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USE OF INVESTMENT APPRAISAL TECHNIQUES AND CAPITAL INVESTMENT DECISIONS OF CROSS RIVER STATE GOVERNMENT OF NIGERIA

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Abstract
The study is set out to examine the application of investment appraisal technique on capital investment decisions of selected public establishments in Cross River State, Nigeria. The study adopted a descriptive survey method and self-administered questionnaire across 20 selected ministries, departments and agencies. The study revealed that investment appraisal methods are selected without taking cognizance of the capital projects that are suitable for them and based on these findings, the study recommended among others that the nature of capital projects should be used in determining the appropriateness of investment appraisal methods.

Keywords: Investment appraisal techniques, capital investment decisions and public establishments.

1. INTRODUCTION

In recent years, governments all over the world have shown strong interests in investment appraisal techniques which have a lot to do with the selection, implementation and management of their public investments and assets. These interests according to Miller and Mustapha (2016) have arisen because the ever increasing debates especially in Latin American countries, on fiscal policy are focused on the role which public investment plays in promoting economic growth. It has also been globally acknowledged that fiscal space can be created and used to promote public investments while low interest rates and poor state of the global economy have made IMF to suggest that the time has come for an infrastructural push (Rajaram et al, and IMF, 2014 as cited in Miller and Mustapha, 2016). Globally, public investments in the past, have lost substantial sums of money as one dollar spent on it is not the same as a dollar's worth of improvement in infrastructure especially in low-income and poorest countries where investment needs are greatest (Pritchett, 2000 and IMF, 2015 as cited in Miller and Mustapha, 2016).

Closer home, these issues are disturbing. Nigeria, a low-income country with a history of abandoned federal projects in almost all the 36 states of the country. For the past seven years, over 1600 rural electrification projects have been criminally abandoned in Nigeria (Nigerian Rural Electrification Agency, 2017). Uncompleted and abandoned capital projects have resulted in large infrastructural gaps and this has unfortunately put Nigeria at the 123rd position in the 2016 global Infrastructural Table where Switzerland occupied the number one position (Punch, March 18, 2017). Numerous public investment programmes that have been implemented especially in the rural areas, have failed to achieve their goals and objectives (Coker and Obo, 2012). In different parts of Cross River State where this study was carried out, several public investment programmes belonging to the state and federal governments, worth billions of naira have been criminally abandoned (Adams, 2018). This situation is worrisome and Odidi (2019)

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lamented that the industrial revolution initiated by Governor Ben Ayade shows that Cross River State can be rapidly developed if its public investment programmes are managed efficiently and effectively.

Unfortunately the superhighway project originally budgeted at ₦800 billion and later revised to ₦200 billion arbitrarily, has since 2015 appeared like a task that can never be accomplished. The project according to Aliyu (2019) has violated many rules and laws of the federation of Nigeria. Aliyu further reported that it would cover a distance of about 275 kilometres and over 25 kilometres in width and would affect more than 600,000 people in 185 communities. The superhighway project has consequently attracted protests, petitions with more than 200,000 signatures and a stop-work order from the federal government of Nigeria (Braide, 2017). The 'Spaghetti' Flyover project originally budgeted at ₦100 billion and later revised to ₦18 billion and the deep seaport project etc. have also been unduly delayed.

The foregoing negative scenarios suggest that public investments or capital investment decisions (capital projects) were not appraised by the appropriate investment appraisal methods. For instance, the superhighway project suffered setbacks because non-financial factors like current legislations, industry standards and good practice, environmental impact assessment and future threats were not considered during the appraisal stage of the project. It is even more doubtful whether or not the appropriate investment appraisal techniques were used in evaluating those projects that have failed in Cross River State.

Despite the fact that a lot of studies have been conducted on capital budgeting and investment decisions in the public sector, these researchers have not come across any study in Cross River State, Nigeria that has specifically investigated the conformity of capital investment decisions with investment appraisal techniques. This is the gap which the current research will attempt to fill. The objective of this study is therefore, to determine the extent to which the capital investment decisions of Cross River State government conform to the chosen investment appraisal techniques. This study will evaluate whether capital projects in Cross River State are indiscriminately abandoned because the appropriate investment appraisal techniques are not used to select such projects. To what extent are the chosen investment appraisal techniques suitable for the capital investment decisions taken by Cross River State Government?

Predicated on this, the researchers formulated the following hypothesis in its null form as follows:

H_0: There is no significant relationship between use of investment appraisal techniques and capital investment decisions. The rest of paper is set out as follows: Section one introduces the background and formulated hypothesis under investigation. Section two presents the conceptual and theoretical frameworks on which the work is based and their related empirical reviews. Section three contains research design and methodology. Section four presents test of hypothesis and discussion of findings while section five shows the findings, conclusion and recommendations.

2. LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 Use of Investment Appraisal Techniques: This is defined conceptually as the application of all or any of the following investment appraisal methods: Payback (PB), Discounted Payback (DPB), Accounting Rate of Return (ARR), Net Present Value (NPV), Internal Rate of Return

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(IRR), Modified Internal Rate of Return (MIRR), Adjusted Present Value (APV), Profitability Index (PI), Real Option Theory, Game Theory, Non-Financial Decision Tools

2.1.2 Capital Investment Decision: Investment takes place when a profitable outflow of cash has taken place or when funds are committed to a chosen course of action or capital projects. The primary concern of this study is the appropriateness or otherwise of the chosen investment appraisal techniques with the investment decision or capital projects selected. Ideally, the chosen investment appraisal method should be compatible with the chosen course of action or the capital projects selected. For instance, not all projects will be appraised using either the payback technique or the net present value technique. The various investment appraisal techniques have capital projects or investment options they are compatible with.

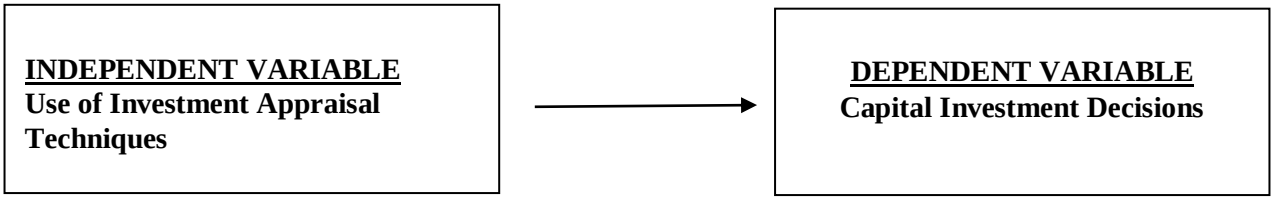

Figure 1: Conceptual Model

The above conceptual model depicts a relationship between the use of investment appraisal techniques and capital investment decisions. This relationship will be used to verify whether or not the investment appraisal methods used were suitable for the capital investment decisions made or the capital projects or investment options selected. These specific study variables ('use of investment appraisal techniques and 'capital investment decisions') will be supported by the theoretical and empirical reviews.

2.2 THEORETICAL FRAMEWORK

2.2.1 *Economic Theory:* This theory holds that profit will be maximized at a point where the marginal cost of an additional unit of output is equal to the marginal revenue from the output (i.e. MC = MR). In the context of capital budgeting, the marginal revenue of a firm represents the rates of return from succeeding investments while the marginal cost of capital (MCC) represents the cost of successive increments of the capital acquired by the firm. This theory assumes that all projects have the same risk. Government will therefore, embark on only those projects that will maximize the welfare of its citizens. The challenge here is that company shareholders have a single objective which is wealth maximization while the citizens of a country have differing objectives. Appropriate models will therefore, be used to maximize the welfare of the citizens.

2.2.2 *Portfolio Theory:* For shareholders to obtain the best advantage, business risk must be prudently managed by the financial manager. Every investment option comes with risk. Thinning out the funds invested makes the investment of funds less risky. According to this theory, all rational investor hold a portfolio of investments instead of investing in a single investment. For the citizens to maximally benefit from public investment, government

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should diversify the economy to reduce the riskiness of investment in government projects. Risk is therefore, a factor which cannot be overlooked whether the investment is in the public or private sector.

2.2.3 *Top-down Theory of Capital Budgeting:* This theory holds that capital budgeting process is a combination of bottom-up procedures (capital request from bottom to top) and top-bottom procedures (release of capital is at the discretion of top management). In capital budgeting, communication between top management and operations is very important. This is true because the information disclosed by investment choices can significantly influence stakeholders' choices. Applying this theory, it can be deduced that the relationship between government (top) and operational managers (bottom) should lead to optimal investment decisions that will be acceptable to all stakeholders (government, ministries' employees, fund providers and the citizen). The success or failure of any public investment will affect all the stakeholders.

2.2.4 EMPIRICAL REVIEW OF LITERATURE

After preparing an annotated bibliography, the following ten empirical studies were found to be in line with the theoretical bases of the current study:

Kee and Robbins (1991) conducted a survey in which they compared the results of municipal and county administrators' capital budgeting practices with the capital budgeting practices of organizations in the private sectors. The authors found that the procedures of capital budgeting in the aforementioned sectors were highly organized and largely relied upon whenever capital investment proposals are appraised but, unfortunately, public sector organizations seldom used advanced investment and risk-adjustment models used by private sector organizations. The authors attributed these later findings to political and some unquantifiable factors which predominantly affect the capital budgeting decisions of public sector organizations. Kee and Robbins also found that when dealing with very important and complex areas of capital budgeting, the perceptions of private and public sector managers were grossly at variance. This study is useful because it has definitely confirmed the dominance of political and other considerations in public sector capital budgeting decision making process.

Sekwat (1996) conducted a national survey to show the various capital budgeting decision models used by county government. The author found that (BCR) Benefit-cost-ratio and (PBP) Pay-back-period mostly used as evaluating and choosing techniques were sparingly used. The study further revealed that few counties considered risk and uncertainty when making their capital budgeting decisions. Finally, limited differences were revealed by the study when the use of the decisions models and evaluation of risks and uncertainty were analyse according to level of government, extent of urbanization and amount of capital invested. This study is important because it has discovered or revealed that fewer county governments now use discounted cash-flow models in appraising their capital projects contrary to the study of Kee and Robbins, 1991 which revealed that county governments seldom used sophisticated investment models. This is also gradually refuting the claim made by Kee and Robbins that county and corporate administrators think differently whenever they make capital budgeting decisions.

Peter and Eniola (2017), conducted a study using secondary data and telephone conversations with two directors of planning, research and statistics to assess and know how Rivers and

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Bayelsa State governments of Nigeria appraise their capital projects. The authors found that the two state governments first conceived the project ideas and communicate their socio-economic importance to the state governors. This according to the authors was followed by structural designs and bills of quantity which were forwarded to the due process unit to make recommendations after which the governors instructed their finance commissioners to release funds for execution of the projects thus bringing the appraisal to an end. This study did not report the use of either the non-discounted or discounted cash flow models. The authors did not also disclose the criteria used by the due process unit to make recommendations for approval and release of funds for project execution.

Mason (2014) argued that public investment in developing countries can only increase productivity and improve lives only when it is efficient and effective i.e. by taking investment appraisal seriously. In order to achieve the above objective, the author used 2010 to 2014 secondary data of World Bank OECD (Organization for Economic Cooperation and Development) and Kenya Ministry of Finance to support his argument. The article revealed that governments in developing countries partnering with donor agencies, lacked the capacity to appraise and choose the most beneficial investments because economic analysis was not seriously used to make their capital investment decisions. It was also revealed that efforts to sustain appraisal capacity were obtained through regular trainings organized by USAID (United States Agency for Information and Development and the developing country concerned. This article is important because it has shown that investment appraisal when efficiently and effectively applied, can improve the quality of investment in education, health and public infrastructure which will in turn increase productivity and improve the lives of the citizens of developing countries.

'Living in the world but not of the world (2009)' identified discount rate used by the Ugandan Local Government to appraise its capital projects for effective capital investment decisions. The article revealed that discount rate which is the investor's cost of capital or what he or she must pay to secure the investment fund is used to appraise capital expenditures i.e. the project will be acceptable if the return expected from it is higher than the discount rate. The present value of future benefits and costs of public sector projects is given by the discount factor usually generated by the discount rate. This present value shows all cash flows' monetary values in the current year (year 0) to allow for meaningful comparison over time. Two challenges were identified: intangible nature of public sector projects and measuring the benefits and cost of public sector projects in monetary terms to enable (CBA) cost-benefit-analysis to achieve its objective of selecting the most viable capital investment option in the public sector. The paper finally concluded that Tax-adjusted capital Asset Pricing model (CAPM) should be used to estimate the discount rate necessary for public sector investments since the discount rate is an essential part of each investment appraisal approach. The CAPM formula is stated as follows: WACC nominal = [RFR x (1 -Tc) + (Ep x βa)] / (1 - Te) Where: RFR = risk free rate; Ep = equity premium Tc = corporate tax rate Te = effective tax rate βa = Asset beta. The real Weighted Average Cost of Capital (WACCreal) on the other hand is computed using the following formula: WACC real = [(1 + WACCnominal) / (1 + i)] -1 Where: WACCreal = Tax-adjusted Weighted Average Cost of Capital; WACCnominal = Nominal Weighted Average Cost of Capital and i = Inflation Rate. This article is important because it shows that using a discount

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rate that is appropriate for public sector projects will result in allocative efficiencies which in turn will improve public sector investment. Improvement in the quality of public investment will lead to national development.

The authors Keown and Martin (1978) asserted that it is not possible to express the benefits relating to fire protection, reduced suffering, reduced loss of life and increased human potentials in monetary terms and even CBA which requires selecting an appropriate discount rate does not provide the best solution hence the goal programming approach. The purpose of this study was to develop a model that will be flexibly applied to achieve 10 public sector goals: system constraint, budget goal, annual operation expenses goal, political-social goal, law enforcement goal, fire protection goal, recreation facilities goal, community intellectual development goal, public housing goal and city cleanliness goal. A mathematical programming approach called goal programming was used to express the model objective function in terms of deviations from stated goals. Scalar weights were attached to these deviation variables and were subsequently ranked ordinally to facilitate efficient capital budgeting decisions. The authors asserted that Charnes and Cooper (1961) first suggested this approach while Ijiri (1965), Lee (1972) and Ignizio (1976) further developed it. The study model revealed that the first 7 out of the aforementioned goals were satisfied leaving goals 8 to 10 partially satisfied. This article provides a helpful guide for making capital budgeting decisions that relate to communities with conflicting goals. Recall that shareholders of a company have a single goal of maximizing profit while communities within the public sector have conflicting goals and this makes the quantitative appraisal of community projects more complex.

Devarajan, Squire and Suthiwart-Narueput (1995) conducted a study to assess the conclusion drawn by Little and Mirrlees (1991) as follows: "We have found that the extent to which social cost-benefit analysis is used and has real influence is not great, even in the World Bank." Consequently, the authors formulated the following question to guide their research: “What steps, if any should the World Bank take to put its appraisal of projects on a firmer analytical footing?” The authors addressed the foregoing question by moving away from some popular points usually made about project appraisal such as how externalities are measured and how shadow prices are estimated. They focused their attention on two central questions like “What is the proper role for project evaluation in today’s world where countries have reduced major economic distortions and are reconsidering the role of the state?” “Besides project evaluation, how else can economic analysis be used to ensure high-quality projects?” They argued that project appraisal should shift its emphasis from rate-of-return calculations to a more detailed assessment of the reason and justification for making provision for the public sector. The authors eventually suggested that for World Bank approved projects to be of high quality, pre-appraisal and review of sectoral public expenditure programs should be carried out.

Udoudoh and Oladokun (2015) carried out a study to determine whether the benefits derived from the provision of urban infrastructures justified the amount of funds expended on the infrastructure. They focused on the effective use of the cost-benefit technique to better the lives of the people. The investment appraisal techniques which the authors studied to achieve the study objective were: social cost benefit analysis, planning balance sheet analysis, development balance sheet, urban threshold analysis and goal achievement matrix (GAM). A modified GAM was used by them to assess urban infrastructural development in order to verify whether or not

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the objectives set for users have actually been achieved. The study revealed that while reasonable distribution of tariff and urban infrastructure were achieved, good quality, regular supply, adequacy and maintenance of the urban infrastructure were not achieved. In general terms, the cost of providing the infrastructure greatly exceeded its benefits. The study therefore, recommended that before embarking on the provision of any urban infrastructure, the appropriate investment appraisal techniques should be used.

Miller and Mustapha (2016) wrote this guide specifically to enable ministries of finance and planning in low-income and capacity constrained environments to become more efficient and effective in the management of their public investments. The authors emphasised that, how well a country's investment portfolio is managed is what determines its economic and social benefits. They disclosed the gap between theory and practice (i.e. paper work and practical work) by stating the meaning and features of public investment management systems in low income countries. The guide therefore, recommended efficient and effective investment appraisal, selection, implementation and evaluation. The authors concluded by providing annotated bibliographies from key literatures in the following areas: improve project design, selection and implementation, assessment of the quality and efficiency of the investment process through benchmarking, assessment of the public investment decision making process, new budgetary and accounting innovations in public investment management and an analysis of the difficulties of implementing public investments. What actually necessitated this guide was the growing gap between paper work and practical work in low-income countries caused by non-use or inappropriate use of investment appraisal techniques.

In their article, Brealey, Cooper and Habib (1997) attempted to identify those assets that should be owned by the public sector and to also investigate whether assets in the public and private sectors have different values. The authors asserted that government should own assets which the fear of expropriation by government has discouraged private sector investment or any privately owned assets that prevent efficient allocation of resources to the public. (Unhealthy monopoly). They further asserted that returns on government projects should be the as the returns expected from similar projects in the capital market and since government collects all tax revenues, cash flows before tax deduction should be discounted using discount rate before tax deduction. This therefore implies that since the private sector pays all taxes, it will use after-tax discount rate to appraise its capital projects. What this means is that the discount factors generated by the after-tax discount rate will be used to discount the private sector's after-tax cash flows to their present value terms in order to facilitate yearly comparison of cash flows. None of the forgoing studies attempted to investigate the degree of conformity of selected capital projects with chosen investment appraisal methods. The current study as stated earlier will attempt to fill this gap.

3. RESEARCH METHODOLOGY

3.1 Operational Definition of Study Variables

3.1.1 Use of Investment Appraisal Techniques: This independent variable is operationally defined as the composite response scores or weights attached to each respondent's perception about the use of investment appraisal techniques.

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3.1.2 Capital Investment Decision: In this study, the results of an investment appraisal can be represented by a choice between alternative capital investment projects. This is therefore, operationally defined as pieces of evidence or procedures which indicate that Cross River State Government has selected and accepted a viable capital project for financing. Decision making is choosing between alternative courses of actions. It is worthy of note that at the decision stage, funds for the commencement of work on the project has also been released. At this juncture, capital investment decision can also be operationally defined as commitment of money resources and addition to capital assets. This variable will be quantified by looking at the composite response scores attached to each respondent's perception about the pieces of evidence that capital investment decisions have actually been made.

This study has a target population of 21 officials of ministries, departments and agencies (MDAs) made up of all heads of finance, budget, research and statistics, and planning. 20 members were accessible from this target population and a sample of 20 heads of departments was drawn from the accessible population. Yaro Yamani formula was used to determine this sample size as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where sample size = n, accessible population = N and level of significance = e. By substituting the appropriate values into the formula above, the sample size, n equals to:

$$n = \frac{21}{1 + 21(0.05)^2}$$

$$= n(1 + 21(0.05)^2) = 21$$

$$= n(1 + 0.0525) = 21$$

$$= n(1.0525) = 21$$

$$= 1.0525n = 21$$

$$n = \frac{21}{1.0525} = 19.95 = 20 \text{ approx.}$$

Due to the inability of the researcher to manipulate the independent variable, ex-post factor research design approach was adopted. Use of investment appraisal techniques (independent variable) had already exerted its influence on capital investment decisions (dependent variable) before the research commenced. It was therefore, the nature of the effect of this independent variable that the study investigated. The 20 members were randomly selected from the target population using the simple random sample technique. A structured questionnaire which contained eleven (11) items or statements, were circulated to sample members using a 5 – point likert scale. (see table 1 on page). All the sample members responded and returned their questionnaires.

In order to test the reliability of the ordinal 5 – point scale data, Cronbach alpha was used. This also facilitated the conversion of the ordinal data to interval scale data. This approach made it appropriate for the simple linear regression analysis to be adopted. The relationship between the dependent and independent variables was expressed using the following equation:

CIVD = f (UIAT)

The regression model now becomes:

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$$CIVD = b_0 + b_1 UIAT + e_i$$

Where,

CIVD = Capital Investment Decisions

UIAT = Use of Investment Appraisal Techniques

b_0 = expected value (constant) of the dependent variable (CIVD) when the independent variable becomes zero.

b_1 = Coefficient which represents the contribution of the use of investment appraisal techniques (independent variable) to the occurrence of appropriate capital investment decisions.

e_i = *error term*

$b_0, b_1, \geq 0$

Please see tables 2 and 3 on pages 10 and 11 which show the distribution of composite likert scores of UIAT and CIVD that have been used in carrying out the simple linear regression.

4. RESULTS FROM PRIMARY RESEARCH

4.1 Test of Reliability and Validity of primary data prior to data analysis

The data collected for the independent variable (use of investment appraisal techniques) and those collected for dependent variable (capital investment decisions) were in conformity with Cronbach alpha which disclosed a reliability coefficient of above the required 0.70 The reliability coefficients of 0.70 and 0.76 respectively were obtained for the independent and dependent variables respectively. (as tables 4 and 5 on pages 12 and 13 respectively show.

4.2 Regression analysis (see table 6 on page 14)

The influence of the independent variable (use of investment appraisal technique was very low while the relationship between the two variables was not significant (R^2 = 0.073, F(1, 18) = 1.424, n.s). The intercept of the dependent variable (capital investment decisions) was positive when the independent variable becomes zero and this was not significant($\beta_0 = 1.545, n.s$).

4.3 Hypotheses testing(see regression output table 6 on page 14)

The following results were obtained after testing the null hypothesis:

Hypothesis: There is no significant relationship between use of investment appraisal techniques and the capital investment decisions of Cross River State of Nigeria. This regression results represented a positive correlation coefficient that is weak and it was not a significant result($\beta_1 = .299, n.s$). This therefore, resulted in the null hypothesis being accepted and the alternative hypothesis rejected.

4.4 Discussion of findings

The variability of the dependent variable (capital investment decisions) as explained by the independent variable (use of investment appraisal techniques) is shown by an adjusted R square of .022 which is .02 approx. (table 6 on page 14 shows). The model has an F – statistic of 1.424 at an alpha level of .25 (.248) and this was not significant. Therefore, the explanatory power of the model was very low. The basis for analysing the hypothesis is the regression output shown in table 6 on page 14

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4.4.1 Hypothesis: (as table 6 on page 14 shows)

There is no significant relationship between use of investment appraisal techniques and capital investment decisions. $(\beta_1 = .299, n.s)$The meaning of this is that with an unstandardized coefficient of .299, an increase in use of investment appraisal techniques by ₦1 will cause capital investment decision to increase by only ₦0.299, holding all other variables constant. For a standardized coefficient of 0.271, it means that as use of investment appraisal techniques increases by 1 standard deviation, capital investment decisions of Cross River State Government will increase by 0.271 standard deviation holding all other variables constant. This positive relationship was however, not significant (i.e. not being true) at a t-test statistic of 1.193 based on the alpha level of .05 (i.e. .248). The positive relationship that would have existed between use of investment appraisal techniques and capital investment decisions is very weak and not significant mostly due to the inappropriateness of the investment appraisal techniques used by government in selecting capital projects in Cross River State. Selection of capital projects was mostly based on non-investment appraisal related factors that have nothing to do with the chosen investment appraisal methods.

For instance, payback technique was chosen but it was not used to appraise capital projects with faster and more profitable returns while others who selected capital projects with faster and more profitable returns did not chose payback technique. Some of the MDAs claim they use net present value method of appraisal but, they failed to apply it to large mutually exclusive and independent projects with discounted cash flows. This research also revealed the following: Discounted payback period (selects projects that are viable and are affected by time value of money), accounting rate of return (selects projects that have expected returns higher than their initial investment), internal rate of return (select projects with highest return after making a comparative analysis), modified internal rate of return (select projects that have investment phase and return phase), profitability index (selects projects that have net present value greater than 1), real option theory (selects projects that generate other investment opportunities), game theory (selects underground construction projects that require the choices and thinking of other decision makers). Non-financial factors (selects projects that fits into the overall strategic objective of the organization or government) and risk analysis (which makes provision for risk before embarking on any capital projects).

5.1 CONCLUSION

Capital investment decisions basically involve making choices among competing capital projects. Such decisions have direct relationships with investment appraisal related factors. These investment appraisal related factors can also be viewed as actions taken before the capital projects are selected. Investment decisions must therefore, be in conformity with the chosen appraisal methods so that project failures do not occur. In general, investment appraisal methods are selected without taking cognizance of the capital projects that are suitable for them. Payback method of investment appraisal is suitable for capital projects that make faster and more profitable returns while net present value method is suitable for the appraisal of large projects that are mutually exclusive and independent and projects which also generate future net positive cash inflow.

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5.2 RECOMMENDATIONS

5.2.1 The quality of public investments will be improved when the nature of project is allowed to determine the investment appraisal method.

5.2.2 The practice of investment appraisal should always conform to the theory of investment appraisal

5.2.3 Financial and non-financial factors should be used to appraise capital projects as this will make the capital investment decisions to fit into the overall strategy of the organization.

5.2.4 High incidences of uncompleted and abandoned capital projects will be minimized when non-financial factors and risks are first considered before commencing any capital project.

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APPENDIX

TABLE 1: RESEARCH QUESTIONNAIRE

To what extent do you agree with each of the following statements in sections A and B below? Please indicate your answer by ticking right (√) against the response option of your choice.

To what extent do you agree with each of the following statements in sections A and B below? Please indicate your answer by ticking right (√) against the response option of your choice.

S/N	**Section A** **Use of Investment Appraisal Techniques (UIAT)**	Never	Rarely	Some times	Often	Always
1	My Organization uses Payback (PB)	1	2	3	4	5
2	We appraise our projects using the discounted Payback DPB	1	2	3	4	5
3	We use Accounting Rate of Return (ARR) for our appraisal	1	2	3	4	5
4	Net Present Value (NPV) is used by us to appraise projects	1	2	3	4	5
5	We use Internal Rate of Return (IRR) to appraise projects	1	2	3	4	5
6	We appraise our projects with Modified Internal Rate of Return (MIRR)	1	2	3	4	5
7	Profitability Index (PI) is used by my Organization for project appraisal	1	2	3	4	5
8	We use Real Option Theory for project appraisal	1	2	3	4	5
9	Game Theory is the technique we use when appraising our projects	1	2	3	4	5
10	Non-Financial Factors are used when projects are appraised by my Organization	1	2	3	4	5
11	We use Risk Analysis for all our capital projects	1	2	3	4	5
S/N	**Section B** **Capital Investment Decisions (CIVD)**	**Never**	**Rarely**	**Some times**	**Often**	**Always**
1	We select projects with faster and more profitable returns	1	2	3	4	5
2	We use time value of money and viability to select our projects	1	2	3	4	5
3	We select projects when expected return exceeds initial investment	1	2	3	4	5
4	We select large mutually exclusive and independent projects that generate future net positive cash inflow.	1	2	3	4	5
5	We select projects with highest returns after a comparative analysis	1	2	3	4	5
6	We divide our projects into investment phase and return phase before selecting them	1	2	3	4	5
7	We select projects when the excess of the present value of inflow over the present value of outflow is greater than 1	1	2	3	4	5
8	We select projects that have other investment opportunities	1	2	3	4	5
9	We select underground construction projects after considering the choices and thinking of other decision makers	1	2	3	4	5
10	We ensure that every project selected fits into our overall business strategy by balancing financial and non-financial factors	1	2	3	4	5
11	We first make provision for risks before selecting our projects	1	2	3	4	5

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Table 2: DISTRIBUTION OF 5-POINTS LIKERT SCALE RESPONSE SCORES AND TOTAL SCORES FOR USE OF INVESTMENT APPRAISAL TECHNIQUE (UIAT)

ID Number	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Total Scores
1	4	4	2	4	3	3	4	4	2	3	3	36
2	3	4	4	3	3	5	5	4	4	3	4	42
3	3	3	4	3	3	3	5	5	4	3	4	40
4	3	4	4	3	4	5	4	4	4	3	4	42
5	4	3	5	3	3	3	4	4	4	3	4	40
6	4	4	5	3	3	4	4	4	3	3	4	41
7	4	3	5	3	3	3	4	4	3	3	4	39
8	3	4	4	3	3	4	5	5	3	4	4	42
9	3	2	4	2	2	2	3	3	2	3	5	31
10	4	4	4	3	3	4	4	4	3	3	3	39
11	4	3	4	3	3	2	4	3	3	3	4	36
12	4	5	5	4	4	5	5	5	4	4	3	48
13	4	3	5	3	3	3	4	4	3	3	4	39
14	4	4	5	3	3	4	3	4	3	3	3	39
15	4	4	4	3	2	2	5	4	3	4	3	38
16	4	4	4	2	2	4	4	4	3	4	4	39
17	3	2	3	4	3	2	3	3	4	2	3	32
18	4	4	4	3	4	3	3	5	3	3	3	39
19	4	3	4	4	3	4	5	4	3	3	4	41
20	3	3	3	3	3	4	3	3	3	4	3	35

Table 3: DISTRIBUTION OF 5-POINTS LIKERT SCALE RESPONSE SCORES AND TOTAL SCORES FOR CAPITAL INVESTMENT DECISION (CIVD)

ID Number	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Total Scores
1	3	3	2	4	3	2	2	2	2	2	1	26
2	2	2	2	3	3	3	3	2	4	3	3	30
3	2	3	3	3	3	3	3	3	4	3	4	34
4	2	2	2	3	4	3	2	2	4	3	3	30
5	2	2	3	2	2	1	1	1	3	3	3	23
6	2	1	2	2	2	1	1	1	2	2	2	18
7	2	2	3	2	2	1	1	1	2	2	3	21
8	2	2	2	3	3	2	3	3	3	4	3	30
9	2	2	4	2	2	1	1	1	2	2	3	22
10	3	2	2	3	3	2	2	2	3	3	2	27
11	3	3	3	3	3	1	2	1	3	3	3	28
12	2	2	2	3	3	2	2	2	3	3	1	25
13	3	3	4	3	3	2	2	2	3	3	3	31
14	3	2	3	3	3	2	1	2	3	3	2	27
15	3	4	3	3	2	1	3	2	3	4	2	30
16	3	2	2	2	2	2	2	2	3	4	3	27
17	2	2	2	4	3	1	1	1	4	2	2	24
18	3	2	2	3	4	1	1	3	3	3	2	27
19	3	3	3	4	3	3	3	2	3	3	3	33
20	2	1	1	3	3	2	1	1	3	4	2	23

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TABLE 4: Results of Testing the Reliability of the Primary Data Collected for Use of Investment Appraisal Techniques Using Cronbach's Alpha Technique (The acceptable Reliability Coefficient of 0.70 was obtained for the data. Reliability Statistics table is displayed below)

Reliability

```
[DataSet1] C:\Users\Lizzy\Documents\Primary data for cronbach test for UIAT.sav
```

Scale: ALL

Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded[a]	0	.0
	Total	20	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.703	11

Item Statistics

	Mean	Std. Deviation	N
Item_1	3.65	.489	20
Item_2	3.50	.761	20
Item_3	4.10	.788	20
Item_4	3.10	.553	20
Item_5	3.00	.562	20
Item_6	3.45	.999	20
Item_7	4.05	.759	20
Item_8	4.00	.649	20
Item_9	3.20	.616	20
Item_10	3.20	.523	20
Item_11	3.65	.587	20

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item_1	35.25	13.355	.110	.711
Item_2	35.40	10.253	.648	.626
Item_3	34.80	11.537	.342	.684
Item_4	35.80	13.326	.089	.715
Item_5	35.90	12.095	.404	.676
Item_6	35.45	9.418	.583	.633
Item_7	34.85	10.766	.531	.649
Item_8	34.90	10.726	.669	.631
Item_9	35.70	12.116	.349	.682
Item_10	35.70	12.747	.259	.695
Item_11	35.25	14.618	-.217	.753

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
38.90	13.989	3.740	11

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TABLE 5: Results of Testing the Reliability of the Primary Data Collected for Capital Investment Decisions Using Cronbach's Alpha Technique (The acceptable Reliability Coefficient of 0.76 was obtained for the data. Please see Reliability Statistics table as shown below)

Reliability

```
[DataSet2] C:\Users\Lizzy\Documents\primary data for cronbach test for CIVD.sav
```

Scale: ALL

Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded[a]	0	.0
	Total	20	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.756	11

Item Statistics

	Mean	Std. Deviation	N
Item_1	2.45	.510	20
Item_2	2.25	.716	20
Item_3	2.50	.761	20
Item_4	2.90	.641	20
Item_5	2.80	.616	20
Item_6	1.80	.768	20
Item_7	1.85	.813	20
Item_8	1.80	.696	20
Item_9	3.00	.649	20
Item_10	2.95	.686	20
Item_11	2.50	.761	20

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item_1	24.35	15.818	.255	.754
Item_2	24.55	13.734	.540	.720
Item_3	24.30	16.537	.000	.791
Item_4	23.90	14.832	.380	.741
Item_5	24.00	15.053	.353	.744
Item_6	25.00	13.368	.562	.716
Item_7	24.95	12.261	.737	.686
Item_8	25.00	13.474	.618	.710
Item_9	23.80	14.274	.494	.728
Item_10	23.85	14.871	.335	.747
Item_11	24.30	15.168	.231	.762

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
26.80	17.116	4.137	11

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TABLE 6: The results of simple regression analysis of the data collected for UIAT and CIVD

Regression

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	USE OF INVESTMENT APPRAISAL TECHNIQUES[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: CAPITAL INVESTMENT DECISIONS

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.271[a]	.073	.022	4.092

a. Predictors: (Constant), USE OF INVESTMENT APPRAISAL TECHNIQUES

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23.838	1	23.838	1.424	.248[a]
	Residual	301.362	18	16.742		
	Total	325.200	19			

a. Predictors: (Constant), USE OF INVESTMENT APPRAISAL TECHNIQUES

b. Dependent Variable: CAPITAL INVESTMENT DECISIONS

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15.150	9.806		1.545	.140
	USE OF INVESTMENT APPRAISAL TECHNIQUES	.299	.251	.271	1.193	.248

a. Dependent Variable: CAPITAL INVESTMENT DECISIONS