SOME PITFALLS IN THE MANAGEMENT OF INDUSTRIAL PROJECTS IN NIGERIA

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ABSTRACT

Industrial project management in developing countries tend to be much more difficult than in industrialised world. The selection, evaluation and implementation of industrial project appear to be very challenging and more complex. Decisions have to be made against a background of inadequate supply of raw materials, ever increasing prices and scarce technical expertise and skills; contracts often tend to involve a large number of consultants and contractors.. The engineering and construction phase under these conditions have to be tightly controlled in order to meet budget, quality and completion targets. The training and setting up of operating organisations for proper control of projects is another pre-requisite for successful project management. These strategies often are not properly applied, thus leading to poor achievement of project objectives.

This paper, based on the study of local management, examines the pitfalls of project management and suggests ways of avoiding such mistakes. The study involved the design and construction of a brewery, a water project, a carton factory and a palm oil mill. Three of the projects were located in the Eastern States and the other in Bendel State.

1.0 INTRODUCTION

The management of industrial projects in developing countries is much more complex and challenging than in the industrialised countries. Managerial and technical skills tend to be inadequate and in some cases non-existent. The infrastructure taken for granted in the developed world is hardly obtainable and where they exist they tend to be highly extended.

The mangers and engineers whose job is to select, evaluate and execute projects in developing countries face considerable managerial and technical challenges and must work extremely hard to achieve meaningful project results.

In developing countries, there appears to be a significant number of pitfalls in the planning and execution of projects. In the author's study of some local projects, the following pitfalls among others were identified: approaches to projects use sets of descrete skills practised by independent specialists operating too much in isolation, clear responsibility for integrating into coherent whole is seldom given; necessary attempts to predict the future are based largely on hunch rather than data; skilled and professional high level project management is not employed; the crucial importance of early thought, dissection, planning and contractual strategy is underestimated; adequate method-related time and cost models for the project are seldom employed.

This paper discusses some of these pitfalls and suggests ways of avoiding them.

2.0 OBJECTIVES, EVALUATION AND SELECTION OF PROJECTS

2.1 Objectives of the Project:

From the start of a project, its objective should be defined and stated, to guide the consequent decisions. The initial statement can be brief, be developed as the project proceeds and altered to adapt to changes in the information used in predicting the value of the project or to satisfy changes in the law or other social constraints. It may sound obvious, yet it is not always done.

An initial investment of resources to analyse uncertainties and conflicts in objectives can have the greatest single influence on the eventual success of projects (2). Table 1 shows that only one project has its objectives defined and stated in a written document.

Project	
1	- brewery construction
2	- water project
3	- carton factory construction
4	- palm oil mill construction

2.2 Evaluation and Selection of Projects:

The selection and evaluation of a project is perhaps the most important decision that can made by an industrial organisation. The failure or success of a project depends on inappropriate or sound selection respectively. A commitment to a certain project can dictate the direction of the company's development or decline for a foreseeable future. A project can also stimulate the local economy and social well-being of the locality.

Table 1: Documentation of Objectives

Project	Project Objectives defined and stated in a written document	Objectives not defined and written down
1	X	
2		X
3		X

A sure way of arriving at the right decision is by carrying out a feasibility study of the project. Studies of projects made locally seem to suggest that feasibility studies are in most cases not properly organised and as a result initial objectives are rarely achieved (1). Table 2 shows the response of the four project management cases studied.

2.2.1. Feasibility Study Team

The team must have a broad understanding of engineering, technological developments in the section in question, knowledge of the marketing and distribution networks (in case of products) in the chosen region. The team must not only be aware of the socio-cultural and political environment but also be competent in the basic techniques of economic analysis. The team with broad understanding in the technological, engineering, marketing, social and political factors are more likely to come out with a more reliable evaluation.

2.2.2. Commercial Feasibility

The final and perhaps the most important aspect of the selection and evaluation of projects is the calculations of the commercial feasibility. If a project is not commercially feasible (except where social and political consideration overrides every other factor), it may have to be dropped. In the present case studies, it was found that only one of the four companies involved carried out commercial feasibility. This type of situation often lead to the abandonment of projects when suddenly the owners realise that a great deal of money is still to be provide for the completion of the venture. Commercial feasibility analysis suggested is shown in Figure 1. It consists of Investment Profitability and Financial Analysis. This evaluation technique follows closely that adopted by the United Nations Industrial Development Organisation (UNIDO) (4).

Investment Profitability Analysis

Two well tried methods are suggested. The are the simple rate of return and the payback period analysis; and the discounted cash flow method, which is grouped into net present value method and internal rate of return analysis. The simple rate of return is designated as

$$R = \frac{N + 1}{L} \text{ or}$$

$$Re = \frac{N}{M} \quad (1)$$

where

R = Simple rate of return on total investment.

Re = Simple rate of return on equity capital.

N = Net profit in year ("t").

I = Annual interest charges on loans in year ("t").

M = Equity Capital Invested (equity + loans).

In the figure above, the project under consideration is

Table 2: Factors considered in the feasibility study in the projects

Project	Factors	
	Considered in the feasibility	Not considered in the feasibility
1	Initial cost of project, skilled manpower, raw materials, availability of technical expertise, maitenability, compleiton date.	Life cycle cost of rate of return on capital. Market demand inflation, net present worth of future cash flow, spare parts availability
2	Initial cost of project, Alternative equipment suppliers, Completion date	Spare parts availability, Equipment reliability, cost benefit analysis, ease of maitenance of equipment, environmental suitability

deemed sound whenever R or Re is higher than the rate prevailing in the capital market. The simple rate of return is further complemented by the payback period method, thus:

$$L = \sum_{t=0}^{P} E_t$$

where

L = total investment

P = payback period

E_t = annual net cash earnings in the t^{th} yr.

If $P < P_m$, the project is accepted. where P_m = cut-off payback period decided by the investor. The discounted cash flow methods start out with the net present value analysis (N.P.V.) such that:

$$N.P.V. = \sum_{t=0}^{n} \left[\frac{CI_t - CO_t}{1 + i} \right] \quad (3)$$

where

NPV = net present value of a project

CI_t = cash inflow in year "t"

CO_t = cash outflow in year 't'

i = rate of discount

n = project life

Project is accepted if N.P.V. > 0.

The internal rate of return method is formulated as follows:

Table 3: Actual and Estimated Project Objectives

Project	Item	Planned	Actual
1	Investment	3.5m Naura	3.8m Naira
	Project duration	15 months	18 months
	Work upto capacity	2 years	3 years, 6 months
	Output per week	Design Level	75% of design level
2	Investment	1.6m Naira	2.1m Naira
	Project duration	12 months	2 years
	Work upto capacity	3 years	4 years
	Output per week	Design Level	50% of Design level
3	Investment	150,000 Naira	180,000 Naira
	Project duration	12 months	16 months
	Work upto capacity	1.5 years	3 years
	Output per week	Design Level	80% of design level
4	Investment	2.5m Naira	3.00m Naira
	Project duration	2 years	2.5 years
	Work upto capacity	5 years	2 years
	Output per week	Design Level	95% of design level

$$0 = \sum_{t=0}^{n} \left[\frac{CI_t - CO_t}{(1+i)^t} \right] \quad (4)$$

where the symbols stand for the same meanings as in equation (3). And if $i < i_{min}$, the project is accepted, (where i_{min}, invested should be compounded). Equation (3) and (4) are one and the same equation. Equation (3) estimates N.P.V. at a given i while equation (4) estimates i at a given N.P.V. = O.

Financial Analysis

In the financial analysis portion, the factors being considered are the adequacy of equity and long term financing, profit rates, breakeven points, rates of dividends, liability - equity ratio, cash deficits or excesses and the minimum standards. Set or indicators which are deemed favourable or feasible, the project is considered acceptable.

Government Sponsored Projects

In government sponsored projects, commercial feasibility is not the only criteria for selection and endorsement of a venture. Other factors such as socio-economic advantages and foreign exchange effects sometimes play important roles in the selection and evaluation decision.

Socio-Economic Analysis

In socio-economic analysis, the first criterion taken into account is the project's contribution in terms of gross value added (G.V.A.).

where G.V.A. $= \sum_{i=1}^{4} A_i$

and where

A_1 = wages and salaries

A_2 = profits

A_3 = rent from land

A_4 = interest incomes from use of capital.

Net Foreign Exchange Effects

The net foreign exchange earnings effects are the results of exports less import. If the net foreign exchange effect is equal or greater than zero during the life of the project, the said project is desirable.

2.3 Range of Technological and Investment Levels

It is plausible to argue that developing countries should invest in the state of the 'art'(technology), since this will enable them to "leap frog" in the race for industrial development and take advantages associated with such technologies (i.e. lower overall cost per unit of output).

On the other hand, it is also reasonable to insist that developing countries should invest in well proven technologies which may result in a lower capital cost. Higher labour utilization is not very important because of lower wage rates and the social obligation to absorb unemployment.

The answer to these arguments, is to evaluate for each stage of the manufacturing process, the range of real technical alternatives, from the most labour intensive to the most capital oriented, to find the solution best fitted to the local economy. In other words, that technology which is appropriate to the economic, social and technical or educational development is what is needed.

2.4 Appropriate Design of Engineering Equipment/Systems

In large scale projects like cement factories, breweries, power houses, and refineries it has always been the practice for technical partners from Europe or U.S.A. to come up with designs of existing plants in these places. A type of design or construction material which is suitable in Europe or America may not necessarily be ideal in the Nigerian Environment. As a result, there has been some instances when corrosion has become a serious problem few years after the handover of the project. It is therefore, necessary for foreign partners to liaise with local engineers to arrive at more appropriate designs.

In Nigeria, like in most developing countries, spare parts are scarce and maintenance skill and culture are not well rooted. This calls for module design of engineering systems so that when one module of the system is faulty the other could be put into use. On the contrary, our technical partners tend to produce designs which result in complete shutdown when an overhaul or repairs are carried out.

2.5 Local Marketing and Distribution Systems

Table 5: Number of Contractors Invovled in Each of the Projects

Projects	Number of Contractors
1	6
2	5
3	3
4	4

The technology recommended for a project must be tailored to suit the local marketing and distribution system (in case of consumer goods). A project for which continuous supply of raw materials cannot be guaranteed or whose products cannot be effectively distributed to dealers and consumers is bound to die commercially.

2.6 Project Schedule and Budget Targets

In Nigeria, like in most developing countries, large and complex projects tend to cost more and last longer to build than similar projects in inudstrialised countries (4).

This appears to be due to poor engineering cost estimates which is often worsened by ever "galloping" price inflation. They last longer because local planners tend not to foresee the inadequacy of appropriate infrastructure. Planners should analyse the cost of similar projects already built elsewhere and take into consideration price inflation before coming to a final cost estimate. Table 3 shows the estimated and actual project

Table 4: Techniques Used In Planningg & Control

Project	PROJECT TECHNIQUES EMPLOYED		
	C.P.M.	PERT/COST	BAR CHART
1	Yes	No	Tes
2	No	No	Yes
3	No	No	Yes

objectives in the study. Project schedules should be based on the experiences of people who have built similar projects before (3). People who have had previous experience in the management of one particular types of projects, know the snags involved and therefore are more equipped to estimate project duration

Most projects are non-repetitive and confront the decision maker as a situation in which prior experience and information for control is non-existent. Therefore, techniques for project control should meet two conditions:

(1) during the planning phase of a project they should make possible the determination of a logical, preferably optimal, project plan, and

(2) during the execution of a project they should make possible the evaluation of a project progress against the plan.

The planning and control of a large-scale project may be accomplished by utilizing activity network as the planning and control medium. Project planning and control techniques may be classified as deterministic and designated C.P.M. (Critical Path Method) or Probablistic and designated P.E.R.T. (Programme Evaluation and Review Technique).

P.E.R.T. is ideally suited to early project planning where precise time estimate are not readily available. The advantage of P.E.R.T. is that it offers a way of dealing with random variation, making it possible to allow for chance in the scheduling of activities, C.P.M. is an activity network technique with activities is an activity network technique with activities and events analogous to P.E.R.T. except that the emphasis for control is placed on critical activities.

An extension of P.E.R.T. and C.P.M. to include cost consideration brings economic factors into project control decision. A cost network can be superimposed upon a P.E.R.T. network by estimating the total cost and cost slope for each activity time.

The bar chart is another techniques that can be used in project planning. In this technique activities are listed in the vertical, and elapsed time is recorded horizontally. This shows clearly the date by which each activity should start and finish, but it does not make clear how the ability to start one activity depends upon the successful completion of other activities. This technique is not adequate for planning some projects.

Table 4 shows the techniques used by the four projects investigated. The findings indicate that the more sophisticated techniques were not popular.

2.7 The Right Type of Personnel to Operate the Finished Project

In developing countries no sooner than the overseas technical partner has ended his contract, the project runs into technical difficulties (3). This happens because appropriate staff were not trained to take over from the expatriates. The training of technical staff should written into the contract of the technical partner.

3.0 PROJECT EXECUTION

The execution stage of the project is usually a period of frantic activities. During this stage, series of decisions are taken rapidly under pressure of time. Some of the decision areas are discussed below:-

3.1 The Best Affordable Project Team

The calibre of staff employed to implement project plans is bound to affect the end result of such an exercise. Where the project represents a huge investment, project team must be carefully selected. The company should endeavour to assemble the best possible team that it can afford.

Prior to undertaking the project, the team should undergo a crash training course in the technology of the project and the techniques of project management, contract law, project planning, cost engineering and cost control techniques.

3.2 Overstretching and Project Team

In Nigeria, like in most developing countries experienced mangers and engineers are often in short supply (3). This sometimes leads to overstretching of the project team. To avoid this, strategies should be developed to make the implementation process much easier. The number of consultants and contractors should be reduced to a minimum in order to provide the necessary technical expertise with enough commercial competition to give appropriate pricing. Table 5 shows the number of contractors involved in each of the project investigated. The numbers appear to be on the high side. Fixed price contracts should be favoured where economically possible, because it tends to reduce the administrative and management load considerably. The consultants and contractors should be the best available. The demonstrable experience of the consultants or contractors in the technology in question and in the developing world environment, should be as important a factor as price (3).

3.3 Contract Price and Mode of Payment

The promoter of a project should strive as much as possible to arrive at a fair price for a fair job. If the price is too tight the contractor will continually try to cut down on quality. In more

extreme cases, he can go bankrupt in mid project with unpleasant and expensive consequences.

The control of payment is one of the most effective forms of control that the project owner could exercise over the contractors. Payments should not merely be based on key events, rather it should be tied to progress made (i.e. payment made according to percentage completion of the project). The contractor should be made to make initial investment in his contract. The mobilisation concept is apparently peculiar to Nigeria. (This is a practice where a contractor without doing any piece of work is given a substantial percentage of the contract price to enable him/her to commence work on the project). If a contractor is given a mobilisation fee, there will be a tendency to abandon the work once he wrongly or rightly feels he has done a job equivalent to the mobilisation fee. The mobilisation concept and practice lead to the signing of contractors with a little or no capital to embark on project contracts. In recent times, contractors, local or foreign have moved out of the country after receiving mobilisation fees.

3.4 Master Plan of Project

A master plan for a project should be drawn up at the start of the job. This is a most important step and will be invaluable as part of the overall control of the project. The master plan should be a composite of the plans of all the requirements of the contractors participation of the job. It should cover studies, all engineering, all construction, recruiting, training of operators and development of management systems for operation. The initial formulation of an agreed master plan is only starting point for control. Key dates affecting many people can be decided early and resources reserved.

Master plans must not be regarded as a once-only exercise carried out at the start of a project. It should be a guideline which could be adjusted to meet changes in objectives or other financial and political factors. An analysis of the studies shows that only one out of the four projects studied had a master plan, as shown in Table 6.

Table 6: Noo of Projects with Master Plan

Project	Master Plan Drawn	No master Plan
1	X	
2		X
3		X
4		X

3.5 Effective Control System

A simple and effective control system should be set up at the beginning of the project. This should be tied to the project master plan and budgets. It should cover commitment, expenditures and progress, project final cost and completion date of project.

This system should be based on the contractually specified progress reports of each consultant and contractor. Contracts status should formally be reviewed monthly on the basis of these reports. The project manager should not get involved in the details, but if the project is deviating from schedule, he should make few, but fundamental decisions and make sure they stick.

3.6 Basic Management Systems

The basic management systems required to operate the plant should be designed prior to start up and should be made to work, from the beginning. Given an analysis of working relationships required between the people can be organised into groups to the extent justified by their numbers and the projects that provide their employment. Obviously, one should not unknowingly choose a system that is likely to arouse conflict or distort the primary task. Particular attention should be paid to maintenance, particularly preventive maintenance and spare parts management. The problem of maintenance and spare parts is one that looms very large in most third world countries (3). The supply of spare parts and the training of maintenance crew should be written and emphasized in the contract agreement.

4.0 CONCLUSION

This paper has highlighted some inadequacies in project management in Nigeria. Because of the small number of cases investigated, it is difficult to generalise on some of these pitfalls. The study, however, has given some insight into project management in Nigeria.

Since financial and technical know-how are scarce resources in Nigeria, the importance of efficient project management cannot be over emphasized.

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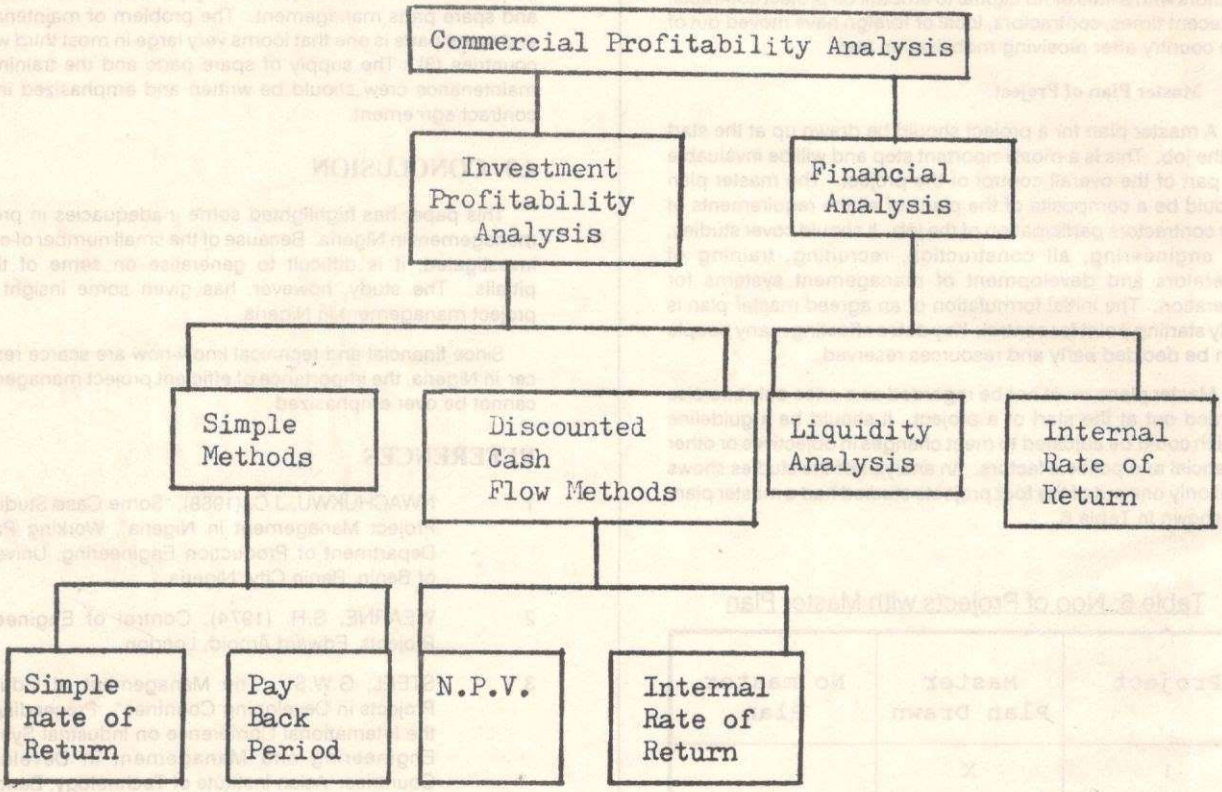


Figure 1: Commercial Profitability Analysis