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Evaluation and selection of construction projects in Nigeria

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Investors in the Nigerian construction industry were surveyed in four major towns in southern Nigeria in order to collect data on the evaluation and selection criteria employed when investing in construction. Their responses were analysed based on type of developer, i.e. individuals, companies or government agencies.

The net present value (NPV), discounted cash flow (DCF) and payback method were identified as the three most significant methods for evaluating construction projects. Of the developers surveyed, about 19% undertook risk analyses, whereas 81% allowed for risk by multiplying by a factor whose value varies. There was closer agreement between individual investors and companies on the priorities accorded to different factors when evaluating and selecting projects, than between government agencies and any of the other two. The availability of capital was considered of utmost importance by all the investors surveyed.

Keywords: Construction projects, evaluation, selection, investment criteria.

Introduction

As with most economic investment there are usually projects within the construction industry which satisfy particular objectives, yet the funds to finance them are limited. The costs and benefits of these projects, together with the risks associated with them, vary. Therefore, there is a need to evaluate and select these projects in order of priority, within the framework of the objectives.

In Nigeria, the need to evaluate and select construction projects within such a framework is further necessitated because of the nation's ailing economy and tight money supply. Coupled with the many projects vying for completion, this characterizes the plight of developing economies. To a great extent, such pressure – most of which is political and aggravated by an inadequate project appraisal system – may be responsible for the large number of projects abandoned in Nigeria in recent years (Osemenam, 1987).

In developing economies such as Nigeria, prioritization becomes more complex because of (1) the uncertainty surrounding the determinants of developments and (2) market imperfections, external factors and disequilibrium prices. Consequently, market criteria become unreliable or, at times, irrelevant, such that decisions about capital allocation may have to be made outside the market mechanism (Meier, 1975). Despite this, however, some form of appraisal is essential if chaos is to be avoided.

The process of appraisal of construction projects involves the estimation of project costs and the calculation of returns. This enables the evaluation and selection of projects, although selection is complicated by the existence of a number of development objectives. In fact, there are no simple criteria (technical or otherwise) for ranking investment priorities. This is worst

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in government projects, because as Brealey and Myers (1981) state: 'Capital allocation is very much a matter of judgement, since the optimal allocation depends upon what objective is being maximized and over what period of time.' However, there is a need for scientific guidelines to enhance the evaluation and selection process.

It was considered that a survey of the methods used to evaluate projects and the factors taken into consideration when evaluating and selecting such projects, might help to improve the process. It was also felt necessary to study the strategies employed by different developers and/or investors, i.e. individuals, companies and government agencies. The results of such a survey would hopefully generate ideas on how to improve the evaluation and selection process within the construction industry and hence reduce the number of projects being abandoned in Nigeria.

Methods

An exploratory survey was first conducted to identify the primary methods employed when evaluating construction projects. Also, efforts were made to identify those factors usually considered while evaluating and selecting such projects. A total of 12 developers were interviewed, including individuals who built houses to be leased or rented, companies and government agencies. We were able to identify six methods used by these developers when evaluating construction projects (see Table 1). We also identified 8 factors which were usually taken into account when evaluating a project (Table 2) and 10 that were taken into account when selecting projects (Table 3) (each of the variables was ranked commensurate with the importance accorded it).

Table 1. Methods of evaluating projects

Method	Percentage employing the method
Net present value (NPV)	92.0
Discounted cash flow (DCF)	70.0
Payback	62.0
Cost-benefit analysis	20.0
Equivalent annual value	5.0
Cost-effective analysis	2.5

Individuals, companies and government agencies who invest in the construction industry in Nigeria were asked to complete a questionnaire that incorporated these variables. A total of 110 qualified developers were identified in Lagos, Benin City, Ibadan and Port-Harcourt. This small number reflects the size of the population in Nigeria, and the investigation required that the questionnaire was not completed by unqualified developers. To be considered qualified, the developer had to be a graduate – or have in their employ a graduate – of social sciences, environmental science or engineering. Only one questionnaire was sent to each company or government agency, as the investigation was directed towards the policies and practices of each as a whole.

Most private individual investors who own houses and rent them out, do not have an

Table 2. Responses to questionnaire regarding the factors for project evaluation

Factors/respondents	Response[a,d] V.I.	I.	S.I.	M.I.	N.I.	Percentage positive[b]	Ranking[c]
Period of construction							
1. Government agencies	18	1	1	1	—	90.5	4th
2. Companies	11	1	—	—	—	100.0	1st
3. Individuals	5	5	—	—	—	100.0	1st
Initial construction cost							
1. Government agencies	15	5	1	—	—	95.2	1st
2. Companies	4	5	3	—	—	75.0	6th
3. Individuals	5	3	2	—	—	80.0	5th
Government policy							
1. Government agencies	9	11	—	1	—	95.2	2nd
2. Companies	8	6	1	3	—	67.0	7th
3. Individuals	—	7	2	1	—	70.0	8th
Cash flow							
1. Government agencies	7	13	1	—	—	95.2	3rd
2. Companies	4	6	2	—	—	83.3	4th
3. Individuals	6	2	1	1	—	80.0	4th
Delays							
1. Government agencies	15	4	1	1	—	90.5	5th
2. Companies	5	8	—	—	—	100.0	2nd
3. Individuals	1	7	2	—	—	80.0	6th
Inaccurate estimates							
1. Government agencies	9	9	2	—	1	85.7	6th
2. Companies	6	3	2	1	—	75.0	5th
3. Individuals	3	4	1	2	—	70.0	7th
Inflation							
1. Government agencies	10	4	7	—	—	66.7	7th
2. Companies	1	4	4	4	—	41.6	8th
3. Individuals	6	2	2	—	—	80.0	3rd
Location of project							
1. Government agencies	10	2	9	—	—	57.1	8th
2. Companies	6	4	2	—	—	83.3	3rd
3. Individuals	4	5	1	—	—	90.0	2nd

[a] V.I., very important; I., important; S.I., of some importance; M.I., of minor importance; N.I., not important.

[b] The percentage that responded either 'very important' or 'important'.

[c] Rankings based on the previous six columns.

[d] Values represent actual number of respondents.

investment strategy and are mostly illiterate. Although this group form the majority in the building sector of the construction industry in Nigeria, they were not included in the survey.

While our survey was limited due to financial constraints, it is believed that the variables identified are applicable to Nigeria as a whole. A total of 43 questionnaires were completed,

Table 3. Responses to questionnaire regarding the factors for project selection

Factors/respondents	Response[a,d] V.I.	I.	S.I.	M.I.	N.I.	Percentage positive[b]	Ranking[c]
Availability of capital							
1. Government agencies	21	—	—	—	—	100.0	1st
2. Companies	6	6	—	—	—	100.0	2nd
3. Individuals	9	1	—	—	—	100.0	2nd
Economic situation							
1. Government agencies	18	3	—	—	—	100.0	2nd
2. Companies	7	3	2	—	—	83.3	5th
3. Individuals	2	8	—	—	—	100.0	5th
Profitability							
1. Government agencies	20	—	1	—	—	95.2	3rd
2. Companies	9	3	—	—	—	100.0	1st
3. Individuals	10	—	—	—	—	100.0	1st
Political situation							
1. Government agencies	18	2	1	—	—	95.2	4th
2. Companies	—	5	2	5	—	41.6	9th
3. Individuals	1	2	7	—	—	30.0	10th
Benefit							
1. Government agencies	2	18	1	—	—	95.2	5th
2. Companies	4	5	1	2	—	75.0	6th
3. Individuals	6	4	—	—	—	100.0	4th
Management							
1. Government agencies	13	6	1	1	—	90.5	6th
2. Companies	4	6	2	—	—	83.3	4th
3. Individuals	1	8	1	—	—	90.0	6th
Competitive activity							
1. Government agencies	6	11	3	1	—	80.9	7th
2. Companies	—	5	2	5	—	41.6	9th
3. Individuals	—	7	1	2	—	70.0	9th
Viability							
1. Government agencies	2	12	3	4	—	66.7	8th
2. Companies	4	4	4	—	—	66.7	7th
3. Individuals	9	1	—	—	—	100.0	2nd
Uncertainty and risk level							
1. Government agencies	9	4	8	—	—	61.9	9th
2. Companies	6	4	2	—	—	83.3	3rd
3. Individuals	5	3	2	—	—	80.0	7th
Project competitiveness							
1. Government agencies	8	3	7	3	—	52.3	10th
2. Companies	—	8	1	3	—	66.6	8th
3. Individuals	5	3	2	—	—	80.0	7th

[a] V.I., very important; I., important; S.I., of some importance; M.I., of minor importance; N.I., not important.

[b] The percentage that responded either 'very important' or 'important'.

[c] Rankings based on the previous six columns (where there is a tie in the percentages, the greater number of those responding 'very important' is taken into consideration).

[d] Values represent actual number of respondents.

representing 39% of those sent out. The details of the number of developers in each group (i.e. individuals, companies and government agencies) and their response rates are given in Table 4.

Results

In the first instance, the evaluation methods used by the various investors were ranked according to the percentage of investors adopting them. Then we tried to establish the relative importance of the various factors considered when evaluating and selecting construction projects. These factors were to be rated on a scale of 1–5, from 'very important' to 'not important'. Taken together, the percentage of investors replying 'very important' or 'important' to each question is shown in the penultimate column in Tables 2 and 3 for each category of investor. These percentages were used to rank the items for each group as given in the final column in Tables 2 and 3. These rankings made it possible to compare the relative importance of each of the variables as seen by the different groups.

In order to measure any agreement in ranking between the groups, a rank agreement factor (RF) as given in equation 1 was used. The RF represents the average absolute difference in rank of items:

$$\mathrm{RF} = \frac{\sum_{i=1}^{N} |R_{i1} - R_{j2}|}{N} \tag{1}$$

The percentage disagreement is given by:

$$\mathrm{RD} = \frac{\sum_{i=1}^{N} |R_{i1} - R_{i2}|}{\sum_{i=1}^{N} |R_{i1} - R_{j2}|} \times 100 \tag{2}$$

The percentage agreement is given by

$$\mathrm{RA} = 100 - \mathrm{RD} \tag{3}$$

where for any two groups, the ranking of the ith item by group 1 is R_{i1} and group 2 is R_{j2}:

$$i = 1, 2 \ldots N$$
$$j = N - i + 1$$

(For a detailed derivation of these equations, see Okpala and Aniekwu, 1988.) The rank agreement factors and percentage agreements are shown in Table 5.

Analysis

Our analysis showed that 95% of our respondents evaluate projects. Those who do not decide to invest once they know that funds are available.

Table 4. Number of questionnaires distributed and completed

Respondents	No. sent	Percentage of total sent	No. returned	Percentage of total returned	Response rate (%)
Government agencies	60	54.5	21	48.8	35.0
Companies	16	14.5	12	27.9	75.0
Individuals	34	31.0	10	23.3	29.4
Total	110	100.0	43	100.0	39.1

Table 5. Comparisons of the relative importance of the factors for project evaluation and selection

	Rank agreement factor (RF)	Percentage agreement (RA)
Project evaluation		
Between government agencies and individuals	3.25	19
Between government agencies and companies	3.00	25
Between companies and individuals	1.75	56
Project selection		
Between government agencies and individuals	2.60	48
Between government agencies and companies	2.50	50
Between companies and individuals	1.50	70

Regarding the financing of projects, 79% of our respondents take out loans, 16% are self-financing and 5% use financial investment houses (project finance). Also, 88% indicated that the method of financing affects their evaluation procedure. Regarding the type of method of evaluation used, 92% of our respondents use the net present value (NPV) method, whereas 70 and 62% employ the discount cash flow (DCF) and payback methods respectively. Other methods used include equivalent annual value (EAV) (5%), cost-benefit analysis (20%) and cost-effectiveness analysis (2.3%). These results show that some developers use more than one method to evaluate construction projects, and that the three most frequently used methods are NPV, DCF and the payback method.

On their own, these are acceptable methods of evaluation. However, for their proper utilization, adequate and reliable information is required. Such information includes a reasonable discounting factor. The question of whether the discounting factor should be tied to the present lending rate or to the inflationary rate may need to be asked. If it is tied to the inflationary rate, is it possible to determine precisely the rate of inflation in Nigeria? Though useful, such information is not always readily available.

A total of 81% of the respondents indicated that a risk factor was built into their evaluation process, a factor that varied between establishments. However, only 19% undertook risk analysis. This very high percentage of respondents using 'crude' methods to cater for risk, may have contributed to the high rate of project abandonment. With about 84% of construction projects in Nigeria being financed by one form of borrowing or another, with high and fluctuating interest rates, and with the unstable nature of the Nigerian economy, nothing short of a thorough risk analysis should be carried out for each project.

For example, there are instances where one project can alter the cash flow of another through being complementary to, or in competition with, it. Even when these effects are not present, the joint cash flows of two projects may present a very different picture from that produced by each project in isolation. As Brealey and Myers (1981) state:

> If you can identify the major uncertainties, you may find that is worth undertaking some additional preliminary research that will confirm whether the project is worthwhile. And even if you decide that you have done all you can to resolve the uncertainties, you still want to be aware of the potential problems. You do not want to be caught by surprise if things go wrong.

This is particularly important in an unpredictable economy like that of Nigeria.

The probable reason for using a multiplying factor to cater for inflation may be due to a lack of adequate statistical data on cost indices and the unpredictable inflationary trends in the country. It may also be a result of inadequate and inexperienced manpower. The solutions to these problems are under further investigation.

Two-step ordinal scale analysis

A two-step ordinal scale analysis was used to calculate the rank agreement factors and percentage agreement between the different groups, as shown in Table 5. The results show that:

1. There is fairly good agreement between companies and individual investors regarding the factors that need to be taken into account when evaluating and selecting construction projects (56% agreement for project evaluation and 70% agreement for project selection). However, when evaluating projects, the importance given to each variable appears to differ greatly between government agencies and individuals (19% agreement) and between government agencies and companies (25% agreement). For project selection, there was 50% agreement between government agencies and companies and 48% agreement between government agencies and individuals.

The low level of agreement seen between government agencies and non-government agencies regarding the factors that need to be taken into account when evaluating and selecting projects, may be due to the fact that government has to consider social benefits as well as profitability and stability of investment. This is clearly shown by the variation in rankings shown in Tables 2 and 3.

2. Regarding the factors taken into account when evaluating projects, the following observations were made:

(a) Individuals and companies ranked *period of construction* as the most important factor to be taken into account, whereas government agencies ranked it fourth. However, more than 90% of each group rated period of construction as 'important' or 'very important'. This implies that both individuals and companies are very conscious of earning a return from their investment. This could explain why private enterprises in Nigeria tend to be very reluctant to invest in manufacturing ventures, preferring instead to earn quick returns from the distribution trade. This has certainly contributed to the very low manufacturing activity in Nigeria.

It may also be that individuals and companies are more conscious of the fact that longer

periods of construction imply paying more interest on loans borrowed for the construction, without generating any profit to offset some of these costs. As this does not appear to be of quite such importance to government agencies, it may explain why most projects that are abandoned are government sponsored. It may also be that although government agencies do consider period of construction to be important (90.5%), the large number of projects usually embarked upon at the same time by government due to political pressures makes their realization very difficult. A reasonable construction period reduces the effect of inflation on the construction cost. For a nation with very high and unpredictable inflation, the period of construction should be taken very seriously.

(b) *Initial construction cost* was rated the most important factor by government agencies, but only sixth most important by individuals and companies. The high priority given to this factor by government agencies indicates that, even when projects with a higher initial cost may be more viable, they may be rejected due to limited funds, resulting in capital rationing. Capital rationing may be more appropriate when other projects are *equally* viable. A major problem in the government evaluation process is the influence of pressure groups pursuing different political demands. These demands are expected to be satisfied simultaneously and hence they lead to unfair and unreasonable capital rationing. To some extent, however, government is expected to provide services; however, there is a need to balance social services and profitable investments. If social services are provided to the detriment of profit-oriented investment, the government could become bankrupt. On the other hand, if all investment is profit-oriented, the government will be come unpopular. It is necessary, therefore, to recognize project interactions. Dasgupta *et al.* (1972) noted that it is not merely a case of accepting or rejecting a project, as capital projects can rarely be isolated from other projects.

The low rating given to this factor by companies and individuals indicates that the returns from a project are considered to be extremely important, even if it means a higher initial outlay. However, 75% of companies and 80% of individuals considered initial construction cost to be either 'important' or 'very important', indicating that they do give it serious thought, especially as very high initial construction costs may delay the realization of profits and, in some cases, it may be difficult to finance the projects.

(c) *Government policy* was ranked second, seventh and eighth by government agencies, companies and individuals respectively. This clearly shows why government projects are delayed and often abandoned. Nigeria has experienced unstable government, with each new government presenting new policies and priorities. Because these priorities dictate the allocation of money, many projects already in progress are starved of funds. This is further worsened by runaway inflation, which usually leads to a revision of project costs, once delayed or abandoned. Government policy should, as far as possible, be non-sectional. Also, incoming governments should, where possible, continue with the programmes (especially the laudable ones) of the previous administration. Alternatively, each administration should undertake less projects, thereby increasing the likelihood of completing them before vacating office. Unfortunately, however, most administrations in Nigeria have never completed their term of office. This has been highly detrimental to the development of Nigeria, more so as each incoming government's first task is to satisfy the needs and wants of those who put it in power. Unpredictable government policies are detrimental to the evaluation processes carried out by government agencies.

(d) The *location of a project* appeared unimportant to government agencies (ranked

eighth). In fact, as long as a particular project satisfied the political aspirations of the government, it was deemed adequate. This may be one reason why central government often issues directives on the location of a project, rather than allowing the agencies to take such decisions based on economic and social considerations. Both individuals and companies appreciated the importance of location, ranking it second and third respectively.

(e) Another factor that was noted as worthy of attention was *inflation*, which was ranked third, seventh and eighth by individuals, government agencies and companies respectively. The low rating accorded inflation by companies may be due to the importance they attached to period of construction (ranked first) and delays (ranked second), which could minimize to a great extent the effects of inflation.

Individuals considered it important, together with cash flow (ranked third), because inflation can catch up the loan taken out and hence delay the completion of the project. Moreover, when individuals borrow from financial institutions, the interest rate on the loan may be linked to inflation. Also, the cost of materials increases with inflation. Individuals may not have sufficient funds to stock materials – such as companies do – and hence inflation might erode such funds, thereby causing the abandonment of the project.

The fact that government agencies did not consider inflation important (Table 2), again indicates that profitability is not the prime motivator. This should not be surprising, since these agencies are not paid based on their productivity and profitability. This, and the fact that a government's policies dictate the evaluation process, show that the role of government is significant. This may be in line with government objectives, e.g. pursuing policies that are in the 'national' interest. If it is in the national interest, then projects should be evaluated in such a way as to single out those projects that contribute most to the ultimate objectives of the country and are affordable. Hence, the government still requires a method for comparing and evaluating alternatives – in terms of their contributions to these objectives – and which must be geared towards maximizing the use of available resources.

3. Regarding the factors taken into account when selecting projects, the following observations were made:

(a) *Profitability* was considered the most important factor when selecting viable projects by both individual investors and companies, while government agencies ranked it third. The importance attached to profitability, which is synonymous with the general belief that it is better to make your money quickly, explains in some measure why Nigerians concentrate in the distribution trade, to the detriment of the manufacturing and/or productive sector.

(b) *The availability of capital* appears to have been seriously recognized, with government agencies ranking it first and individuals and companies ranking it second. Each of the groups considered it to be 'important' or 'very important'. However, how seriously is the availability of capital taken, for why are there so many projects abandoned by the government? It appears that the relationships between the different factors are not properly understood. For example, delays and inflation can reduce the funds available in absolute terms, yet these two factors were only ranked fifth and seventh by the government respectively. Also, incorrect estimates of projected government income – something which happens frequently in Nigeria – can distort this parameter. It is better to have a realistic projection of income rather than being over-optimistic. This need is strengthened by the fact that the Nigerian economy is affected to a great extent by the policies of foreign countries, especially those in the West.

Therefore, an economy that is externally dependent needs to be cautious when projecting income.

(c) Government agencies appear to take the *political situation* into account, ranking it fourth (companies and individuals ranking it ninth and tenth, respectively). Of 21 government agencies who responded to the questionnaire, 20 (95.2%) considered the political situation either as 'important' or 'very important'. However, if the political situation were properly weighed up by government agencies before selecting construction projects, both the type of project selected and completion times would have been improved. It may be that decisions are taken without proper referral to previous analyses. On the other hand, it may be that because the political situation in Nigeria is so difficult to analyse, mere suppositions are made – something that appears to have been the case for many years.

The effect of the lack of interest shown in the political situation by individuals and companies, can be seen in the large number of private construction projects that were abandoned after civilian rule between 1979 and 1983. Most of these projects were embarked upon with politically ill-gotten wealth. However, because the sudden change in the political situation could not be anticipated, nor the rate at which the country's resources were being drained, many private projects were abandoned.

4. One very disturbing finding was that only about 50% of the respondents evaluate performance during a project. Performance measurements include (Brealey and Myers, 1981):

(a) Monitoring projects under construction to ensure that there are no serious delays and/or cost overruns.

(b) Carrying out post-mortems on major projects shortly after they are put into operation. This helps to identify problems and check the accuracy of forecasts, which would help in the implementation of future projects.

(c) If the continuous measurement of performance were not carried out, an investor could repeat the same mistakes.

However, due to the chaotic and unstructured nature of the construction sector in Nigeria, coupled with ever-changing and unpredictable government policy, it may be extremely difficult to evaluate the performance on projects. This is more the case because the government is the industry's main client, and future commissions to consultants and contractors have no bearing on previous performance.

Conclusions

The following conclusions can be drawn:

1. The net present value, discount cash flow and payback are the three most commonly used methods for evaluating projects. Also, some developers use more than one method when evaluating projects.
2. Only 19% undertake risk analysis, whereas 81% allow for risk by using a multiplying factor.
3. On factors to be considered during project evaluation and selection, it would appear

that there is more agreement between individual investors and companies than between government agencies and any of the other two.

4. Decisions on project evaluation and selection by government agencies appear to be greatly influenced by government policies. These policies, however, change frequently in Nigeria, because the many administrations introduce different programmes. The large number of government projects that have been abandoned in the past may be due to each administration embarking on entirely new projects.

It is recognized, however, that government policy should play a role in the evaluation and selection of projects by government agencies, because government needs to balance commercial profitability with social benefits and responsibility. However, we contend that it is necessary to balance social services and profitable investments, so as to avoid the government becoming bankrupt. Even after government policy has been considered, an evaluation should be carried out based on available statistical tools, because many projects are likely to be considered by government as meeting its criteria. Government agencies should also take inflation into account much more than they appear to, as inflation affects every activity in a nation.

This study has presented the 'subjective' results of three important groups of developers in the construction industry, and therefore should not be construed as an absolute statement of the factors necessary for consideration when evaluating and selecting all construction projects. Some factors may not have been considered.

While the problem described here is large-scale in outlook, we take the view that only a few variables be studied at a time. Most of the interactions between the various factors which influence project evaluation and selection have not be considered holistically. The idea presented here is to 'divide and conquer'. Futher work in this area needs to be geared towards examining the complex nature of these interactions.

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References

Brealey, R. and Myers, S. (1981) *Principles of Corporate Finance*. McGraw-Hill, New York.

Dasgupta, P., Sen, A. and Marglin, S. (1972) *Guidelines for Project Evaluation*. United Nations, Vienna.

Meier, G.M. (1975) *Leading Issues in Economic Development*. Oxford University Press, Oxford.

Okpala, D.C. and Aniekwu, A.N. (1988) Causes of high cost of construction in Nigeria. *Journal of Construction Engineering and Management, ASCE* **114** (2), 233–44.

Osemenam, C.A. (1987) Why construction projects are abandoned. *The Nigerian Quantity Surveyor* **5**, 16–21.