

Managing a Housing Project in Botswana

Dikagiso B. Mokotedi

Architect

Integrated Development Consultancy, Botswana Housing Corporation, Botswana

Summary

Organisation and planning were pre-requisites for the successful execution of this project. This is particularly true because of economic, social and political pressures, which played major roles in decision-making.

Before the project started, it was important to clearly define the objectives and goals of the project, and to map out the means by which these goals and objectives were to be achieved. All stakeholders should have been fully involved in the formulation of the goals and objectives of the project from the beginning to ensure that once the projects started on site, goals were not changed. It is through clear definition of goals and objectives that the organisation and management system of the project could have been determined, and brought together the activities necessary for the successful execution of this project.

When contractors were contracted to execute this work, contracts were signed between contractors and the employer. Under the Standard Form of Building Contract, JCT80, the contract documents embodied the extent of the works. Contractually, these documents represented the volume of the work contracted. Changes, which were made to the documentation at production stage, prompted contractors to claim more time and money in order to complete the work. This meant that all the initial cost and time plans that were put in place at the beginning of the project became obsolete and more resources for the completion of the project had to be found elsewhere. These changes could easily have led to contractual disputes, and the result may have been the frustration of the entire contracts. It is therefore important that all role players in the project should have been brought into the project from the initial stages, so that all design decisions could have been made at the right time in the project. A plan for the co-ordination of other utility corporations involved in the project should have been thought out at the beginning of the project to avoid delays during the construction.

It was also important for the corporation to recognise the difference between this project and all other projects carried out before by the corporation, and to adapt appropriate procurement systems suitable for this project. It would have been cheaper to negotiate phase two development with contractors who were already on site, rather than to call for new tenders which took some time. Time lost while going through the tender procedures could have been used to advance the project on site, and this could have saved money. A more flexible and adaptable approach was necessary to enable the Constancy Department to make decision without prejudice to a particular procurement system.

Introduction

Aim of the paper

The aim of this paper is to evaluate the organisation and management of a housing project in which I participated as a Project Architect during its implementation. I

will look at the management and organisation approach put in place for the project to see if these yielded the desired results. I will analyse the different steps and roles in the development process in order to develop and propose better methods and solutions which could then be used in future for similar projects to avoid unnecessary complications during the production stage.

Since its establishment in 1970, Botswana Housing Corporation has been building houses of low to high income for the nation. All previous housing projects have been of standard designs and quality, and they were built primarily for rental purpose. Those that were sold were sold long after their completion. End users were never involved in the design or construction process of these projects, the property department of the corporation was setting designs, specification and cost parameters on behalf of the end users and passing these to designers to proceed with the design work. In the past few years, the corporation realised that it had accumulated a large amount of housing stock over the years through the rental policy. It has now become increasingly costly to maintain these houses. There was also a realisation by the corporation that it has to promote home ownership rather than just renting houses. The cost of maintenance, as well as the change in emphasis from being a renting organisation to home provider through selling, made it necessary for the corporation to vicorously start selling many of its existing housing stock, as well as ensuring that all new projects are only executed when there are customers who are committed to buy the new houses on completion. The drive to promote home ownership, together with the corporation's quest to increase its revenue base through house sales, made this project somehow different from the rest of the previous projects because there was a shift in emphasis of purpose. This project, however, started like all other projects previously executed by the corporation. The preparation of design briefs, funding and management approach, were all done in arccodance with the corporation's standard practices.

Changes started to take place in the processes during the production stage. Those responsible for selling the houses gave the end users the opportunity to change the designs and specification. This was a way of meeting some specific demands from some clients, through this exercise; there was also an intention to rebuild a better relationship with the public, which had fallen over the years. New relation between the end users and designers, which was never there before, was established with some clients. This also brought with it some problems which could have been avoided if the project was conceived in totality from the beginning, in light of the new emphasis of "building to sell" policy.

The Project

The project was a housing initiative by Botswana Housing Corporation, a parastatal housing organisation charged with the responsibility of providing housing to the nation. The entire project comprised 225 low, medium and high cost houses in Gaborone. The development implementation was split into two phases. The first phase comprised 150 housing units, which were further divided into two contracts of 88 and 62 houses respectively. On completion, these houses were to be sold outright to the public. Two separate contractors who started the projects at about the same time carried out construction work.

The first contract comprising 88 houses had to be completed in 43 weeks. 62 houses out of the 88 were low cost units of 67m², 5 houses were medium cost houses of 65m² and 21 houses were medium cost houses of 80m².

The second contract comprised 62 houses to be constructed over 44 weeks. 38 houses were low cost units of 52m², 18 high cost houses were 101m² and 10 high cost houses were 127m².

The second phase of the project comprised 105 houses, and had a contract period of 40 weeks. These houses were built solely for the civil service, so this contract was not affected by the "build to sell" policy. 60% of the houses were low cost of 52m² and 67m², while the remaining 40% were medium cost houses of 65m² and 80m². The area in which the development was taking place is part of a block of land previously fully serviced by the government and reserved for housing developments. Connection of services to individual houses such as water and electricity was the responsibility of water and electricity corporation utilities, but the activities had to be managed as part of the building contracts. The housing corporation had already paid for the connection of both water and electricity to the individual houses, but

contractors had to liaise with the respective service providers so that the services are made available at the time as programmed by various contractors. This was particularly important because the houses could not be taken over from the contractors without:

- a) electrical testing and certification of individual houses from the power utility corporation, and
- b) testing of leakage in all sanitary appliances to individual houses using the water utility corporation's main supply as part of quality control by the building inspector on site. Another major role player was the local authority, which approves and carries out periodic inspections of the works during construction. The local authority has to carry out inspections and give permission to the contractor to proceed to the next stage of the works in the following stages:
 - Setting out
 - Foundation excavations
 - inspection of the subfloor compaction before laying the floor slab
 - Wall construction
 - Roof construction
 - Drainage inspection
 - Final inspection prior to the issuance of occupation permits certificates.

Background Information

Key Economic Factors

Botswana covers an area of 581,730SQKM, with a population of 1,443,000 (1994); this translates to about 0,4SQKM per citizen. The urban population is estimated as 26%(1995) of the total population. Annual population growth is projected as 3.5% (1992-2000). The growth of the per capita Gross National Product (GNP) is estimated at 6.6% (1985-1994), with an 8% estimate of annual inflation. Most of the country's revenue comes from the export of diamonds, but in the past few years other sources of revenues such as tourism and manufacturing industries, have been promoted to diversify the national economy. The 1994 imports and exports statistics indicate that during that year USD1 638 million was spent on imports while USD1 845 million was earned from exports. Food, machinery and most of the building materials are imported, the latter being imported mostly from the neighbouring South Africa.

Overview of the Construction Industry and the Key Players

Government contracts amount to over 50% of all the construction work in the country. Between 1996 and 1999, the government had been pushing out contracts fairly rapidly in a bid to finish projects hanging from National Development Plan 7 (NDP7) covering the period between 1994 to 1999, and to accelerate those planned in NDP8, covering the period between 1999 to 2004. Although only around 50% of the construction budget for NDP8 has spent, it appears Government has been pulling back in order to evaluate its position and to avoid overheating the economy. Government work is now coming through at a more conformable pace and is expected to remain at this level over the next five years. The government's construction plans have been well thought out in terms of Botswana's long-term development. The construction industry is one of the largest employers in the country. Through strategic use of diamond revenues, the government is successfully putting money into the community, and continuing to develop an increasingly sophisticated infrastructure at the same time. During the three years of construction boom 1996-1999, came the re-emergence of the so-called fly-by-night contractors who, according to some of the long-term resident companies are out to make a quick buck. The general complaint from the existing contractors is that the new comers do not have the overheads of the long-term players including the accrued severance benefits and investment in infrastructure. New contractors are also blamed for not developing the locals, and taking money out of the country instead of putting it back into the local economy. In addition, these new competitors have been accused of putting in unrealistic tenders in terms of the price and time quoted for contract

completion. After they have been awarded the contract, many have been unable to meet their deadlines.

The general growth in Botswana’s economy has boosted disposable income and consumer confidence, and has also lead to increased demand for commercial, retail, housing, residential factory shells and industrial buildings from the private sector. It is against this background that Botswana Housing Corporation embarked on the housing programme the management of which this paper is going to be the subject of discussion.

Design Stage

Project Organisation, Planning and Financing

Botswana Housing Corporation (BHC) was established in 1970 through an Act of Parliament. Its primary responsibility is to provide housing to the nation. The corporation is at liberty to put up housing schemes anywhere in the country, but most of its activities have been in urban centres where shortage of housing accommodation has been escalating over the years. The project under review was built in Gaborone, the capital city of Botswana. The corporation is accountable to the Government, and all its activities are overseen by the Ministry of Lands and Housing through a Board of Directors appointed by the minister. The function of the board is to formulate policy matters for the corporation and device strategies for the corporation’s self-sustenance. The board also recommends the appointment of the Chief Executive Officer (CEO), whose responsibility is to oversee the day-to-day activities of the organisation. The minister appoints the CEO after the recommendation from the corporation's the Board of Directors. The CEO in consultation with the board of directors appoints departmental managers. These departmental managers are then responsible for the day to day running of the organisation including initiation of projects for the approval of the board before their implementation. See organisational structure below.

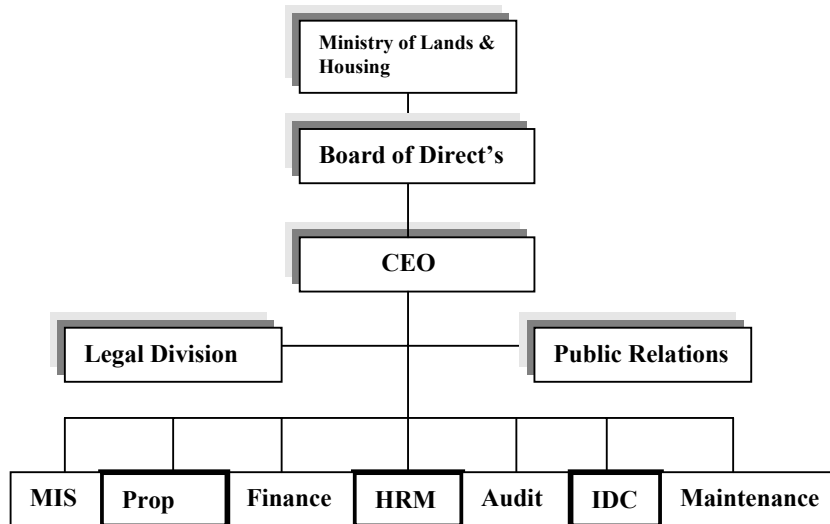


Figure 1. BHC ORGANISATIONAL STRUCTURE

The following is the full description of the abbreviations:

- CEO – Chief Executive Officer
- MIS – Management Information Systems Department
- HRM – Human Resources Department
- IDC – Integrated Development Constancy
- Prop – Property Department

The relevant departments initiate all projects in the corporation and the necessary approval obtained from the management as well as the board. The corporation's projects are funded in two ways, either funded internally by the corporation from rental or sale of property revenue, or by borrowing from the government's Public Sector Borrowing Fund (PSBF). This project was funded internally. Regardless of how projects have been funded, there has to be a 10% return on investment in all housing projects.

Design Brief

Property Department initiated the project. The first phase of the project, which comprised 150 houses, was to be sold to the general public immediately on completion. Using their knowledge of the housing market, Property Department put together design briefs for various house types, which included the outline specification, amenities to be provided in each house, as well as the size of each unit. After the preparation of the brief, it was passed on to Integrated Development Consultancy for the preparation of a budget estimate. The quantity surveyors at IDC prepared a budget estimate for the project. The budget estimate was further broken down to show the cost estimate of the individual houses, and thereafter passed back to Property Department for further action. In addition to the normal costs of various house types, allowance for site works preliminaries and generals were also included in the budget estimate. After studying and verifying that the cost estimate was a viable proposition, the necessary approval for the execution of the project was obtained from the management, and latter from the Board of Directors. After the approval of the project IDC was instructed to proceed with the design work and all other documentation required for tender purposes. At this stage of the project, Property Department was acting as a client for the end users, and they provided any additional information, which was required during the design process.

I have already mentioned that the objective was to sell these houses on completion, which implies that the corporation was never going to be the long-term owner of these houses. The question then is why did the corporation decide for the long-term owners the type and size of the house to be build? Why were they not involved in the process much earlier to contribute in the design process? The following could have been advantages if the clients were brought early into the project;

- (a) Clients could have participated in major decision-making process from the start
- (b) Education of end users about the processes involved through participation thereby minimising the chances of them making major design changes at the production stage, and
- (c) Increased mutual trust between the corporation and the end users through dialogue during which each other's point of view would be understood and respected.

The process of preparing a design brief should have not been rushed. It is at the design stage that major cost components of the project are controlled and fixed. If the end user is not given the opportunity to participate in this process, there will always be voices of discontent from the public, even from those who accepted what was offered. It will make a big difference if the end users can be given sufficient time to study and understand what is offered, and come up with what they consider to be their preferred options. Allowing the potential clients to acquaint themselves with the design proposals before final design decisions were made could have done this. They could have been brought in during the compilation of user requirements by property department. This would have given a fair assessment of the variety of the houses required and affordability limits set. The initial budget estimate could have been more representative of the needs than when Property Department decided on its own what to build. The process could have taken a longer time, and people's aspirations could have been taken on-board at this crucial stage. Once the design proposals were made, the same people should have been brought into the process again so that they could then see in graphic terms what their houses would look like. This will also be the opportunity to discuss the specification in more details. After this phase the customers will now have a mental picture of what to expect. In addition, they will know how much it will roughly cost them. It is then that a final budget estimate could be made and the management and the board approval obtained in order to commit funds for the project. I am aware that what I am proposing here has some financial implications in that more resources would be required for the time spent in consultations with the clients. These resources would

have to be found somewhere if the intention is to satisfy the needs of the end users. One side of the coin is to ignore the needs of the customers and run the risk of not selling what we thought was what the customer wants. The other potential risk is to continue the situation and carry on as the corporation has done before. The problem with this is that the products will not compete favourably with what rival competitors are offering and the corporation will lose business.

A project team put together at the IDC included the project engineer, the project quantity surveyor, building inspector and the project architect, who was the leader of the team. A precontract programme was prepared by the team and agreed with the property department. The development of the designs was carried out in consultation with property department. IDC as the consultant, still had no contact with the end user at this stage of the project.

While the design work was in progress, marketing efforts were put in place by property department to pre-sell the houses before construction started. One of the selling points of these houses which property department made was the promise to the end users that once they have enlisted and paid up their deposits, they will then have the opportunity to change the designs to suite their individual needs. The opportunity to change one's design was seen by end users as one of the attractions of the project as this has never happened in all other housing projects which the corporation has previously undertaken. Many of the organisation's existing houses were perceived to be too monotonous and not appealing. It was therefore a noble idea to involve the end users in the process both as a public relations exercise and as an attempt to satisfy the needs of the end users. What Property Department perhaps overlooked was:

- (a) not to inform IDC about the new strategy which they have adopted to promote the selling of these houses, and
- (b) not to give the end users at least a cut-off date after which no further changes could be made to the design.

Detailed drawings and models of all the building types were completed and given to Property Department. These were used to assist in the campaign to sell the various house types. At this stage, no information was passed to the consulting department about any possible future changes to the designs by any of the end users. If the consulting department was aware that end users could still change the designs at this stage, the design process could have been completed here before the work went out for tender.

While the technical department was finalising the contract documentation, the property department was already pre-selling the houses. The project generated a lot of interest from the public. Most of the houses were pre-sold before the work started on site. It was the first time in the history of the corporation that the entire houses were sold before the project was completed, and Property Department, was very excited about this. All those who intended to buy were asked to pay a 10% security deposit, but these could only be made after they received an offer from the corporation. At this stage of the project, the corporation did not know the exact cost of each unit as these were finally going to be determined by tenders from the contractors, but tenders were not due until a month and a half later. Potential clients had to be made an offer in order for them to make the necessary financial arrangements with financiers. Property Department decided to make offers using the budget estimate previously given to them as a guide for the cost of the individual units, and the 10% deposit was based on the budget estimates as well. IDC was not involved in the sale campaign exercise and was still not aware of the promises being made to the end users. Many of the clients who bought the houses did not require any change, except for a handful number of people, most of who were in the high-income bracket. Despite their desire to make modification to the specification/designs, all of them did not come forward until the project had started on site.



Figure 2 showing various house types of the project

Tendering Processes and Tender Evaluation

The evaluation of tenders is supposed to be a fair and non-bias exercise, and it involves an accurate assessment of who qualifies for the work on the basis of his technical competence, the price offered and the time within which he has offered to complete the work. A final recommendation on who gets the job is usually a balance of all the above factors.

On completion of tender documentation, tenders were called in through open tender system. Pre-qualified contractors who were selected on the basis of their classification as determined by the Central Tender Board during the registration of these companies, were invited on the local media to collect tender documents. The contractors were competing on cost as well as time. One month after the collection of tender documents, tenders were returned and opened as a public tender. The quantity surveyors went through all tenders to determine the likely contenders for the job, and to narrow down the selection from a total of over fifteen contractors for each contract to three. If a mistake in pricing was found on the bills of quantities of a particular contractor who was, say among the lowest three, that contractor was called in to be shown his mistakes and to ask him if he wants to withdraw his tender, or he still stood by his price. This was done because in terms of the contract, which will be signed once the offer has been accepted, the contractor cannot turn around and request for more money on the basis of his mistakes in pricing. At the same time, the contractor cannot alter his tender price once tenders have been opened as this will be unfair to other competitors, who even given the opportunity, they could also change their prices now that they knew their competitors bids. Depending on the magnitude of the error in pricing by a particular contractor, that contractor can still win the work. The quantity surveyor indicated in his tender evaluation report all the errors in the documentation of the three likely contractors competing for the

award of the job. The production of tender reports also involves background arch on these contractors who seemed to be the likely contenders to get the work after checking all the bills of quantities. Information on the contractor's financial position is checked from their financial institutes, and their technical ability as well as their general conduct and efficiency is checked with those who have worked with them before.

A recommendation for the lowest bidders was made to the Property Department for the award of the various contracts. On receipt of the tender report the Property Department carried out a second financial appraisal using the recommended tender prices to ensure that the projects were still viable. While doing the appraisal, it was found that the prices for individual houses had risen slightly from the prices offered to the clients. The project quantity surveyor, together with the Property Department personnel went through both budget estimates and the tender prices to determine the cause of the discrepancies. It was discovered that when offers were made to the clients, an omission on the cost of site works and outbuildings provided for the medium and high cost houses was made. These accounted for much of the differences, and the project was running a risk of being rejected by the clients due to increase in costs. An agreement was reached that the necessary adjustments had to be made to the offers already made to the clients to accommodate the increase in cost. Although this change in costs did not have any significant impact on the project, it could have easily put the entire project in jeopardy. After an agreement was reached to adjust the offer prices to reflect the tender prices was reached and approved by the management, the tender recommendation was submitted to the board for approval. An approval was sort and the technical department instructed to proceed with the award of tenders for the site operations to start. Offer letters were made to the winning contractors who accepted the offers and precontract meetings were set to brief various contractors about the projects and to take-over the site to start site operations.

Use of Information Technology

Botswana Housing Corporation is fully computerised with a network system connecting all the head office with all its major regional offices. IDC office employed the use of computer technology to produce and exchange information amongst the various professionals involved in the project. All contract documents were produced with the use of computers. This made it easier to make changes that were necessary, and various design options could be exploited with relative ease before a final decision could be made. Quantity surveyors were able to make a quick cost comparison by a press of a button to advise on cost matters and this made the design process quicker than if conventional methods would have been employed.

While the above is true in as far as the use of information technology is concerned, a lot could have been achieved if the project could have been planned and co-ordinated properly from the beginning. With the use of information technology, clients could have been given more insight of the project through 3D-computer simulation of the individual houses to show three-dimensional interiors of the houses. The entire neighbourhood could have been generated to create the new townscape to try and create the atmosphere of the area once the project was completed. Visual aid could have been used to the maximum to explain the project to the clients and to demonstrate various options of the designs before final decisions were made. The use of IT during the design process could have been exploited more to take on board all the clients to make sure that they understood the project thoroughly before it started on site, this could have avoided the issue of late instructions during the production stage.

Conclusions

The project followed the prescribed company policies to ensure that its implementation did not undermine the set rules and policies. While this is understandable, it is also important to have an open mind about circumstances, which require thinking outside the framework of the set policies if it is in the interest of the company. Policies should not become a hindrance to innovation in solving problems, but should allow operatives the opportunity to explore all possible avenues, which may render the best solutions to the problem being addressed. The tender process followed what is prescribed in the tender policy. Even if a different tender system could have been more ideal for this project, it would have not been

possible to use it. Other forms of tendering other than open tender system are excluded from the policies, and it is my considered opinion that this project could have benefited from other forms of tendering systems such as negotiated tender. The second phase development could have been negotiated with the two contractors who were already on site. Site establishment costs could have been reduced or eliminated through a negotiated contract with these contractors. Policy on tendering did not allow negotiated contract, particularly for large amounts. The means by which goals and objectives of this project were to be achieved should have been set and agreed by all stakeholders from the beginning. Change in strategies and emphasis while the project has already started had the potential to jeopardise the entire project. The shift from being a rental organisation, to homeownership promoter, calls for a change in the mindset. It is important to understand that major decisions, which affect the cost and time, are made during the design process.

The corporation's tradition of bungling individuals together and classifying them, as low, medium and high income is not appropriate as the sole basis for the generation of design briefs. A house is a symbol of social, economic or political status. Individuals should therefore be given the opportunity to participate in defining their identity through participation during the design process.

A mechanism should have been put in place, which allowed end users' participation in the process from the beginning to the end. Sufficient time which enable maximum participation of end users should therefore be allowed at this stage. The decision making mechanism, and the flow of information from one department to the other, needs to be improved to ensure that all role players are kept abreast of all new developments in the project. An introduction of a project manager in a project similar to this one, who co-ordinates the design and selling process, could perhaps improve the co-ordination between the clients and property department, and between property department and the designers.

Production Stage

Pre-Tender Planning

The term planning appeals by its suggestion of considered, orderly and rational action. It implies tidiness, method, system, discipline, regularity and a measure of exactness. It gives the impression that someone is in charge, has hands on the wheel, and a sense of direction and destination. It represents co-operation and co-ordination, and contrasts with the inevitable disorder, which generally prevails when, people act independently in their own interests with no overall framework into which they are constrained to fit.

Construction planning in this project was generally concerned with completing the contract in the shortest possible time compatible with economy. Contractors gave prior consideration to their plan of campaign. The plan indicated to the client the intended completion or handing-over dates. At the same time suppliers and subcontractors should have been notified of when their goods or services will be required. Moreover the contractor himself must have known at pre-tender stage what his future commitments will be for staff, labour and plant. Adequate period before starting site operation, was made available for the proper planning of equipment and methods, ordering of materials, and preparation of a balanced programme.

Since the priced tender largely predetermined the character of this construction project, then it followed that there was a concerted discussion and planning at estimating stage. When preparing a tender the contractor's estimator obviously have looked into the methods and timing of operations, and considered the contract as a whole rather than as a series of isolated events, he must of necessity have prepared an outline programme. Some of the objectives of the pre-tender planning are:

- (a) To pool the company's past experience and knowledge of its various departments and specialists
- (b) To assist the estimating department by delegating certain tasks to other interested personnel
- (c) To eliminate future controversy between estimator and supervisor on such matters as method, output rates, preliminaries and on-costs

(d) To ensure a realistic tender by co-ordinating technical theory with current practice

(e) To improve the ratio of awards/tenders submitted, by reason of the increased attention to detail and the advantages of co-operation.

Production Planning

The award of contracts to the contractors marked the beginning of the postcontract activities. Once the awards were made, contractors were each called to a precontract meeting at which the following matters were discussed and confirmed:

1. **Contract particulars.** This entailed details such as subcontractors employed by the main contractors, formal signing of the contract, procedure for the handover of the completed houses to the client, defects liability period and insurance cover for the works.
2. **Construction documents.** Included in this was confirmation and issue of drawings to the contractor, bills of quantities, specifications and contractors' building programmes.
3. **Site establishment.** Issues discussed included joint initial site visit by the client and the contractor to confirm its physical location and extent. Contractors' working areas is established and the need to provide building inspector's site offices. Security of the works and materials during construction, local authority's approvals, service connections to houses, cadastral pegs and setting out of the buildings are also discussed.
4. **Project management.** Among issues discussed here were sites meeting frequencies, attendance of site meetings, recording of site minutes and their distribution after the site meetings and the procedure for the clarification of site minutes.
5. **Communication.** Site instructions, procedure for raising queries by contractors, language used during the contract, and the issue on discrepancies between parts of the contract documentation.
6. **Payment.** Procedures for the preparation of interim valuations, additional work, dayworks and matters relating to the works that required remeasurement during the progress of the works on site were highlighted here.
7. **Quality control.** The role of the resident building inspector was clarified to the contractor, periodic testing of materials to confirm conformity to the specification was highlighted and the issue of site safety were all raised to alert the contractors of their responsibilities on this matters during the contract period.
8. **Frequencies of site meetings.** The need for regular site meetings was discussed and framework indicating their frequency was set out for the contractor to ensure that he makes all the necessary arrangements for these meetings in advance

Having made an appreciation of the project and decided one's campaign for execution, it was now necessary to co-ordinate the actions of the numerous participants. Building and civil engineering is essentially a team operation so that careful liaison between designer, suppliers and subcontractors, was of the main contractor's prime functions. Each of the major groups of components; labour, plant and materials, were carefully scheduled to arrive on site at the right time and in correct quantities.

Contractors were each given two weeks mobilisation period at the precontract meetings, after which they started work on site. At this stage of the project, contractors pulled out their resources and reviewed their pre-contract programmes to ensure they were workable documents for practical implementation on site. All labour, equipment and materials were organised in a manner that allowed a smooth sequence of operation on site and there were no delays due to bad programming. Contractor's head offices had ensured that all what was required by the site personnel was ready as and when required on site. By and large, most of the planning at this stage of the project was well prepared in readiness for the execution of the project. Each contractor submitted his programme to the employer for comments. Contract programmes in this instance were not part of the contract documents, but just an indication of how various contractors intended to carry out the works. The employer could only comment and advice the contractor on certain

aspects of the programme, but could not instruct the contractor to plan his work in a particular way. Any instructions which could have been given to the contractor either to carry out his work in particular way or by a given date, could have been interpreted as variation instructions, which could have had effects on the cost or time. The programme was used for the following:

- (a) to record agreed intentions with the client,
- (b) to supply a timetable for co-ordinating the issue of drawings and information, the placing of orders and delivery of materials, and the operation of plant and subcontractors,
- (c) to prepare a basis for the introduction of 'payment by results' or other incentives,
- (d) to show sequence of operations and the total output rates required of labour and plant,
- (e) to provide a yardstick for progressing and costing,
- (f) to furnish the financier of the project with the likely financial requirements,
- (g) to discourage changes in design by indicating the natural consequences, whilst at the same time facilitating amendments and minimising their harmful effects should contingencies arise.

During the execution of the works, contractors were responsible for the management of their respective programmes.

There were a number of variations that prompted the architect to issue instructions to the contractors. Conflicting information between the documents made it necessary to clarify the information to the contractors by omitting what was not required. Changes in the designs by some clients also made it necessary for the issue of variation orders. Material supply companies sometimes failed to keep up with the supply programmes, and the project architect had to use his influence to urge the suppliers to expedite the supply. Contractors also experienced shortage of skilled labour, and this problem, together with that of material supply shortage, was to a large extent, the consequences of government projects where many suppliers were also supplying material for government projects scattered all over the country. The government being the biggest customer for most of these suppliers was given the first preference for the supply, the supply to the other smaller customers afterwards. This had some effect on the projects, but the damage was somehow minimised through intense lobbying by the project architect to some suppliers. The local authority, water and electricity utility corporations, occasionally gave the contractors hard time and the client's project team often had to assist the contractor to ensure that the project was not delayed through bureaucratic controls in these establishments.

Phase one contracts, particularly clients from the high-income bracket, started to request design modifications as soon as they saw that the houses were coming off the ground. This also had some effect on the contractor's programme, as he had to contest with the unpredictable series of instructions, which made his scheduling of work difficult. This problem lied squarely with the employer because the project was not conceived in totality from the start, and it had very little to do with the contractor's ability. Up to this stage, the contractor was on programme and things were going fairly smooth. It was not until the variation of designs that there were some visible delays to the programme, as the contractor had to go back and re-do what he had completed earlier. The project architect could not refuse to do the variations requested as it had earlier been agreed that minor changes will be incorporated, but these had some impact on the programme. The contractor co-operated and did his best to minimise the negative impact that these changes could have had on the project, should the contractor have chosen not to cooperate.

Quality Management

Terms and conditions of these contracts made it very clear that it was the responsibility of the contractors to ensure that the work was executed to the specifications, and to the satisfaction of the employer. To ensure this, the contractors' site personnel were intimately involved with the planning of their sites. In this way, the knowledge gained by research was available to them where it was best put to further use, and confident acceptance of the programme was assured. The predominant factor in the erection of these houses was the output of the bricklayers. High productivity and quality control measures ensured the elimination of double-

handling, by the careful timing of bulky material deliveries and the strategic siting of mixing plant, casting bays and stock piles. Site agents and site supervisors were closely involved with the day-to-day site operations and they had control of the site staff without interference from their head offices. This created confidence in decision-making and gave the site staff total control of the project without fear of intimidation from head office on decisions made concerning their sites. Contractors' quality control measures were highly organised, there were very few breakages on site, and at handover stage, there was not even a single house, which was rejected by the Property Department either due to bad workmanship or for any other reasons.

The client's project team also consists of a building inspector who was resident on site. His primary duty was to ascertain that contractors were strictly complying with the contract documentation in terms of materials and workmanship. In the event that the building inspector was not happy with any of the aspects of the work, he was empowered to reject the works and instruct the contractor to rectify the works to the acceptable standard. The building inspector issued site instructions for the rectification of the defective work, and these had no cost or time implications in as far as the contract was concerned. The project architect visited the site at least three times a week, to ensure that work was progressing in accordance to specifications.

Manufacturers were often invited to site to come and verify if products were used in accordance to their specifications. Generally, there was a good working relationship between the employer's representatives and the contractor, which ensured an atmosphere of mutual trust and respect. There were monthly site meetings where a number of issues were raised such as site progress, workmanship, contractor's payment and any other issues that were relevant to the progress of the projects. Either of the parties was also free to call a meeting at any time to raise any matters of concern before things got out of control. The entire projects were managed on partnership basis where the two parties had a common purpose, i.e., to complete the projects successfully. The local authority was also involved in checking the works for compliance to the specifications. This was another quality assurance mechanism, which the contractor had to satisfy, as he required the local authority's certification of compliance before the houses could be taken over by the client. All the above mechanisms, together with the contractors' own quest to maintain their status as efficient contractors, ensured that quality work was maintained during the course of the projects. The contracts had a six months liability period as well, which prompted the contractors to be more responsible on the quality of materials as well as the quality of workmanship.

Contractors for the phase one projects were given a total of six weeks time extension between them. This was prompted by increased scope of work and adverse inclement weather. The revised completion date for the contractor who was building 88 medium and low cost houses was 28.03.2000, and by the end of that day, all the 88 houses were taken over from the contractor. The project was completed on time and within the budget. The project is now under defects liability period. The completion date for the other contractor in phase one development was also moved to 04.04.2000, and the contractor had appealed for more time by the time I left the project for this course. This contractor's work was most affected by the changes, and it became apparent that he might be delayed in completing the project. The completion date for phase two development is in July, and it is expected that the contractor will finish on time as well.

Budgetary Control Mechanisms during Construction

During construction phase, it is necessary to have in place some mechanisms, which control the expenditure of the project to ensure that the project does not overrun its budget. All the variations were checked and priced by the quantity surveyor before they were issued to the contractors. This was to ensure that the variations did not shoot the project over the budget. The building inspector in liaison with the contractor accurately measured measurements for provisional items such as substructure work and services, then submitted to the quantity surveyor for verification before payments were made. Weekly records of the contractors labour and machinery was kept by the building inspector, and were then used by the project quantity surveyor to prepare interim payments. There are instances where the contractor offers to use another material than the specified. This is common as the specification normally identifies what is to be used or its equivalent. The quantity surveyor checks and

confirms the price before the alternative is accepted, provided that it meets the specification. Contractor's interim pay claims were thoroughly checked by the quantity surveyor. Valuation of the work was physically carried out on site, including checking of materials on site by the client's quantity surveyor and the contractors' quantity surveyors. The client's quantity surveyor was then able to determine the amount due to the contractor in comparison with what the contractors had claimed. Once the project quantity surveyor had satisfied himself about the amount due to the contractor, a valuation certificate was prepared. The valuation certificate has information on the details of the project including the following: (a) the contract number; (b) the project start and completion date; (c) valuation date; (d) contract value; (e) previous payment; (f) liquidated damages if any; (g) advance payment if any; (h) certificate number, and (j) amount due to the contractor in that certificate. The computerisation of the above information will immediately indicate the financial status of the project, if it is on budget or over the budget. Once the certificate was ready, it was checked and verified by the principal quantity surveyor, thereafter by the project architect. The certificate is finally checked and signed by the IDC manager before it is sent to the finance department for the preparation of the contractors' cheque.

On arrival at finance department, the details in the certificate are checked and the budget checked to confirm if the funds have not been exhausted in the project. The checking mechanism here is independent from that which was done by the quantity surveyor, and if there is any discrepancy pertaining to the availability of funds from which the claim was made, then this has to be sorted out immediately. The employer has a contractual obligation to pay the contractor his money within a set period of time; therefore the inquest on cost overrun is something that takes place internally. As there were no cost overruns in these projects, I will not discuss the procedures of how this matter is dealt with in the corporation. In addition to checking the project's financial status during payment, the quantity surveyor also produces monthly financial reports on the projects and these reports normally have projections, which indicate the expenditure of the project and make a projection to see if the project will meet the budget. These reports assist in making financial plans in situations where it becomes apparent that more resources will be required to complete the project. The overall responsibility of the project's financial control lies with all team members as their decisions on the project have the potential to affect the economy of the project. One important control mechanism in controlling the budget is the issue of variations. All variation orders were issued through the project architect, and also checked by the quantity surveyor before they were issued.

Conclusion

The success of a building project depends on teamwork. The attitude and behaviour of all role players in the project has an impact on the project. Events that sometimes seem remote and unrelated to the project have to be treated cautiously as they may have triple-effects on the project. Performance of the contractor on site does not only depend on his ability as a contractor, but also depend on how well the information he is required to act upon is communicated. There are some advantages in working together as a team than creating divisions. Artificial divisions between the client's representative and the contractor has the potential to create misunderstanding between the two, but if both the client's representatives and the contractor act as one for the common purpose, this can culminate trust and respect for each others role in the project.

The contractors' programme is only an instrument to guide him how best to execute the work, but if the client keeps on moving the goal posts, it becomes impossible for the contractor to have things under control and to plan his resources properly. It therefore becomes impossible for anyone to predict when the project will finish, and whether it will meet its original budget. Major decisions affecting time and cost are made during the design phase, if these are changed during the production stage, this places the project into a risk and it may invite other contractual complications. In terms of the JCT form of contract, which was used in this project, design phase have to be completed before production phase. The change of design during production hampered progress, contractors working rhythm was interrupted and this created uncertainty about the cost and time. This situation should be avoided at all cost as it makes life difficult for everybody involved in the project.

Solutions, which have not been thoroughly thought through, are likely to be put into action, the contractor may be required to perform miracles and suppliers required to deliver the undeliverable. To ensure that projects run smoothly, it is important for the client to understand that there is a limit on how far one can manoeuvre the process to suite his circumstances. The time is right, perhaps for the corporation to look at other procurement methods which may be more accommodating in dealing with individual clients as opposed to the traditional approach of bungling individuals as low, medium and high cost clients, thereafter building everything all at once as one large contract.

Property Management

Botswana Housing Corporation has both Property and Maintenance Departments, which deal with the after-care services once the houses, are completed. In this project, 50% of the houses have already been sold out to the private tenants. The clients made their private arrangements with their financial institutions to secure mortgages. The corporation was not involved much in the mortgage application process, except to provide the information where it was necessary to do so. The balance of the houses will be allocated to Government on rental basis. Before the Government takes up the tenancy, a Lease Agreement will be signed. The responsibilities of each party to the agreement will be set out clearly in the agreement. Among the clients' primary responsibilities set out in the agreement is:

- (a) to ensure that the rental payment is timely, and
- (b) To ensure that the property is kept under proper condition so that it does not lose its market value due to dilapidation as a result of neglect in maintenance.

The Government, who will then recover the same from the sitting tenants, will make rental payment. Any failure to observe the terms of the tenancy agreement by either party may lead to the cancellation of the agreement or legal action by any the parties to the agreement.

Maintenance Planning and Connection to the Design

The Maintenance Department of the corporation is responsible for maintaining all the corporation's buildings. An annual budget is allocated for this operation and the Maintenance Manager manages it. At the beginning of the financial year when the budget is prepared, this budget takes into account the maintenance of all existing properties as well as those, which will fall under the department's care latter during the year. Responsibility for the maintenance of the houses sold out to the tenants will lie with their owners, while the corporation will be responsible for the maintenance of structural elements in the rented houses. Maintenance of non-structural elements, of say, pipe leakage, replacement of lamp bulbs etc., will be the responsibility of the tenants. The Maintenance Department can also maintain these private houses at a cost if requested by these private clients. Apart from maintaining the houses, the department was also involved in the project during the construction phase. The maintenance personnel attended site meetings, and they also took part in the inspection of the houses at the completion stage before the houses were taken over from the contractor. In order to ensure that tenants do not neglect their maintenance responsibilities, the Maintenance Department will carry out periodic maintenance checks in all the rented houses to ensure that the tenants keep these properties in good condition.

Failure to carry out the required maintenance constitutes a breach of agreement, which may lead to eviction of the tenant from the house. Once evicted from the corporation's house for whatever reason, the corporation can never give a tenant another house. This to a large extent, act as a deterrent since there is accommodation shortage in most urban areas and people want to hold on the houses which they have been allocated. Since the Maintenance Department is responsible for maintaining all the corporation's houses, which they have been doing over a long period, they have accumulated a data on some materials, which often present maintenance problems. This information is continually passed to the Integrated Consultancy Department to ensure that the use of these materials is avoided where possible.

Conclusions

The property management activities have influence on the overall project, as these were the basis upon which the project was conceived from the beginning. Property management is the final destination of the project, and this activity will exist as long as the buildings are still there. Management of the Lease Agreement, future sales of these houses, maintenance, insurance of the properties and all other activities related to these houses are all property management activities which form an important part of the project. It was important that more all these property management issues were fully considered and taken as integral part of the design. A detailed maintenance plan should have been drawn right from the project inception stage to ensure that the designs take cognisance of the maintenance requirements from the design stage. Property Management function is to ensure a return on investment as well as building a data base for future projects by the corporation.

Experiences to be used in the future

The lessons learned during the construction include the following:

- A design brief is an important part of the project during which all major design matters and cost of the project are determined.
- It is important to establish some sort of a project co-ordination strategy to ensure that all decisions on the project filters down to all role players in the project timeously.
- Every project is unique; it should therefore be treated as such. It is important to be open-minded about the requirements of each project.
- Any changes made during the production phase have the potential to frustrate the entire project; changes have to be avoided at this stage.
- Teamwork is a key to the success of any project.

Experiences from the Course

Experiences from the course include the following:

- The construction management programme had presented construction practices and techniques in Sweden, which are slightly different to those, which I am used to; some of the ideas like Property Management and Estimating Techniques can be put to use.
- Site visits, particularly the tour of Skanska's offices, was of particular interest. Their approach to the development of projects from beginning to the end offer an alternative to the normal practice, which can function fairly well even in the environment, I come from.
- Experience gained from other participants of the course also provided a wealth of information about how other people are addressing similar problems faced by my own company, i.e. provision of affordable housing.
- Environmental issues were presented in more positive way, as something designers can use positively to enhance the functionality of their products, as opposed to viewing it as an impediment to creativity.

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