

**APPLICATION OF ACCOUNTING METHODS AND
TECHNIQUES IN APPRAISING RIVAL PROJECTS IN
SITUATIONS OF RISK AND UNCERTAINTY**

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CERTIFICATION

This is to certify that this project written by ADEMU MARTINA HASSANA with Registration Number PG/MBA/07/46745 presented to the Department of Accountancy, University of Nigeria Enugu Campus (UNEC), is original and has not been submitted for award of any degree or diploma either in this or any other tertiary institution.

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This is certify that this research work written by ADEMU MARTINA HASSANA with Registration Number PG/MBA/07/46745 presented to the Department of Accountancy, University of Nigeria Enugu Campus (UNEC), was submitted in partial fulfillment for the award of MBA in Accountancy.

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DEDICATION

This work is dedicated to the memory of my late father Chief Ademù Chigbogu and my beloved mother Mrs. Afulenu Ademù.

ACKNOWLEDGEMENT

I am particularly grateful to God who made it possible for me to have reached this stage in life and under whose care, protection and guidance I was able to achieve the much I had done.

My humble regard equally goes to my supervisor Dr. (Mrs.) Regina Okafor, who saw me through, irrespective of work, still have the courage and perseverance to carry me along throughout the research process.

My special thanks also goes to Dr. Daniel Ademue who left no stone unturned to have made me what I am today. Though you are a brother you acted like father to me. May God Almighty bless you and your family. (Amen).

Also worthy of mentioning is Hon. James Ikechukwu Ademue thank you for all your assistance to me both financial and otherwise. May God bless you and your entire family.

My special thanks equally goes to my beloved husband Mr. Alogwuja Nathaniel Joel. Thank you for been for me and love you so much.

ABSTRACT

In the practical word of business, certainty is a luxury rarely enjoyed by investors. Quite often, investor have to make very important investment decisions in situations of uncertainty and risk.

This study looked into the use of accounting methods and techniques. When appraising rival projects in situations of risk and uncertainty. The study tried to ascertain the extent to which individuals and businesses use accounting techniques and methods, when appraising rival projects in situations of risk and uncertainty.

In the process of carrying out the study, secondary data were gathered from books and journals, while primary data were obtained through personal interview and questionnaires administered to select business executives, accounting and to accounting staff of the accounting section of various organizations.

Simple percentage and chi-square techniques were employed in analyzing the data and testing of hypothesis formulated.

The findings included amongst others:

1. In practices most companies do not use accounting methods and techniques to incorporate risk and uncertainty when appraising rival projects
2. Rival projects selected in situations of risk and uncertainty using accounting methods and techniques generally perform better than other projects.

Based on these findings, some recommendations were put forward for consideration in chapter five.

CHAPTER ONE

1.1 BACKGROUND OF THE STUDY

Many accounting techniques and methods are available for appraising projects. Such techniques include: the net present value (NPV), internal rate of return (IRR), accounting rate of return (ARR), the profitability index (PI). Many of the accounting techniques available for appraising projects is based upon a basic assumption of certainty as regards the ultimate outcome of an investment opportunity. This assumption of certainty makes such techniques unrealistic and therefore inadequate in appraising projects in the practical world of business.

Since conditions of certainty are not tenable, or are at best very rare, in the investment world, it becomes imperative to make an enquiry into the use of accounting techniques in appraising rival projects in the situations of uncertainty and risk. In the practical world, managers of business often have to make decisions in situations of risk and uncertainty as regard which project to invest in or which project to reject. Such decisions, if necessary made, could result in heavy losses to the organization. In order to be able to make the best decisions in such situations, managers should be aware of the various techniques which could be used in appraising the projects to determine their viability or otherwise. Managers should

also be aware of which particular techniques to use in any particular given situation.

To a large extent, it is this need for managers to be able to make decisions when appraising projects in situation of risk and uncertainty that motivates this study into this particular topic.

1.2 Statement of the Problem

Investors in the business world of risks and uncertainties are confronted with problems of selecting rival projects. This may be due to in adequacy of funds, limited managerial ability and mutual exclusiveness of some projects, investors, have to choose between two or more rival projects.

This research will also try to compare the performance of those businesses that use accounting techniques to appraise their projects in situation of risk and uncertainty with the performance of those businesses that do not use .

1.3 Objectives of the Study

The objectives of this study will include the following:-

- i. An evaluation of the various accounting methods and techniques available for appraising projects in situations of risk and uncertainty.
- ii. Ascertain the extent, if at all, company management use accounting

techniques when appraising their rival projects in situations of risk and uncertainty.

- iii. A comparative analysis of the performance of companies that use accounting techniques in appraising their rival projects in situations of risk and uncertainty with that of companies that do not.

1.4 Significance of the Study

Up to now, companies and organizations have tended to dwell so much on those accounting techniques which assume certainty as regards the outcomes of projects. However since situations of certainty are indeed very rare in the investment world, the significance of this study can hardly be over-stressed.

When completed, this study will help in highlighting to companies, those accounting techniques available for appraising projects in situations of risk and uncertainty in order to achieve higher returns and maximize the utility of the organization.

This study will also serve to highlight the highpoints and short-coming of these various techniques and also establish which methods would be best to use under given conditions.

Finally, this study will also be significant in the area of aiding other researchers and research scholars who may wish to carry out further research on

the subject matter or on other related topics.

1.5 Research Questions

- i. What are the various accounting techniques available for appraising projects in situations of risk and uncertainty?
- ii. What are the highpoints and short-comings to these techniques?
- iii. To what extent, if at all, are those techniques being used by organizations in practice?
- iv. Does companies that use accounting techniques in appraising rival projects in situations of risk and uncertainty perform better than other companies that do not use these techniques?

1.6 Research Hypothesis

The following hypothesis shall be subjected to testing:

1. Ho: Business, in practice, do not use accounting techniques in appraising projects in situations of risk and uncertainty.
Hi: Business, in practice, use accounting techniques in appraising projects in situations of risk and uncertainty.
2. Ho: There is no difference between the performance of businesses that use accounting techniques in appraising their

projects in situation of risk and uncertainty and those that do not use them.

Hi: There is different between the performance of businesses that use accounting techniques in appraising their projects in situation of risk and uncertainty and those that do not use them.

1.7 Conceptual and Operational Definitions

1. Cash Flow

It is the same thing as the various receipts and payments that are made throughout the life span of a project. These receipts are termed cash inflows, while payment are termed cash outflows.

2. Certainty:

This is a situation where a potential investor has full knowledge of the ultimate outcome of an investment opportunity. A condition of certainty exist where the probability of realizing out come is one.

3. Capital Rationing

This is the allocation of scarce capital resources among competing economically desirable projects which cannot all be carried out due to capital or other constraints.

4. Management

This refers to a group of people charged with the responsibility of directing, planning, controlling, organization to ensure the achievement of organizational goals and objectives.

5. Ranking

This is the arrangement of projects in order of preference or viability.

6. Risk

A condition of risk exists where an investor knows the range of possible outcome to expect from an investment opportunity as well as the likelihood (probability) of each outcome.

7. Uncertainty

This is a situation of near ignorance of the future outcome of decisions. It arises where the decision taken has no dependable information about the nature of significance of factors which affect the investment.

1.8 Limitations of the Study

The scope of this work is limited by the following:

- i. Time: The time available to the researcher to carry out this piece of research could not allow very extensive research into the subject matter. In addition, the researcher also has to carry out her normal class work along side this research project.
- ii. Finance: the amount of funds available to the researcher also helped to limit the scope of this work. Some materials that may have aided the research could not be acquired, also transportation costs and cost of other logistic did not allow the researcher to visit all the companies she would have wanted to visit.

1.9 Scope of the Study

This study has been designed to cover investment decisions of profit oriented organizations in situations of risk and uncertainty. Thus charitable

organizations and non profit making organization are outside the scope covered by this study.

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CHAPTER TWO

2.0 LITERATURE REVIEW

Analytical Frame Work

It is absolutely necessary in a study of this nature to review the available literature in the subject as a guide towards eventual determination of the most viable accounting techniques used to appraise rival project in the situation of risks and uncertainties and the solutions to those risks.

This chapter reviews related literature existing on this area of study. Many works have been done on projects appraisal techniques. So as far as these concepts are concerned, this study is not a pioneering effort, previous works by several authors have been consulted and their opinions incorporated in this works.

2.1 Historical Perspective on Project

Appraisal Techniques

Anyafu (2000:1) discovered that investment decisions are of two types. Those involving selection of new projects and those involving replacement of existing

facilities. He defined budgeting as the process of making long-term planning decisions where consumption and investment alternatives are balanced time in the hope that investment now will generate extra returns in the future.

Anyafu (2000:1) was able to establish that most expenditure on plant, machinery and other fixed assets affect operations over a number of years. They are large permanent commitments that influence long-term flexibility and earning power. Decisions in this area are among the most difficult, primarily because the future is uncertain.

Anyafu (2000:1) noted that investment decision-making is a top management task. This he attributed to the scale and long-term nature of the consequences of such decision. He stated that a very important part of a financial manager's job is to provide information, which will assist decision-making on investment of capital funds.

Anyafu (2000:2) was of the opinion that a proper procedure for capital budgeting is developed and installed in an organization. He pointed out that a clearly defined system will ensure that project are approved or rejected at the most appropriate level of management. This he said should ensure that a decision is arrived at as quickly as possible with the most efficient use of valuable management time. He outlined the important steps involved in capital project as (i) Origination, (ii) appraisals, (iii) selection,

(iv) Implementations and (v) post-investment audit

Project Origination:

The origination of investment proposals is the starting point in capital budgeting. Capital expenditure ideas flow into the enterprise through various schemes or proposals by the firm's stakeholders particularly the management staff. These ideas emanate from the creative instinct of the persons concerned. Management should create an environment in the organization free from inhibition so that all potential generators of useful project ideas may have the scope to put forward their ideas. All such proposals should be carefully considered and screened at the appropriate levels and finally submitted for top management decision.

Project Appraisal:

Appraisal of a project involves two-steps: estimation of cost and benefits measured in terms of cash flows, and choice of an appropriate criterion of budget the desirability or otherwise of the investment.

Project Selection:

Project screening and selection procedures differ from one organization to the other, but corporate financial policy should provide general guidance about the minimum rate of return expected on capital projects. The minimum rate should

normally reflect a realistic assessment of the firm's capital structure and liquidity position. Besides the policy on minimum rate of return, management must specify the risk policy of the firm. Selection of any particular project would depend on its risk-return profile.

Project Implementation:

Funds are appropriated for capital expenditures after the final selection of investment proposals. Allocation of funds should be in accordance with the firm's capital expenditure budget and utilized strictly for the authorized purposes.

Post-Investment Audit

The issue here is capital control. Post-investment audit can be achieved through a good internal control system. It is self-defeating to carefully classify, appraise and approve project by then fail to monitor the progress of accepted projects.

Idowu (2004) stated that organizations operate in a dynamic environment. He postulated that they must therefore continually make changes in different areas of their operations in order to meet the challenges that the dynamic nature of the environment brings and also in order to survive and prosper. It is believed that according to him, that continuous changes could improve the way things are done, thereby putting the organization at an advantage over their competitors. He further said that most changes involve capital expenditure, which can invariably involve

large sums of money. This expenditure according to him might involve replacing existing fixed assets with something more efficient and up to date or acquire an entire business.

He opined that the decision to go ahead with any capital expenditure of a significant amount could necessitate spending a large sum of money. He advised managers to give careful thought to every step that they need to take before a final decision is made on whether or not to invest money on such a project. Most investments, he further stated would have one form of return or another, The question to address is whether or not the future returns will be sufficient to justify the sacrifices the investing entity would to make.

He said that before an organization goes out to appraise an investment opportunity, a strategic need for the project must exist. The strategic need will determine, amongst other things, such as which of the many investment opportunities before the entity will best help to meet their strategic objectives, how much to commit to the project and when to undertake the investment. He said that the organization might use SWOT and PEST analysis in order to be able to provide answer to these and similar questions.

He gave the basic information the appraiser must have about the following relevant areas in order to appraise an investment project as:

1. Cost of investment project.

2. Estimated life of project.
3. Estimated net cash inflows from project.
4. Estimated residual value of project at the end of its life if applicable.
5. Cost of capital.
6. Taxation implication of project.
7. Inflation rates and effect on project.

He advised that anyone who has had plan for future activity event should understand that the future is never certain. Bearing this in mind, one must try to predict the future by drawing from past experience and using available information either from published statistics or from other sources. Some of the data requires about the project he further advised would have to be estimated taking into consideration all available information. The accuracy of these estimated data would have a consequential effect on the final result of the decision; as such care must be taken in making these estimates. Idowu (2000:58) stated that when the decision-maker at his/her disposal basic information about the project as stated above, he/she is then ready to use one or more of the four main methods use is appraising investment projects.

The four main methods according to Idowu (2004) are:

(1) **Payback Method:**

The payback method is used to determine how long it will take for future

cash inflows from the project, to equal the initial cost of the project. The method as the name implies establishes the payback period of each project. As the method stands, the shorter the payback period the better.

The reason being that it is critical that the initial cost of the project is recovered quickly. In any case, most organizations have a set of standard Payback Period for each investment project. They will in most cases compare the Payback Period from each investment project with the pre-determined Payback Period. Any project that falls short of the standard payback period according to him will be rejected.

He said that evidence has shown that apart from this fact, managers will prefer to use the method as an initial a screening process it is easy to use and understand by them. One important disadvantage of the method is that it ignores the time value of money. It also ignores profitability of the project but stresses the importance of liquidity.

(2) Accounting Rate of Return (ARR)

This method ARR according to Idowu (2000:59) is also referred to by some others names such as Return on Investment (ROI), Return on Capital Employment (ROCE). The most important thing to remember about this method is that it establishes rates of return on projects. There are different ways of determining a rate of return. For this purpose, we will use Average Capital Accounting profits

divided by Average Capital Employment multiplied by 100. That is:

$$\text{ARR} = \frac{\text{Average Accounting Profits}}{\text{Average Employed}} \times 100$$

Where: Average Accounting Profits = Profits over that life of the project/life of the project.

Average capital employment - Initial cost of project + scrap value/2. When there are two or more investment project, rates of return are compared. A project, which has a higher rate, will be recommended, as this is an indication that it will give a higher return to the investing entity compared with the one with a lower rate.

Discounted Cash Flow (DCF) Methods:

The Net Present value (NPV) and Internal Rate Return (IRR) are the two investment appraisal methods under DCF according to Idowu (2004)

Net Present Value (NPV) Method:

Of all the Accounting techniques, the NPV is often argued to be the most superior. This he said is because it takes into account the time value of money. The method assumes that a pound today is worth more than a pound this time next year. According to him, it works under the assumption that if one is owned a pound and the borrower offers a choice of either giving the pound now or in a year's time; the more rational option for the lender is to take the pound now. Provided the lender does not keep the pound under his mattress at home, it will be worth more than a pound in a year's time.

The reverse is true if the borrower has the option to pay either now or in a year's time, the borrower would choose to pay in the future as the pound he/she would have paid now. It stresses that future cash flows should be expressed in terms of what they are worth now when cash is expended on the project. The present values of this future cash flow can then be compared with what we are spending now on the project. In other words, the NPV is saying that one should compare like with like, which of course is a statement. By setting the future cash inflows from the project without discounting them against the initial capital cost, one is not being realistic and fair, he said.

When present values of cash outflows and inflows are compared, if the result gives a positive NPV, then the project should be recommended. In a mutually exclusive situation, that is, when you can only undertake one project and not two project at the same time, if two projects were to give NPVs, and then the project with the higher NPV is the one to recommended.

Internal Rate of Return (IRR) Method.

Often an entity would want to establish its internal rate of a project for various reasons e.g., for decision-making purposes.

By IRR we mean a rate will be used to discount future cash inflows to make the total of the present values equal cost of the project. The attempt being made under IRR is to find a rate that will equate the NPV of a project to be zero. The

IRR therefore is the maximum rate of discount that will be used to finance a project without making a loss from it.

Again in a mutually exclusive situation, the project that has the highest IRR is the one to recommend. The reason he said being the IRR is showing the highest rate that can be used to finance a project without incurring a loss from it.

In order to find the IRR manually, this is done by the trial and error approach. By this he means using a discount rate, which gives a positive NPV and another rate, which gives a negative NPV. Then apply the formula.

$$IRR = A + a \times \frac{(B - A)}{a + b}$$

Where:

A = the lower discount rate which gives the positive NPV

B = the higher discount rate which gives the negative NPV

a = the value of the positive NPV

b = the value of the negative NPV

(a and b should be added together as the negative sign in b ignored)

Anyafu (2000:5) noted that techniques of investment appraisal could be grouped into two categories namely the traditional methods and the time - adjusted method. He started that two particular methods of comparing the attractiveness of investment options are termed traditional in literature. These are the Payback

Period and the Accounting rate of Return. Time-adjusted methods are the Discounted Cash Flow (DCF) techniques, which are the Net Present (NPV) the Internal Rate of Return IRR)q and the Cost-Benefit Ratio (or profitability index).

Anyafu (2000:6) observed that an investment appraisal method, which will serve a useful purpose, needs to possess the following necessary attributes:

- a) It should have the capability of resolving the problem of choice among alternative projects.
- b) It should have the ability to discriminate between an acceptable and an unacceptable project.
- c) It should have the capability of wide application to different types of projects.
- d) It should have the capability of providing a basis for ranking project desirability.
- e) It should have the ability to recognize and highlight higher and timely benefits. HE gave the definition, merits and demerits of the traditional and the time-adjust methods as follows:

Payback Period

Payback period is the length of time required to recoup the initial outlay

invested in a project. It is the number of years, which it takes the cash inflows from a capital investment project to equal the original cash outflows.

T_p = Cash outlay

Average Cash inflow per Annum

Where,

T_p = the project payback period

He said that in alternative, the payback period can be determined by a sequential year-by-year check-off of cash inflows against the project capital cost. This he said is used for cases of unequal period in cash inflows.

Anyafu (2000:8) gave the project decision Rule Given.

T_e = the expected payback period set by the management or specified as the budgeted payback period, then:

If $T_p \leq T_e$, Accept the project or else,

If $T_p > T_e$, Reject the project.

He said that when deciding between two or more competing projects, the usual decision is to accept the one with the shortest payback. The underlying rationale he further stated for this decision rule is that the shorter the payback period, the less risky the project and the greater the liquidity

Merits and Demerits of Payback Period

The merits of using the payback period method of evaluating an investment

project are that (1) it is easy to understand and simply to calculate (2) it uses project cash flows rather than accounting profits and hence it is more objectively based, (3) it favours quick-return projects which may produce faster growth of the business and enhance liquidity, (4) it costs less than the other sophisticated techniques in terms of analysts time and computer usage.

The demerits of this method are that (1) It does not recognize the time value of money; (2) It fails to consider the pattern of cash inflows that is the magnitude and timing of cash inflows. It gives equal weight to returns, (3) It ignores the impacts of cash inflows after the payback period, (4) It overlooks the importance of overall profitability of an investment as only the cash earnings before the payback period are recognized, (5) determining the expected or budgeted payback period is subjective and may create administrative difficulties,

Accounting Rate of Return

It is ratio of average annual profits, after depreciation, to the capital invested (Anyafu,2000:14). This is a basic definition only and variations exist, for example; Profits may be before tax or after tax; Capital may or may not include working capital; capital invested may mean the initial capital invested or the average of the capital invested over the life of the project.

ARR = Estimated Average Profit

Estimated Average Investment

Or

Account both the time value of money and also the total profitability over a project's life. According to (Anyafu, 2000:21) DCF techniques look at the cash flows of a project, not the accounting profit. Like the payback technique, DCF is concerned with liquidity, not profitability.

Net Present Value (NPV)

Anyafu (2000:23) defined as NPV as the excess of the present value (PV) of cash inflows generated by the project over the amount of the initial investment.

$$NPV = \frac{F_1}{(1+k)^1} + \frac{F_2}{(1+k)^2} + \dots + \frac{F_n}{(1+k)^n} - P$$

$$= \sum_{t=1}^n \frac{F_t}{(1+k)^t} - P$$

Where, $F_1, F_2 \dots F_n$ = future cash inflows at time, $t = 1, 2 \dots n$

k = cost of capital of the firm

p = initial cash outlay of the project

n = Life span of the project

Internal Rate of Return (IRR)

Anyafu (2000:30) define IRR as the discount rate flows with the project's initial cash outlay. It is a break - even rate at which the NPV of an investment is

zero.

$$P = -F^0 + \frac{F^1}{(1+r)} + \frac{F^2}{(1+r)^2} + \dots + \frac{F^n}{(1+r)^n}$$

$$P = -F^0 + \sum_{t=1}^n \frac{F^t}{(1+r)^t}$$

$$t = 1, 2, \dots, n$$

$$P = -F^0 + \sum_{t=1}^n \frac{F^t}{(1+r)^t} = 0$$

Where $F^1, F^2, \dots, F^n$ = future cash inflows at a time, $t = 1, 2, \dots, n$

r = the internal rate of return (IRR)

n = life span of the project

p = initial investment outlay.

According to Anyafo (2000:31), the decision rule

i) If $r > k$, then accept the project, or else.

ii) If $r < k$, then reject the project

Where k is the firm's required rate of return, that is the firm's cost of capital or a pre-determined investment hurdle rate, and r is the internal rate of return (IRR).

Duncan (2003) was of the opinion that the financial appraisal should form only a part of the decision as to whether or not to invest in a capital project and that there will be other factors that need to be considered in making the final decision.

This is said include the making of risk and reward, the intangible benefits of undertaking a particular project, how each project fits in with the strategic aims of the business, the liquidity of the project and the return to shareholders. It however said that the financial appraisal does provide a quantitative analysis, which gives a firm basis from which a considered decision can be made.

It discovered that capital investments tie up significant amount of resources for long periods of time and consequently the decisions to invest become a critical part of the business plan.

It outlined the types of investment decisions against which investment appraisal can be applied as:

- i) Expansion of building, plant, equipment and stock
- ii) New product lines, business diversification and new enterprises
- iii) Cost savings, such as technology versus labour
- iv) Weather or when to replace a piece of capital equipment
- v) Choosing between alternatives
- vi) Determining optimum financing options, such as lease versus purchase.

It advised that when evaluating projects; whether or not they are competing for that scare resources, capital, the appraiser need to consider the cost of capital, the asset's residual value, the cash flows and timings emanating from the project,

taxation including capital allowances, grants, risk and cost benefit.

It said that there are three principal methods of project appraisal:

- (i) Payback Period
- (ii) Accounting rate or Return (ARR)
- (iii) Discounted Cash Flow, which splits into:
 - (iiia) NPV
 - (iiib) Internal Rate of Return (IRR)

Payback Period (PBP)

This is said to be calculated by determining the length of time required to recover the initial investment. It mentioned that the advantages of the payback period are its simplicity.

Its disadvantages are that it ignores what happens beyond the payback period, the time value of money and is concerned with cost recovery not profitability. It further pointed out that the payback period is considered more of an indication of risk rather than an investment criterion.

Accounting Rate of Return (ARR)

It was of the opinion that ARR is the accounting profit as a percentage of the capital employed. It gave the advantages of the ARR as its simplicity and its concern with profitability; however it still has the disadvantage of ignoring the

time value of money and also is dependent of the depreciation policy adoption by the business.

Discounted Cash Flow (DCF)

It opined that DCF focus on the time value of money; ≥ 1 in the future. The reason it further said being that it could be invested and makes a return (yes, even in time of low interest, so long as interest rate are positive).

It gave the discount formula as: $I / (1+r)^n$, where I = investment, r = discount rate of interest and n = number of years.

It further attributed that the discounting methodology, DCF has two methods:

(i) Net Present Value (NPV):

The annual cash flows are discounted and totaled and then the initial capital cost of the project is deducted. The excess or deficit it further said is the NPV of the project, it was of the view that it goes without saying that for the project to be worthwhile the NPV must be positive and the higher the NPV the more attractive is the investment in the project.

(ii) Internal Rate of Return (IRR)

It defined the IRR or yield of a project as the rate of return at which the present value of the net cash inflows equals the initial cost, which it maintained is the same as the discount rate, which produced a NPV of zero.

It further said that for an investment to be worthwhile the IRR must be

greater than the cost capital.

The advantages of the discounting methods as it said are that they are concerned with profitability and the time value of money. They also provide a common denominator, being today's value for variable lengths of investment.

Their disadvantages according to it relate to the complicated (relative) nature of the calculations, the choice of the rate of discount to apply, giving rise to the possibility of multiple solutions existing and the assumption that cash surpluses can be reinvested at the same rate.

It has not dwelled on an IRR calculation since this discounting method is not generally used.

Duncan (2003) said that it was grateful to the research carried out by Arnold and Hatzopoulos in 1999 on appraisal methods used by UK firms. Their findings based on research into a sample of companies from the times 1000, of varying sizes, found, amongst other things, that DCF methods were used by some 96 percent of the respondents. Amongst larger companies NPV was used more frequently than IRR and a surprising 70 percent of respondents still used the rule of thumb, payback methodology. ARR was used by just over 50 percent of the respondents. What the survey established according to it was that no one single method of investment appraisal was used exclusively by the respondents, rather they used a mixture of these methodologies, but with no consensus on the actual

combination. It further said that using more than one methodologies to evaluate a single investment opportunity or comparing a number of opportunities is rather like mixing apple and rears.

This research it opined does add weight to the academic cry that the NPV is the correct method of investment appraisal to use, there are those that say that NPV fails because it does not fully take into account the size of the capital investment required to produced an increased value and may not identify the most advantageous mix of projects when there is a capital shortage.

It emphasized that amongst these critics are Lefley and Morgan who have developed a financial appraisal model, which has extended the traditional appraisal methodologies so as to provide more considered comparison for individual investment projects and in situations where projects are competing for capital.

It said that Lefley and Morgan model creates a NPV profile (NPVP), which extends the NPV by incorporating the discounted payback period (DPB) the discounted payback index (DPBI) and the marginal growth rate (MGR) into a financial profile of an investment opportunity.

The NPV, DPBI and MGR according to it help to identify projects that are beneficial to the long-term interest of the shareholders, in other words.

It further emphasized, their economic return and the DPB measures the projects time risk and liquidity.

Hirst (2000) acknowledged that the pressure on companies to maximize returns to shareholders places a weight of responsibility on the organization to ensure that each investment opportunity is subject to the best available investment appraisal is conducted as effectively as possible.

He stated various appraisal techniques as payback period (PBP), Average rate of Return (ARR), Discounted cash flow method which he said is of two type- Net present value (NPV) and Internal Rate of Return (IRR) and outlined argument in favour of against each appraisal techniques.

Arguments in Favour of Payback Period

Firstly he stated, it is popular because of its simplicity. He further said that research over the years has shown that UK firms favour it and perhaps this is understandable given how easy it is to calculate.

Secondly he said, that in a business environment of rapid technological change, new plant and machinery might need to be replaced sooner than in the Past, so a quick payback on investment is essential.

Thirdly, the investment climate in the UK in particular, according to him, demands that investors are rewarded with fast returns. Many profitable opportunities for long-term investment he remarked are overlooked because they involve a longer wait for revenues to flow.

Arguments against Payback Period

It lacks objectivity. Who decides the length of optimal time? No one does- it is decided by pitting one investment opportunity against another he explained Cash flows are regarded as either pre-payback or post - payback, but the latter tend to be ignored. Lastly, he said that payback takes no account of the effect on business profitability. Its sole concern is cash flows he added.

In summary, Hirst (2000) emphasized that it is probably best to regard payback as one of the first methods you use to assess competing projects. It could be used, as an initial screening tool, but it is inappropriate as a basis for sophisticated investment decisions.

Average Rate of Return

According to him, average rate of return express the profits arising from a project as a percentage of the initial capital cost.

$$\text{ARR} = \frac{\text{Average annual revenue} \times 100}{\text{Initial capital costs}}$$

Advantages of ARR:

As with the payback method, the chief advantage with ARR according to him is its simplicity. This makes it relatively easy to understand. He added that there is also a link with some accounting measures that are commonly used. The Average rate of Return is similar to the Return on Capital Employed in its construction; this may make the ARR easier for business planners to understand. He said that ARR is expressed in percentage terms and this, again may make it easier for managers to use.

Arguments against ARR:

Firstly, he said that ARR doesn't take account of the project duration or the timing of cash flows over the course of the project.

Secondly, he said that the concept of profit can be very subjective, varying with specific accounting practice and the capitalization of project costs. As a result, the ARR calculation for identical projects would be likely to result in different outcomes from business to business.

Thirdly, he further emphasized that there is no definitive signal given by the ARR to help managers decide whether or not to invest.

This lack of guide for decision-making he said means that investment decisions

remain subjective.

Discounted Cash Flow Methods

i. Net Present Value: He was of the opinion that the Net present value (NPV) as the first Discounted Cash Flow (DCF) technique relies on the concept of opportunity cost to place a value on cash inflows arising from capital investment. He explained that opportunity cost is the calculation of what is sacrificed or forgone as a result of a particular decision. He further referred opportunity cost to as the *real* cost of taking some action.

He advised that the concept of present value can be looked at as being the cash equivalent now of a sum receivable at a later date. So how does the opportunity cost affect revenue that we can expect to receive later, he asked. Well, trying to find a solution to the question, he imagined what a business could do now with the cash sums it must wait some time to receive.

Hirst (2000) explained, if you receive cash you are quite likely to save it and put it in the bank. So, he further explained that what a business sacrifices by having to wait for the cash inflows the interest is lost on the sum that would have been saved.

Looking at another way, he said, it is likely that the business will have borrowed the capital to invest in the project. So, what it foregoes by having to wait for the revenue arising from the investment he said is the interest paid on the

borrowed capital.

In summary, Hirst (2005) was of the opinion that NPV is a technique where cash inflows expected in future years are discounted back to their present value.

This he said is calculated by using a discount rate equivalent to the interest that would have been received on the sums, had the inflows been saved, or the interest that has to be paid by the firm on funds borrowed.

(ii) The IRR approach asks if the IRR on the, project is greater than the borrowing rate.

Gana (2001:119) was of the opinion that one of the first decisions an entrepreneur takes when he has sourced his business funds is to buy capital (fixed) assets. According to him, the benefit derived from a fixed asset goes beyond one year. Therefore, the current outlay of cash in fixed assets may not be realizable within a year he emphasized. The benefits derivable from the assets will accrue over one year. This he said means that when a firm invests in fixed assets, it uses current cash outlay for future benefits. The implication of this he opined is that the money invested in fixed assets are permanently held to some extent and taken away from circulation within the firm.

He was of the opinion that since investment in fixed assets ties down money over a long run means that the entrepreneur cannot afford to buy fixed assets without careful evaluation, of what is needed for the operations of the firm. He said

that only assets that needed must be bought. He stated that if one buys items that are not immediately needed, it means that one is investing in idle assets and while the assets are lying idle, the working capital is depleted and of course the result is shortage of working capital this he said can lead to insolvency and subsequently to business failure.

To avoid business failure due to the over investing in fixed assets which culminates into idle assets he advised, there is the need for the entrepreneur to carefully evaluate an investment proposal very carefully before committing his financial resources into it. He further advised that proper evaluation and appraisal of a project allows one to know the worthwhileness of the commitment of money into the project. It allows you before hand to determine and compare the cost and benefits of the proposal. He said that the benefits must surpass the cost before the proposal can be accepted.

The proper evaluation and appraisal before committing the money he emphasized helps the decision - making process as regards to whether to buy a given assets or not. This is because the decision to buy fixed assets is a very important one for the firm, since it involves the commitment of large sums of money in a decision that is not immediately reversible he added.

The evaluation and appraisal and hence worthwhileness of a project according to Gana (2001:19) can be done by estimating the cash flows of the

project. The cash flows involve he said determines what the cash out flow and inflow will be throughout the life span of the project.

Gana (2000:19) was of the opinion that establishing a business venture is an investment. That is, it involves the commitment of money presently into a venture with the hope of greater benefit (returns) in future. According to him, since the return is futuristic, then the entrepreneur must find a way of determining whether the returns and benefits, over the life span of the project will surpass the initial outlay of cost in addition to the production/operational costs throughout the life span of the project. He emphasized that it is highly important that a realistic way be found for estimating the cash flow. As a matter of fact, he advised, the entrepreneur should be conservatives especially when he is determining the cash flow.

He stated that in establishing a venture, there is an initial outlay of funds. This he said involves the money used in buying or procuring fixed assets. Apart from initial cash flow outlay he added, the entrepreneur also incurs expenditure in the process of producing a product or service. He outlined that this production/operation costs included labour costs, maintenance cost, sales and marketing cost, and other management experiences. He advised that after the production of the product or service, the entrepreneur must sell the product. The money realized from the sales (sales revenue) he remarked comes into the business

and his becomes our cash inflow.

Gana (2001:120) states that from the projected cash flow, the entrepreneur would be able to know the attentiveness of the project. So he would be able to take good decision as regards whether he should invest in the project or not.

According to him, in other instances where he wants to make a better choice between two proposals, the cash flow of the proposals will.

Enable him, make a better choice as regard to which projects to accept or reject.

He outlined various methods of evaluation of project after estimating this cash flow. These methods are:

- (i) Pay-Back Period
- (ii) Average Rate of Return
- (iii) Initial Rate of Return
- (iv) Net Present value
- (v) Cost benefit Analysis)

He emphasized that it is necessary to state here that the entrepreneur should act realistically in making projections for his cash flow. This he added since the projections are futuristic, expecting over ambitious eventually returns will make projections not to stand the test of time when the project is eventually established.

2.2 Risk Analysis in Project Appraisal

All Investment projects involve some degree of risk. Few cash flows can be

predicated with absolute certainty because many factor (variables) tend to introduce some risk on investment decisions. Risk in investments could, therefore, be taken to mean the variability of the possible returns of an investments proposal. Risk may arise from internal factors such as bias, and the bias could be optimistic. And such level of bias creates its own errors and the errors could be due to over estimation or underestimation leading to what pigeon called the "mutual" generation of errors (when there is excessive optimism it creates its own errors so does excessive pessimism).

External factors such as competition, public taste, government regulation and government policies also affect the level of attendant risk.

An investment decision is normally said to be risky or uncertain if several outcomes are possible.

Anyafo (2000:73) observed that years ago when inflation was generally overlooked in economic evaluations of projects. It was thought that all proposals were affected similarly by price changes and there was negligible difference between current and future costs to influence the order of performance. These arguments Anyafo stated lack merit when inflation reaches double-digit levels and prices of some goods and services escalate much more rapidly than others.

Anyafo (2000:73) was of the opinion that with the recognition of the impact of inflation of most investment opportunities, investment analysts must settle the

question of the method of incorporating it in their appraisals. He said that there are two basic methods, with a number of refinements available for each.

- i) Eliminating inflation effects by converting all cash flows to money units that have constant purchasing power called real cash flows.
- ii) Estimate cash flows are the amount of money units actually exchanged at the time of each transaction called money cash flows.

The money cash flow approach he said is generally easier to understand and apply and is more versatile than the real flow method. He defined money cash flows as the actual amounts of money changing hands whereas real cash flow is the purchasing power equivalents of the actual cash flows. In a world of zero inflation he was of the opinion that there would be no need to distinguish between money and real cash flows, as they would be identical.

Where inflation exists he said that a difference must arise between money cash flows and their real value. Resolution of this difference he admitted is the issue at stake in treatment of inflation in project appraisal.

Anyafu (2000:74) opined that the analysis of the impact of inflation on investment appraisal does not only distinguish money cash flows (that is actual naira cash flow) and real cash flow but also distinguishes between money rate of return ($1m$), the real rate of return (ro) and the rate of inflation(1), the relationship can be expressed as follows:

$$1 + r_m = (1 + r_o)(1 + f)$$

making r_o the subject of the formula, we have

$$r_o = \frac{1 + r_m}{1 + f} - 1$$

Thus:

Real Rate of Return = Money Rate of Return - Inflation Rate

$$1 + \text{Inflation Rate}$$

He defined real rate of return as the inflation-free rate of interest for discounting the real cash flows in order to arrive at the net present value (NPV) of an investment. Money rate of return according to Anyafo (2000:75) is variously referred to as nominal rate of return or minimum acceptable rate of return (MARR) or the required rate of return (RRR) or the market rate of interest. He said that it is the interest rate for discounting the money cash flows.

In order to arrive at the net present value (NPV) of an investment.

Anyafo (2000:75) summarizes the principal of handling inflation subject to the relationship between the money rate of return and the real rate of return in DCF appraisal as follows;

- i) If future cash flow are expressed in real values, these cash flows must be discounted at the real rate of interest, r_o , (that is, at the real cost of capital);
- ii) If future cash flows expressed in money values (that is, inflation - adjusted values), these flows must be discounted at the money rate of interest, r_m , *that

is, The money cost of capital);

iii) Discounting money values at the money rate of interest and real values

The real rate of interest will give the same NPV for any particular project. Van Horne (1992:162) noted that risk was created by a wide range of factors: the economy in general, economic factors peculiar to investments, competitions, technological development, consumer preference, labour conditions and all sorts of circumstances seemingly as uncertain as weather.

Consideration of risk he said has, therefore made it imperative for firms to carefully select adequate methods of project appraisal for its investments. The techniques in use for incorporating risk in capital budgeting to him could be classified into two broad groups.

- 1) The non-statistical and less rigorous techniques such as the payback period, the risk adjusted discount rate, conservative forecast or certainly equivalent techniques.
- 2) The more rigorous statistical techniques, which includes the probability assignment methods.

2.3 Costs-Benefit Analysis of Evaluating Projects

Duncan (2003) discussed that many projects have environmental, and other consequences, which do not have, price tags attached to them. it further affirm that the essence of Cost-Benefit Analysis (CBA) is the use of the techniques of project

appraisal where the impacts of the project included in the analysis are not limited to those that show up in actual money terms but where projects are considered from the perspective of the society as a whole rather than the firm perspective undertaking the projects.

Anyafo (2000:80) was of the opinion that Cost-Benefit Analysis was developed to attempt to evaluate public sector projects for which conventional methods are unsuitable and attempts to discover the social costs and the social benefits attributable to any particular projects. He recalled that cost-benefit ratio also known, as profitability index is particularly useful for ranking of competing projects. He made a remark that the criteria by which a private enterprise evaluates its activities are different from those that apply in the evaluation of public activities. He state categorically that, in general, private activities are evaluated in terms of profit, whereas public projects are evaluated in terms of the general welfare as connectively and effectively expressed. He advised that, a basis for evaluating public sector projects is necessary for an understanding of the characteristics of the governmental agencies that sponsor them.

He classified government activities under the general headings of protection, enlightenment and cultural enhancement, and economic development.

Anyafo (2000:81) was of the opinion that a popular method for deciding upon the economic justification of a public a project is to compute the benefit-cost

ratio:

$$\text{BCi} = \frac{\text{Benefits to the public}}{\text{Cost to the government}} = \frac{\text{Equivalent Benefits}}{\text{Equivalent costs}}$$

Where the benefits and the costs are present or equivalent annual amounts computed using the cost of capital.

Anyao (2000:85) outlined the traditional investment acceptance criteria in literature as: Factor Intensity, Foreign Exchange Benefit, capital-Output Ratio and Benefit-Cost Ratio.

Factor Intensity:

This criterion he said relates to the general principle that maximum use should be made of abundant factors and minimum use of scarce factors. Projects are therefore evaluated on this basis. He gave example that if the priority of the nation is utilization of abundant human resources, projects, which maximize employment opportunities, would be selected.

Foreign-Exchange Benefit:

He opined that the proponents of the foreign exchange benefit criterion support giving a high priority to projects, which promise savings or earnings in foreign exchange.

Capital-Output Ratio:

He was of the view that with the interpretation of the goal of society as growth maximization, another criterion argues that growth goal would be attained by selecting projects, which promise the highest reinvestment potentials that is projects which maximize the capital-output ratio.

Benefit-Cost Ratio

He defined benefit-cost ratio, as the equivalent benefits divided by equivalent cost, where benefits are all the advantages less disadvantages to the project beneficiary and costs are all the disbursements less any savings to the project sponsor.

$$BC_i = \frac{B}{I + C}$$

Where

B = Net equivalent benefits in the user:

I = Equivalent capital invested by the sponsor,

C = Net equivalent annual costs to the sponsor.

The task of projects evaluation reduces to testing whether or not the equivalent benefits exceed the equivalent costs, Anyafo (2000:87):

If $BC_i > I$

Then $B/I + C > I$, it follows that $B - (I + C) > 0$

2.4 Capital Rationing

Funds for financing proposals of the companies are generated internally, that is by accumulated and or by externally which is by loan.

Consequently, the capital rationing of the companies depends solely on the profitability of the project. All projects with positive NPV are accepted. However, there is a limit to which they can go in their investment objectives, beyond which, no matter the level of return promised by a project, they will be either reluctant or unable to undertake. As a result of this ceiling placed on the funds available for investment purposes, a case of capital rationing is established. What they usually do is that management does, start from the projects having high internal rate of return and then down to projects with lower IRR, until the available funds are exhausted.

In all cases projects that have negative NPV or borrowing rate higher than the IRR will be rejected-even if there are surplus funds.

Anyako (2000:48), defined capital rationing as a situation in which an enterprise is constrained for one reason or the other to obtain funds needed to take advantage of all profitable investment opportunities. Under such circumstances he said that management would not accept project with positive NPV or with IRR greater than or equal to the firm's required rate of return but as well ranked the projects according to their relative profitability.

2.5 Selecting an Efficient Portfolio

Investors are normally not in the habit of holding only one asset. They prefer to hold a combination of asset at a particular point in time. In order to select an efficient portfolio of assets, an investor is usually more interested in the entire risk of a portfolio rather than the risk of any individual asset. Therefore, in deciding which of two rival assets to acquire, the investors must consider the effects each of the assets is going to take on the riskiness of his portfolio. Likewise, the investor should also consider the effect each of the assets is likely going to have on the expected return of his portfolio. The investor will then choose either the asset that promises higher returns or the asset that promises lesser risk, depending on whether the investor is risk averse or risk loving.

2.6 Capital Asset Pricing Model [CAPM]

The CAPM is an alteration approach to the problem of measuring the cost of capital. The model attempts to measure the relationship between risk and return in the capital market. Underlying the model is the assumption that the return to an investor is made up to two parts; a risk free rate of interest to which is added a premium to cater for the particular level of risk in a given security; where the risk is greater so is the additional premium. The premium is calculated by using what is known as the β [Beta] coefficient.

The beta-coefficient is a measure of the volatility of the individual security's returns relative to market returns and thus, when a risk-return profile for the market is calculated, the cost of capital for a given company can be established. Assuming that such a value is available, it can be used as the discount rate being a fair approximation of opportunity cost representing as it does the market's expected rate of return for shows in its class.

The CAPM was developed as an aid optimal portfolio selection hereby, according to the attitude to risk of the investor; a capital market line would be established such that all efficient portfolios [i.e. preferred trade-offs between risk and return] lie on the capital market line.

From the capital market line the security market line is developed which relates to individual securities and firms. From this line, using the Beta coefficients, an estimate is made of the cost of capital.

Although this process is involved and somewhat it is an attempt to obtain an objective estimate of the require return of shareholders and seeks to measure the very real trade-off that exists between risk and return in the capital market. Like all theoretical models the CAPM incorporates numerous assumptions which may limit its application in practical situations. Some of the major assumptions are:

- a. Investors are wealth maximisers who base their choice of portfolio on the mean and variance (i.e. measure of risk) of the returns

expected from the security.

- b. All investors can borrow or lend unlimited amounts at a given risk free rate of interest.
- c. All investors have identical objectives estimate of the return and variance of return (riskiness) of a particular security.
- d. There are no transaction costs and no taxes.
- e. All investors are price takers. This means that no investor operates on a scale large enough to have any significant influence on the price of security.

Note: These are restrictive assumption and the CAPM can be criticized on these grounds but it should be made against ALL investment appraisal techniques.

2.7: Using CAPM to Estimate the Cost of Equity

The steps involved in using CAPM to estimate the cost of equity capital are as follows:

1. Estimate the market parameters.

That is risk-free rate of return the expected return on the market and the variance of the market return.

2. Estimate the firm's beta coefficient

This is based on an historical analysis of the shares performance, i.e. the price changes, dividend yield, variance of return and covariance with market returns over as long a period as possible.

Risk-less securities have beta coefficient equal to nill; an average security has a beta value of 1.0; lower risk securities have value less than 1 and relatively higher risk securities have beta value greater than 1.

3. Estimate the cost of equity using the market parameters and the firm beta coefficient.

The figure below provides a representation of the process

Risk (Beta Values)

The intercept with y axis is the riskless rate of return and is generally taken as the return on government stocks.

The appropriate equation for establishing the expected return is as follows:

$$R_a = R_f + [R_m - R_f]\beta$$

Where R_a = The expected return on the security.

R_f = The risk free interest rate

R_m = The expected return on a market portfolio

β = The beta co-efficient which measure the volatility of the security's return relative to market return.

For example, if the risk free interest rate is 9%, the market return 13% and the beta co-efficient is 1.4 the:

$$\begin{aligned} R_a &= 9 + [13-9] 1.4 \\ &= 18.2\% \end{aligned}$$

-Which would be cost of capital estimate according to the Capital Asset Pricing Model.

2.8 Summary of the Review

This review has tried as much as possible to make a through review of relevant empirical studies which helped to illuminate the problem at hand.

This review has analysed the various accounting techniques and methods

available for incorporating risk and uncertainty when appraising rival projects. It has also taken a critical look at the impact of portfolio consideration rival projects. It has also taken a critical look at the impact of portfolio considerations on the decision of an investor when appraising projects in a situation of risk and uncertainty.

In all this literature review has provided a solid cradle on which to build this study.

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CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

This chapter takes a look at the procedures adopted by the researcher in collecting and analyzing data necessary for finding solution to the research questions. The chapter will also look at instruments employed by the researcher in the study.

3.1 Sources of Data

For the purpose of this study, the sources of data can be grouped into two namely Primary sources and Secondary sources.

3.1.1 Primary Sources

Primary sources refer to those sources through which primary data are collected. Primary data on the other hand refers to those data that are obtained first hand by the researcher.

For the purpose of this study, primary sources include: Surveys, personal interviews and observations. For this study, the researcher administered questionnaire as a way of collecting primary data.

3.1.2 Secondary Sources

Secondary sources of data collection refer to those sources through which secondary data are collected. Secondary data are collected from the works of other researchers and authors. For this study, the researcher sourced secondary data through the following mediums: textbooks, published and unpublished research works, journals, magazine and newspaper.

3.2 Research Sample

The sample for this study consisted of staff in the accounting units of various business organization visited. In selecting those elements from which the

information was collected, the entire "population" was not used. The researcher therefore collected information from a portion of the population by taking a sample from the population and basing her inference about the larger group on information generated from the sample.

To avoid sampling bias, the sample was randomly selected. This researcher on several occasions had to hand pick some individuals within the frame who were expected to offer the contribution sought after thus serve the researcher's purpose.

As a result of the nature of this research topic, the "deliberated selection" technique was mostly used in selecting the sample used for this research project. The sample for this consisted of carefully members of staff, well versed in management accounting in the accounting units of the various organizations visited; the sample also included a carefully selected bunch of experienced business executives and business managers of various business outfits.

Research instruments

As afore stated, the research instrument employed in this study include question, reviews and oral interview.

3.3.1 Questionnaire Survey.

The researcher made use of questionnaires, which raised important questions necessary for the ascertainment of the facts required for this study. These

questionnaires were distributed to members of accounting staff of accounting units of various business organizations and also to some carefully selected experienced business executives.

3.3.2 Personal Interview

Another primary sources of data used in this study is personal interview. Even though the authenticity of personal interview as a source of data collection is questionable. For instance, there are certain questions that cannot be effectively covered through the use of questionnaire. For that reason, personal interview as an instrument of data collection was used along side questionnaire survey in this study.

3.4 Method used in Constructing the Questionnaire

In constructing the questionnaire, the researcher adopted what is generally referred to as "the funneling procedure" in which she started with general questions and then gradually narrowed down to specific questions related to the topic.

These questions were designed in two broad dimensions namely:

- i. **Unstructured Questions:** This type of questions offers the respondents an opportunity to phrase his own responses in his own word and for this reason no

exact answer is expected.

ii. **Structured Questions:** These are made up of:

a. **Simple alternative questions:** whereby two choices of responses (Yes or No) were provided and respondents were expected to tick X against the response that is appropriate to them.

b. **Multiple choice questions:** whereby a range of possible answers are provided to questions. The respondents are expected to tick the most appropriate answer to the questions.

3.5 Tools for Analysis

The questions in section A of the questionnaire, which dwelt more on personal data, would be analyzed using mean and percentage. The section B part of the questionnaire dwelt more on the research topic and hypothesis would be analyzed using mainly standard deviation and percentages.

The hypothesis would be subjected to testing using tests of significance. In analyzing the data of this research, the weights 4, 3, 2, 1, 0 would be assigned to variable as follows: Strongly Agree, Indifferent, Disagree and Strongly Disagree respectively. While 4,3,2,1 would be assigned to variables such as Very Great

Extent, great Extent, Little extent and No Extent respectively.

The Yes or No objective questions would be analyzed using percentages.

3.5.1 Statistical Formula

For the purpose of data analysis, the following statistical formula would be used:

(i) Mean $\bar{x}$

$$\bar{X} = \frac{\sum fx}{n}$$

Where f = Frequency

x = the value of variable

n = Number of observation

Σ = Summation

(ii) Standard Deviation δ

$$\delta = \frac{\sum fx (x-\bar{x})^2}{\sum f} \quad \text{or} \quad \frac{\sum fx (x-\bar{x})^2}{N}$$

Where δ = standard deviation

F = sample size or number of observations

X = values of variable

N = sample size

However, in calculating the population standard deviation from a given sample, the denomination in the above formula may be replaced by (N-1) or (F-1).

Thus the formula for standard deviation becomes:

$$\delta = \frac{\sum fx (x-x)^2}{\sum f} \quad \text{or} \quad \frac{\sum fx (x-x)^2}{N}$$

(iii) Chi-square distribution

The chi-square distribution method would be used to test the hypothesis. This is used to testing hypothesis concerning the difference between a set of observed frequencies of a sample and a corresponding set of expected frequencies.

The formula for the calculation of chi-square is given as:

$$X^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where X^2 = chi-square

O_i = observed frequency

E_i = expected frequency

The degree of freedom is computed using the following formula.

Degree of freedom = (R-1) (C-1)

Where R = Number of rows

C = Number of columns.

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CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

This chapter deals with the presentation, analysis and interpretation of data obtained from responses to questionnaires administered to members of accounting staff of accounting units of various business organizations and also to some carefully selected business executive.

4.1 Data Analysis

In the process of data collection for this study, a total of seventy one (71) questionnaires were administered out of which sixty eight were completed and returned by respondents.

TABLE 4.1.1 ISSUE AND RECEIPT OF QUESTIONNAIRES

	NO	%
Questionnaires administered	71	100
Questionnaires returned	68	95.77
Questionnaire withheld	3	4.23

Source: Field Survey 2009.

Question: Does your company use accounting techniques and methods to appraise rival projects?

Table 4.1.2: RESPONDENTS OPINION ON WHETHER THEIR COMPANY USE ACCOUNTING TECHNIQUES AND METHODS TO APPRAISE RIVAL PROJECTS

Alternatives	No. of responses	Percentage (%)
YES	30	44.12
NO	38	55.88
TOTAL	68	100

Source: Field Survey 2009.

The above question was designed to ascertain whether companies actually

make use of accounting techniques and methods when appraising rival projects in practice. A look at the summary of the responses above shows that more than 55% of the companies studied does not use accounting techniques to appraise rival projects, while only 44% uses accounting techniques when appraising rival projects.

Question: Does company believe hat it is necessary to consider the effects of risk and uncertainty when appraising rival projects.

TABLE 4.1.3: RESPONDENTS OPINION AS TO WHETHER COMPANIES BELIEVE THAT IT IS NECESSARY TO CONSIDER THE EFFECT OF RISK & UNCERTAINTY WHEN APPRAISING RIVAL PROJECTS

Alternatives	No. of responses	Percentage (%)
YES	68	100
NO	-	-
TOTAL	68	100

Source: Field Survey 2009.

The above question was designed to ascertain whether companies really

appreciate the need to incorporate elements of risk and uncertainty when appraising rival projects. The data obtained from responses as summarized above, shows that all the companies considered in the study appreciates that there is need to consider the effects of risk and uncertainty when appraising rival projects.

Question: Does your company make use of accounting techniques to incorporate risk and uncertainty when appraising rival projects?

Table 4.1.4: RESPONDENTS OPINION ON WHETHER THEIR COMPANY MAKES USE OF ACCOUNTING TECHNIQUES TO INCORPORATE RISK AND UNCERTAINTY WHEN APPRAISING RIVAL PROJECTS

Alternatives	No. of responses	Percentage (%)
YES	5	7.35
NO	63	92.65
TOTAL	68	100

Source: Field Survey 2009.

The above question was aimed at ascertaining whether the various accounting methods and techniques available for appraising projects in situations of risk and uncertainty are actually being used by companies in practice. From the

data gathered in the study, as shown above, only 7.35% of the respondents who completed and returned the researchers questionnaire agreed that their companies make use of these techniques in practice. Over 92% of the respondents don't make use of accounting techniques when appraising projects in situations of risk and uncertainty.

Question: How would you assess your company's reliance on accounting techniques when appraising rival projects in situation of risk and uncertainty?

Table 4.1.5: RESPONDENTS ASSESSMENT OF THEIR COMPANY'S RELIANCE ON ACCOUNTING TECHNIQUES WHEN APPRAISING RIVAL PROJECTS IN SITUATION OF RISK AND UNCERTAINTY.

Alternatives	No. of responses	Percentage (%)
Very great extent Great extent Little extent No extent	2 4 60 2	2.94 5.88 88.24 2.94
Total	68	100.00

Source: Field Survey 2009.

The above question was designed to ascertain the extent to which companies actually rely on the results provided by accounting techniques when appraising rival projects in situations of risk and uncertainty. The data obtained show that most companies (88.24%) rely on these techniques only to a "little extent". Only 2% relies on these techniques to a "very great extent", 4% rely on it to "great

extentò, while 2% rely on it to ñno extentò.

Question: If your company uses accounting techniques to appraise rival projects in situations of risk and uncertainty, which method does your company mostly use?

Table 4.1.6: RESPONDENTS OPINION ON THE METHOD THEIR COMPANY MOSTLY USE TO APPRAISE RIVAL PROJECTS IN SITUATIONS OF RISK & UNCERTAINTY

Alternatives	No. of responses	Percentage (%)
a. Risk premium Method b. Probability estimates of cash flows c. Adjusted pay back period d. Sensitivity Analysis e. A combination of more than one method above f. Others (specify) -----	- 4 - 5 5 -	- 28.57 - 35.71 35.71 -
Total	14	100

Source: Field Survey 2009.

The aim of the above question was to ascertain which of the various accounting methods and techniques of appraising rival projects in situations of risk and uncertainty that companies mostly like to use in actual practice. Out of the 68 questionnaires returned, only 14 representing 20.58% answered that question. Of the number that reacted to the question, 28.57% adopts probability estimate of cash flows, 35.71% carries out sensitivity analysis, while another 35.71% combined more than one of the methods listed.

Question: Do companies that use accounting techniques to incorporate risk and uncertainty when appraising rival projects perform better than companies who do not?

Table 4.1.7: RESPONDENTS OPINION ON WHETHER COMPANIES THAT USE ACCOUNTING TECHNIQUES TO INCORPORATE RISK AND UNCERTAINTY WHEN APPRAISING RIVAL PROJECTS PERFORM BETTER THAN COMPANIES WHO DO NOT.

Alternatives	No. of responses	Percentage (%)
a. Strongly agree b. Agree c. Disagree d. Strongly disagree	10 38 16 4	14.71 55.88 23.53 5.88
Total	68	100

Source: Field Survey 2009.

The above question, which is central to the project topic, was designed to ascertain whether companies that use accounting techniques in appraising their rival projects in situations of risk and uncertainty perform better than other companies who do not use them. 14.71% of the respondents ñstrongly agreed that companies that use these techniques perform better. 55.88% only ñagreed that companies that use these techniques perform better in practice. 23.53% and 5.88% ñdisagreed and ñstrongly disagreed respectively.

Due to the importance of the above question to the achievement of the main objectives of this research work, the result tabulated above is further going to be illustrated using pie chart to help clarify the findings of the research on whether

companies that use accounting techniques to appraise their rival project in situations of risk and uncertainty actually perform better than companies that do not use these techniques.

Question: When appraising rival projects, the entire portfolio risk of the company is considered more important than the risk of any individual asset.

Table 4.1.8: RESPONDENTS OPINION ON WHETHER THE ENTIRE PORT FOLIO RISK OF A COMPANY IS CONSIDERED MORE IMPORTANT THAN THE RISK OF ANY INDIVIDUAL ASSET

Alternative	No of responses	Percentages %
Yes	65	95.59
No	3	4.41
Total	68	100.00

Source: Field Survey 2009.

The above question was designed to ascertain the effect of portfolio considerations on the investment decisions of companies when appraising rival projects in situations of risk and uncertainty. A look at the data obtained from responses shows that most companies (ell over 90%) pay more attention to the entire portfolio risk than any individual asset when appraising rival project.

4.2 ANALYSIS OF PERSONAL INVESMENT DECISIONS OF THE RESPONDENT

The section C of the researcher's questionnaire dealt with the personal investment decisions of respondents when appraising their private projects in situations of risk and uncertainty. Here an attempt is made to analyse the responses of the respondents with respect to the most vital questions raised in the questionnaire.

Question: Do you try to incorporate risk and uncertainty when appraising rival projects?

Table 4.2.1: RESPONDENTS OPINION AS TO WHETHER THEY
INCORPORATE RISK AND UNCERTAINTY WHEN
APPRAISING RIVAL PROJECTS

Alternative	No of responses	Percentages %
Yes	68	100
No	-	-

Total	68	100
-------	----	-----

Source: Field Survey 2009.

Question: Do you make use of accounting techniques to incorporate risk and uncertainty when appraising rival project?

Table 4.2.2: RESPONDENTS OPINION ON WHETHER THEY MAKE OF ACCOUNTING TECHNIQUES TO INCORPORATE RISK AND UNCERTAINTY WHEN APPRAISING RIVALPROJECT

Alternative	No of responses	Percentages %
Yes	41	60.29
No	27	39.71
Total	68	100.00

Source: Field Survey 2009.

Question: How would you assess your reliance on accounting techniques when appraising rival projects in situations of risk and uncertainty?

Table 4.2.3: RESPONDENTS OPINION ON THE ASSESSMENT OF THEIR RELIANCE ON ACCOUNTING TECHNIQUES WHEN APPRAISING RIVAL PROJECTS IN SITUATIONS OF RISK AND UNCERTAINTY

Alternatives	No. of responses	Percentage (%)
a. Very great extent b. Great extent c. Little extent d. No extent	14 20 31 3	20.59 29.41 45.59 4.41
Total	68	100.00

Source: Field Survey 2009.

Question: Do projects which accounting techniques have been used to appraise and select performance better than other project?

Table 4.2.4: RESPONDENTS OPINION ON WHETHER PROJECTS

**WHICH ACCOUNTING TECHNIQUES HAVE BEEN
USED TO APPRAISE AND SELECT PERFORM BETTER
THAN OTHER PROJECT**

Alternative	No of responses	Percentages %
Yes	59	86.76
No	9	13.24
Total	68	100.00

Source: Field Survey 2009.

Question: When appraising rival projects in a situation of risk and uncertainty, do you consider your entire portfolio risk to be more important than the risk of any individual asset?

**Table 4.2.5: RESPONDENTS OPINION TO WHETHER THEY
CONSIDER THEIR ENTIRE PORTFOLIO RISK TO BE
MORE IMPORTANT THAN THE RISK OF ANY
INDIVIDUAL ASSET**

Alternatives	No of responses	Percentages %
Yes	66	97.06
No	2	2.94
Total	68	100.00

Source: Field Survey 2009.

4.3 Summaries of Responses from Interview

Questions

As previously stated, one of the primary sources of data collection adopted by the researcher in this study is personal interview. The researcher sought to find out answers to such questions which she felt could not adequately be covered by questionnaire.

For instance, the researcher sought to find out from the accountants among the respondents why accountants well versed in accounting techniques and methods as they are, do not always use accounting methods and techniques when appraising their rival projects in situations of risk and uncertainty. There was not a lot of variation in the responses received from the respondents. Most of respondents pointed out that the assumptions upon which many accounting methods and techniques are based are a times so unrealistic in the practical world, that it is very difficult and at times impossible to use some of these methods and techniques in practice. In the words of the accountant of Omason Enterprises Nig. Ltd. "theory is quiet different from practice".

Some respondents also pointed out that the inability of many businesses to hire the services of well qualified accountants is another contributory factor to the fact that most accounting methods and techniques to appraise their rival project, due to their inability to hire the services of qualified accountants who are well versed in those accounting techniques.

Most respondents attributes this inability of most medium and small scale business to hire services of well qualified accountants to the fact most such businesses do not have enough resources to pay for the services of well qualified accountants. Some respondents also believe that most small scale and medium scale business in Nigeria do not really appreciate the importance of hiring the

services of well qualified accountants, in their view this fact accounts to why some businesses which are in a position to hire services of well qualified accounts still feel reluctant to do so.

4.4 Testing of Hypothesis

4.4.1 Hypothesis 1

Ho: Businesses, in practice, do not use accounting techniques in appraising rival projects in situation of risk and uncertainty.

Hi: Business, in practice, use accounting techniques in appraising rival projects in situation of risk and uncertainty.

To test the above hypothesis, we apply the response to one of the questions contained in the questionnaire.

Question: Does your company make use of accounting techniques to incorporate risk and uncertainty when appraising rival projects?

Alternative	No of responses	Percentages %
Yes	5	7.35
No	13	92.62
Total	68	100.00

Source: Field Survey 2009.

From the above results shown, it may not be necessary to subject the above

hypothesis to further testing. It has already been seen that some companies do in fact, make use of accounting techniques when appraising their rival projects in situation of risk and uncertainty. Even though the proportion of business that use these techniques is very small (just 7.35%), it is still clear that some businesses do in fact use them. Therefore we can safely reject H_0 :

4.4.2 Hypothesis

H_0 : There is no difference between the performance of businesses that use accounting techniques in appraising their projects in situation of risk and uncertainty and those that do not use them.

H_1 : There is difference between the performance of businesses that use accounting techniques in appraising their projects in situation of risk and uncertainty and those that do not use them.

The above hypothesis is going to be subjected to testing using the responses to the following question. Companies that use accounting techniques to incorporate risk and uncertainty when appraising rival projects perform better than companies who do not.

Table 4.4.2

Alternatives	No. of responses	Percentages (%)
a. Strongly agree b. Agree c. Disagree d. Strongly disagree	10 38 16 4	14.71 55.88 23.53 5.88

Total	68	100
-------	----	-----

Source: Field Survey 2009.

The above hypothesis is subjected to testing using the chi-square distribution.

Decision Rule: Reject H_0 : If calculated value is greater than table value.

	O _i	E _i	o _i -e _i	[o _i -e _i] ²	<u>[o_i-e_i]²</u> e _i
a. Strongly agree b.	10 38	17 17	-7 21 -	49 441	2.882 25.941
Agree c. Disagree d.	16 4	17 17	1 -13	1 169	0.059 9.941
Strongly disagree					
Total	68				38.823

Degree of freedom [v] = 4-1 = 3

Using 5% level of significance

Table value = 7.815

Decision: Reject H_0 : Because calculated [38.823] is greater than table value [7.815]. Thus we accept that there is a difference between the performance of business that use accounting techniques in appraising their projects in situations of risk and uncertainty and that of other business that do not.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

The major findings of this study can be summarized as follows:

- i. Most companies [in fact all the companies studied] believe that there is an important need to incorporate risk and uncertainty when appraising rival projects.
- ii. In practice most companies do not use accounting methods and techniques to incorporate risk and uncertainty when appraising their rival projects.
- iii. Most companies that use accounting techniques to appraise their projects in situations of risk and uncertainty do not rely solely on the results shown by these techniques, when making their decisions.
- iv. Most companies and individuals consider their entire portfolio risk to be more important than the risk of any individual assets; when appraising rival projects in situations of risk and uncertainty.

- v. Rival projects selected in situation of risk and uncertainty using accounting methods and techniques generally perform better than other projects.

5.2 Conclusion

It has been a worth while venture, carrying out this piece of research into the topic: the Use of Accounting Techniques in Appraising Rival Projects in Situations of Risk and Uncertainty. This work has tried as much as possible to highlight the various accounting methods and techniques available for incorporating risk and uncertainty when appraising rival project. This piece of research has also been able to establish that projects selected in situations of risk and uncertainty using accounting methods and techniques tend to perform better than projects otherwise selected.

It is the researcher's hope that the findings of this study and the recommendations contained in this report will help individual and organizations to make better decisions when appraising their rival project in situations of risk and uncertainty. It is also hoped that the findings of this study will be of immense help to future researchers in this topic or in related topics.

5.3 Recommendations

Indeed a study of this nature cannot be complete, if an attempt is not made to suggest ways through which individuals and companies can improve their returns through adequate effective use of accounting techniques in situation of risk and uncertainty.

In an investment world fraught with risk and uncertainties, the importance of accounting methods and techniques that incorporate these risk and uncertainties when appraising rival projects can hardly be over-stressed.

It has been seen from this study that numerous accounting methods and techniques abound for incorporating risk and uncertainty when appraising rival projects. It has been seen from the data collected in this study that rival projects selected in situations of risk and uncertainty using accounting methods and techniques tend to perform better than projects otherwise selected.

However for any business to be able to enjoy the benefits of using accounting methods and techniques, such an organization should have services of a well qualified accountant at its disposal. It is therefore hereby recommended that business in Nigeria should endeavor to hire services of qualified accountants to help them reach the best decision in situations of risk and uncertainty.

For small and medium scale business, that are not able to hire qualified

accountants on a part-time basis or at least to consult accountants before taking any major business decision in a situation of risk and uncertainty.

Finally this researcher would like to stress that this study lays no claims to complete exhaustion of this topic: the use of Accounting techniques in Appraising rival projects in situations of risks and uncertainty. It is therefore recommended that future researchers should consider carrying out further studies into this topic, in order to help businesses and individuals make the best decisions when appraising rival projects in this investment world fraught with risks and uncertainties.

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APPENDIX A

Questionnaire

Department of accountancy
UNEC
Enugu

Dear Sir/Madam,

REQUEST FOR COMPLETION OF QUESTINNAIRE

I, a student of the above named department. Am currently carrying out research project in partial fulfillment of the requirements for the award of masters of Business Administration (MBA) with specialization in Accountancy.

I request that you kindly complete the questionnaire attached below sincerely and honestly. Be assured that all your responses will be treated with strict confidence.

Thanks for anticipated co-operation.

Yours faithfully,

Ademu Martina Hassana

Please mark 'X' against the option that is most appropriate to you

SECTION A **Personal Data**

1. Sex

(a) Male []

(b) Female []

2. Age é é é é é é é é é é é é . yrs

3. Marital Status

(a) Single []

(b) Separated []

(c) Married []

(d) Divorced []

(e) Widowed []

SECTION B

4. Does your company use accounting techniques and methods to Appraise rival projects?

a. Yes []

b. No []

5. Does your company believe that it is necessary to incorporate risk and Uncertainty when appraising rival projects?

a. Yes []

b. No []

6. Does your company make use of accounting techniques to incorporate risk and uncertainty when appraising rival project?

a. Yes []

b. No []

7. How would you assess the extent to which your company relies on accounting techniques when appraising projects in situations of risk and uncertainty?

a. Very great extent []

b. Great extent []

c. Little extent []

d. No extent []

8. If your company uses accounting techniques to appraise projects in

situations of risk and uncertainty , which methods(s) does your company use to incorporate risk and uncertainty?

- a. Risk premium method []
- b. Sensitivity analysis []
- c. Adjusted payback period []
- d. Simulation modeling []
- e. Probability estimates of cash flows []

9. Companies that use accounting techniques to incorporate risk and uncertainty when appraising rival projects generally perform better than companies that do not.

- a. Strongly agree []
- b. Agree []
- c. Disagree []
- d. Strongly Disagree []

10. The entire portfolio risk of risk of your company is considered more important than the risk of any individual asset when appraising rival projects.

- a. Yes []
- b. No []

11. Do you try to incorporate risk and uncertainty when appraising

rival project?

a. Yes []

b. No []

12. Do you make use of accounting techniques to incorporate risk and uncertainty when appraising rival projects?

a. Yes []

b. No []

13. How would you assess your reliance on accounting techniques when appraising rival projects in situations of risk and uncertainty?

a. Very great extent []

b. Great extent []

c. Little extent []

d. No extent []

14. Do Projects, which accounting techniques have been used to appraise and select perform better than other projects?

a. Yes []

b. No []

15. When appraising rival projects in a situation of risk and

uncertainty, do you consider your entire portfolio risk to be more important than the risk of any individual's asset?

a. Yes []

b. No []

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