leaving the large ones competing with each other. As such the suitability of one state of the industry to the country is really an aspect of the state of the market and the economy since construction industry largely deals with provision of infrastructure facilities which depend largely on the state of economy.

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