AGRICULTURAL PROJECT APPRAISAL AND FINANCIAL MANAGEMENT

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DEFINITIONS AND CLASSIFICATIONS OF PROJECT AND AGRICULTURAL PROJECT

1.1 Definitions of a Project

Definition 1

A project is any scheme, or part of a scheme, for investing resources which can be reasonably analysed and evaluated as an independent unit (Little and Mirrlees, 1974).

Definition 2

A project is a compilation of data which will enable an appraisal to be made on the economy advantages and disadvantages attendant upon the allocation of country resources to the production of specific goods and services.

Definition 3

A project can be considered as a systematic sets of information and calculation on the basis of which the consequences costs and earnings but also more generally advantages and disadvantages of production of specific goods and services can be reduced and appraised.

Definition 4

A project is defined as the use of one or more scarce resources during a specific time period for the purpose of producing an economic return or output at a later time. The final results of a project planning system are the choice of those projects which can be accomplished with the available resources so as to provide the community with maximum benefits from the output.

Definition 5

A project begins with an idea, suggestion including certain measures which could lead to the achievement of desired results, it gradually acquires more and more precise forms by means of collected and systematically elaborated data and information then its realizability benefits and costs are verified and if possible it is compared with other projects. We can have our working definition:- "A project is certain well thought out, minutely described, well calculated and motivated proposed to accomplished certain activities for the purpose of achieving goals fixed before hands".

Projects can and should be considered at many levels. If it makes sense to treat some components separately, that is what should be done, conversely, we may want to package smaller propositions into a larger project. Project may take various forms and it may provide various depth of analysis which depend on:- (a) The kind of activity in question, (b) The purpose the project is to serve. Usually a project is understood to be a set of series of individual study and reports, consisting of textual and tabular parts dealing with different aspects

usually the following aspects are involve:- (a) It's technical and technological aspects (b) Spatial (Locational), (c) Economic including financial aspects (d) Political aspect. All this aspects are closely inter-related for example the choice of certain technology involves certain brought about from those technologies chosen. This multi-aspects of a project requires that it's formulation and evaluation has to be done by a group of experts, the formulation and evaluation has to be done by a group of experts, the formulation and evaluation of project usually representative combine effort of a team of Engineers and Economics, where work must be complementary.

Example 1

Consider the following two instances:-

(a) Should a project to develop a transmission mechanism for passenger motor cars be treated as a project or as part of a car investment package?
(b) How about proposals by an irrigation authority to construct a dam and the main canal for distributing its water?

Solution

(a) It is probably possible to treat the investment proposal on its own merit, developing or buying transmission mechanisms as a separate economic or commercial proposition.
(b) Concerning the proposal for irrigation, however, it would make no sense to do so.

Example 2

The commercial development and operation of a new aircraft will most probably require an extension and improvement to the existing airport facilities e.g. passenger and baggage handling capabilities, telecommunications and radar equipment; runway etc. should we treat these as one (1) or two (2) different projects?

Solution

If the airline or aerospace companies, developing the craft are also in charge of the airport, then it should be treated as one package. However, it is becoming increasingly common for airport authorities and national airlines to be independently managed, in which case the two (2) are separate potential projects.

1.2 Classifications of Project

There are many kinds of project and each of them has certain specific aspect by which it differ from others, it is hardly possible that two (2) absolutely identical project could exist, we can therefore classified project/into several groups according to some common features:-

(a) Project can be classified from the point of view of different sector of national economy, thus we have:-
    (i) Public sector project

(ii) Private sector project

Even within that classification, we have the following classes of projects;-

i. Those that have the aim of obtaining information about natural resources e.g. Geological Survey, complex study of river-basins.
ii. Infrastructural projects e.g. to construct rural road, to install telephone.
iii. Agricultural projects e.g. Fadama I, II, III projects
iv. Industrial projects e.g. gas projects
v. Multipurpose project e.g. construction of dam for generating power, for water control and for irrigation.

(b) Project can be classified from point of view of their relation to already existing industry or enterprises, under this scheme, we have the following:-
1. New project e.g. building a factor, launching a new product line, buying a new machine.
2. Replacement project:- This are new projects replacing obsolete or inadequate facilities.
3. Expansion project:- This are projects that are aimed at expanding existing capacity and equipment e.g. extending a warehouse.

(c) Project can be also be classified on the point of view of ownership, here we can have:-
(1) Public project
(2) Private project
(3) Mixed public-private project

(d) Project can be classified on the point of view of those who are to finance the projects, we have:-
1) Domestic projects e.g. River Basin Projects
2) Foreign Projects e.g. ARMTI (Agricultural and Rural Management Training Institute) World Bank Project
3) Joint Project ADP (Agricultural and Development Project), World Bank, Federal Government and State Government Projects.

(e) Project can be classified on the point of view of selection, choice of project to be formulated, in this categories we have:-
(1) Project derived from overall development plan, arising from planning (budget)
(2) Project based on sectoral study
(3) Project based on political decision.

1.3 Definitions of Agricultural Project

Definition 1

An Agricultural Project is an investment activity upon which resources-cost-are expended to create capital assets that will produce benefits over an extended period of time and which logically lends itself to planning, financing and implementing as a unit. A specific activity, with specific starting point and specific ending point, intended to accomplish a specific objective (Gittlinger, 1982).

Definition 2

Agricultural project is a discrete package of investment of inputs to activities designed to remove developmental constraints in order to achieve benefits in terms of greater production and improving the quality of life of a group of target beneficiaries over a given period of time span.

Note that Gittinger's definition highlights certain important features of agricultural projects:- (a) They are investment packages, (b) they have their own, separate identifies (are well-defined in terms of the sequence of investment and production activities they embrace), (c) they are bounded activities (both in terms of time and geographical location), (d) They are thus different from ongoing development plans or programmes which may constitute a whole set of sector or infrastructural interventions in the economy over time.

1.4 Classifications of Agricultural project

Agricultural projects can be classified as follows:-

(a) Water Resources Development Project

This are normally capital intensive. They include those for irrigation, land reclamation, drainage, salinity prevention and flood control. Appropriate arrangement will be needed if the project is to recover the operating and maintenance cost from farmers whose income will increase when their land is irrigated. Appropriate arrangement include, organization for construction, operation, maintenance of the project, coordinating and adequate administrative arrangement, including supporting services like extension, marketing, credit and transportation.

(b) Agricultural-Credit Project

This is sometimes called on lending project. Agric-credit projects are intended to provide a large number of farmers with the resources they need for an on farm investment so that they increase their production and hence living standards. Agric-credit project is a commercial operation not a welfare activity. Projects may include variety of activities or they may be limited to specific investment programme such as livestock, poultry or small machinery etc.

(c) Agricultural-Industries and Commercial Development Project

This includes introduction of more advanced technology which requires placement of small and scattered processing units by modern industries with a larger scale of operation. This improves adequacy and timeliness of input supplies, storage, processing and marketing system. If small scale farmers are to produce high quality crops, it may be necessary to make sure they have inputs that are suitable for them and more importantly markets and price policy incentive.

(d) Agricultural-Development Project

This includes such project as land settlement schemes for smallholders or estate and ranch development. Attention must be paid to:- (a) commodity market for the farm products from the producing area, (b) Administrative, financial and technical services, (c) Roads that links production, processing area and marketing centers, (d) Distribution of income among the various participants, (e)Incentive for farmers in order to respond to the services and opportunities provided by the Government.

Exercises for Chapter One

(1) Define Agricultural Project

(2) Identify and explain which items in the following list qualify as projects and which as programmes or plans

- (a) A new irrigation and drainage improvement scheme for village X.
- (b) An export promotion strategy for the electronics industry.
- (c) A rotating credit and savings scheme to mobilize the savings of the urban poor.
- (d) A campaign to improve road safety (and alterations to traffic layout to achieve this in a specific location).
- (e) An integrated rural development programme.
- (f) A youth training scheme.

CHAPTER TWO

TIME VALUE OF MONEY

2.1 The Reasons for Time Value of Money

The time value of money is the value of money figuring in a given amount of interest earned or inflation accrued over a given amount of time. The ultimate principle suggests that a certain amount of money today has different buying power than the same amount of money in the future. This notion exists both because there is an opportunity to earn interest on the money and because inflation will drive prices up, thus changing the "value" of the money. For example ₦100 of today's money invested for one year and earning 5% interest will be worth ₦105 after one year. Therefore, ₦100 paid now or ₦105 paid exactly one year from now both have the same value to the recipient who assumes 5% interest, using time value of money terminology, ₦100 invested for one year at 5% interest has a future value of ₦105. There are several reasons why a naira now is generally considered more valuable than a naira in the future.

(a) There is the sacrifice involve in waiting in respect of consumption, purchasing decision has to do differed till the Naira becomes available.
(b) A sacrifice of what could be earned if the Naira were to be available now and an investment decision were to be made.
(c) There is the uncertainty surrounding the Naira in the future in the sense that it may never comes.
(d) There is the effect of increase in prices which reduce the purchasing power of money. A Naira now is worth more than a Naira next year. Money are better than the same value in the future and earlier returns are better than later one. The time value of money indicates there is a difference between the future value of a payment and the present value of the same payment.

2.2 The Concept of Discounting

The concept of discounting is based on the assumption that a Naira now is worth more than a Naira next year because of the interest that could be earned one Naira if it were put in the bank now. Discounting is essentially a technique by which one can reduce the future benefit and cost streams to their present worth. The technique of discounting permits us to determine whether to accept or reject the projects for implementation that have obviously shaped time-stream that is, patterns of when costs and benefits fall during the life of the project, when they differ from one another and are of different durations.

The process of calculating the present value of an expected future income is known as Discounting. The discount factor is the factor by which a future cash flow must be multiplied in order to obtain the present value.

$$\text{Discount factor} = \frac{1}{(1+r)^n}$$

Where,
n = time factor
r = interest rate
The present value (PV) of a specific amount (A) available at some future time at an interest or discount rate (r) is given by the equation:-

$$PV = \frac{A}{(1+r)^n}$$

Where,
PV = Present Value
A = Future Value
A whole series of cash flows which are required to be discounted to a present value, in such circumstances the formula becomes:-

$$PV = i = \sum_{i=1}^{n} \frac{Ai}{(1+r)^n}$$

Where,

Ai = Cash flows for 1, 2, 3…n.
$\sum$ = Summation sign
PV = Present Value
r = Discount rate (interest rate)
n = time factor

2.3 Determination of Discount Rate

The discount is usually associated with a discount rate, which is also called the discount yield. The discount rate should reflect the opportunity cost of investing on a project being evaluated, the essence of discounting is the emphasis on money as a growing resource, the rate of growth of which depend on the exact use, assuming that no alternative use could be found, the discount rate will be zero. On the other hand if the alternative use to which money can be put is to deposit in the bank, then the discount rate should be rate of interest that could be earned. There are however other uses, for examples, purchase of shares, bonds or use in other alternative investment projects or a combination of all in which case a weighted average of interest rate earnable should be found.

The discount rate or discount yield is simply the proportional share of the initial amount owed (initial liability) that must be paid to delay payment for one year. It is also the rate at which amount owed must rise to delay payment for one year. Since a person can earn a return on money invested over some period of time, most economic and financial models assume the discount rate, or discount yield is the same as the rate of return the person could receive by investing this money elsewhere in assets of similar risk over the given period of time covered by the delay in payment. The concept is associated with the opportunity cost of not having use of the money for the period of time covered

by the delay in payment. The person delaying the payment of the current liability is essentially compensating the person to whom he/she owes the money for the lost revenue that could be earned from an investment during the time period covered by the delay in payment. Accordingly, it is the relevant discount yield or discount rate that determines the discount, and not the other way around. The discount rate is the rate at which the discount must grow as the delay in payment is extended. This fact is directly tied into the time value of money and its calculations. The discount rate which is used in financial calculations is usually chosen to be equal to the cost of capital. The cost of capital, in financial market equilibrium will be the same as the market rate of return on the financial asset mixture the firm uses to finance capital investment. Some adjustment may be made to the discount with other developments. For financial analysis, the discount rate is usually the marginal cost of money to the farm or firm for which the analysis is being done. This often will be the rate at which the enterprise is able to borrow money. This is the rate that will result in utilization of all capital in the economy if all possible investments are undertaken that yield that much or more return. It would be the return on the last or marginal investment made that uses up the last of the available capital. If set perfectly, the rate would reflect the choice made by the society as a whole between present and future returns, and hence the amount of total income the society is willing to save. Discount rate that might be chosen for economic analysis is the borrowing rate the nation must pay to finance the project. But, in this way, selection of projects will be influenced by the financial terms available and will not be based solely on the relative contribution of projects to national income. It is best to break the link between choosing projects and financing them.

Example 3

What is the present value of receiving ₦1,000 in 1 year's time, ₦2,000 in 2 year's time and ₦3,000 in 3 year's time when the discount rate is 10%.

Solution

$$PV = \sum_{i=1}^{n} \frac{Ai}{(1+r)^n}$$

$$PV = \frac{1000}{(1+0.1)^1} + \frac{2000}{(1+0.1)^1} + \frac{3000}{(1+0.1)^3}$$

$$PV = 1000(0.909) + 2{,}000(0.826) + 3{,}000(0.751)$$

$$PV = ₦4{,}814$$

2.4 The Concept of Compounding

Compounding shows the amount to which a sum of One Naira will grow in any given number of years at varying rates of interest. Compounding is the process of predicting accumulated future costs overtime.

$$A = S(1 + r)^n$$

Where,

A = Amount receivable
S = A given sum of Principal
n = Number of years
r = rate of interest

Formulae are presented in greater detail under time value of money

$$FV = PV(1 + i)^n$$

Where,

i = Effective interest rate per period
FV = Future Value
PV = Present Value
n = Number of periods

This calculates the future value (FV) of an investments' present value (PV) accruing at fixed interest rate achieved if an initial investment of 'PV' returns a value of 'FV' after 'n' accrual periods is given as:-

$$i = \left(\frac{FV}{PV}\right)^{\frac{1}{n}} - 1$$

(All symbols are as earlier defined).

The number of periods required to get future value (FV) given the present value (PV) and the interest rate (i) is:-

$$n = \frac{\log(FV) - \log(PV)}{\log(1 + i)}$$

(All symbols are as earlier defined)

The log function can be any base e.g. natural log (In), as long as consistent bases are used all throughout calculation. A formula for calculating annual compound interest is:-

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

Where,

A = Future Value
P = Principal amount (initial investment)
r = Annual nominal interest rate (as a decimal, not in percentage)
n = Number of times the interest is compounded per year
t = Number of years.

Continuous compounding can be thought of as making the compounding period infinitesimally small therefore achieved by taking the limit of 'n' to infinity.

$$PV = FV.\ell^{-rt}$$

Where,

PV = Present Value
FV = Future Value
e = Base of the natural logarithm
r = continuous compounded rate
t = Number of years.

Rates are sometimes converted into the continuous compound interest rate equivalent because the continuous equivalent is more convenient, for example, more easily differentiated. This can be generalized to discount rates that vary over time, instead of a constant discount rate r, one uses a function of time r(t). in that case the discount factor, and thus the present value, of a cash flow at a time T' is given by the integral of the continuously compounded rate r(t):-

$$PV = FV.exp\left(-\int_0^T r(t)\ dt\right)$$

Where,

PV = Present Value
FV = Future value
$\int$ = Integral Symbol
T = Upper time limit
r = continuous compounded rate

Indeed, a key reason for using continuous compounding is to simply the analysis of varying discount rates and to allow one to use the tools of calculus. Further, for interest accrued and capitalized overnight, hence compounded daily, continuous compounding is a close approximation for the actual daily compounding. The effect of compounding depends on the frequency with which interest is compounded and the periodic interest rate which is applied. Therefore, in order to define accurately the amount to be paid under a legal contract with interest, the frequency of compounding (yearly, half-yearly, quarterly, monthly, daily etc) and the interest rate must be specified. Different conventions may be used from country to country, but in finance and economics the following usages are common:-

(a) Periodic Rate: The interest that is charged and subsequently compounded for each period, divided by the amount of the principal. The periodic rate is used primarily for calculations, and is rarely used for comparison. The nominal annual rate or nominal interest rate is defined as the periodic rate multiplied by the number of compounding periods per year. For example, a monthly rate of 1% is equivalent to an annual nominal interest of 12%.

(b) Effective Annual Rate:- This reflects the effective rate annual compounding were applied, in other words it is the total accumulated interest that would be payable up to the end of one year divided by the principal.

Economists generally prefer to use effective annual rates to allow for comparability. In finance and commerce, the nominal annual rate may however be the one quoted instead. When quoted together with the compounding frequency, a loan with a given nominal rate is full specified, the effect of interest for a given loan scenario can be precisely determined, but the nominal rate cannot be directly compared with loans that have a different compounding frequency. Loans and finance may have other 'non-interest' charges and the terms above do not attempt to capture these differences.

Example 4

What is the rate of interest at which a farmer invested ₦2,000 on a sheller for 30 years at 5% is compounded. Do you advice him to go for it?

Solution

$$A = S(1 + r)^n$$

$$A = 2000(1 + 0.05)^{30}$$

$$A = ₦8{,}640$$

The farmer is advised to go into the investment since in 30 years to come, the ₦2, 000 invested would have grown to ₦8, 640.

Example 5

Musa invested ₦100 today and ₦2000 return is expected in five (5) years; what rate of return (interest rate) does this represent?

Solution

$$i = \left(\frac{FV}{PV}\right)^{\frac{1}{n}} - 1$$

$$i = \left(\frac{200}{100}\right)^{\frac{1}{5}} - 1$$

$$i = 0.15 = 15\%$$

Example 6

An amount of ₦1, 500 is deposited in a bank paying an annual interest rate of 4.3% compounded quarterly. Find the balance after 6 years.

Solution

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

$$P = 1500, r = {}^{4.3}/_{100} = 0.0430, n = 4, and\ t = 6$$

$$A = 1{,}500\left(\frac{0.043}{4}\right)^{4\times6}$$

$$A = ₦1{,}938.84$$

2.5 The Concept of Annuity

In this case the cash flow values remain the same throughout the 'n' periods. An annuity is also a collection of payments to be periodically received over a specified period of time. Examples of annuities are regular deposits to a savings account, monthly home mortgage payments and monthly insurance payments. Annuities are classified by the frequency of payment dates. The payments, deposit may be weekly, monthly, quarterly, yearly, or at any other interval of time. The discount factor that should be used where the future stream of cost or benefit is expected to flow at constant rate is referred to as Annuity, hence you have Annuity Table. Annuity as reflected in Annuity Table can be obtained by simply adding up the discount factor for the number of years involved.

$$Annuity = \sum_{i=1}^{n} \frac{1}{(1+r)^n}$$

Where,

$\sum$ = Summation sign

n = Number of years

r = Interest or discount rate

An Annuity is also a series of payments made at fixed intervals of time. if the number of payments is known in advance, the annuity is an annuity-certain. If the payments are made at the end of the time periods, so that interest is accumulated before the payment, the annuity is called an annuity-immediate or ordinary annuity. Mortgage payments are annuity – immediate, interest is earned before being paid. An annuity-due is an annuity whose payments are made at the beginning of each period. Deposits in savings, rent or lease payments, and insurance premiums are examples of annuities due.

The present value of an annuity is the value of a stream of payments, discounted by the interest rate to account for the fact that payments are being made at various moments in the future. The present value of an annuity (PVA) formula has four (4) variables, each of which can be solved for:-

$$PV(A) = \frac{A}{i}\left[1 - \frac{1}{(1+i)^n}\right]$$

Where,

PV (A) = Present value of annuity, value of the annuity at time = 0.

A = value of individual payments in each compounding period.

i = The interest rate that would be compounded for each period of time.

n = Number of payment periods.

Note:- To get the present value of an annuity-due, multiply the above equation by (1+ i).

The present value of a growing annuity, in this case each cash flow grows by a factor of (i+g). Similar to the formula for the present value for an annuity, the present value of a growing annuity (PVGA) uses the same variables with the addition of 'g' as the rate of growth of the annuity.

Where, $i \neq$ g

$$PV = \frac{A}{(i = g)}\left[1 - \left(\frac{1+g}{1+i}\right)^{n}\right]$$

A = Annuity payment in the first period.

g = Rate of growth of the annuity

(All symbols are as earlier defined).

Note: - To get the Present Value (PV) of a growing annuity-due, multiply the above equation by (1+ i).

Where, i = g

$$PV = \frac{A \times n}{1+i}$$

(All symbols are as earlier defined).

The future value of an annuity (FVA) formula has four (4) variables, each of which can be solved for:-

$$FV(A) = A\left[\frac{(1+i)^{n} - 1}{i}\right]$$

Where,

FV (A) = Future Value of an Annuity, is the value of the annuity at time = n.

A = Value of the individual payments in each compounding period.

i = Interest rate that would be compounded for each period of time.

n = Number of payment periods.

Note: To get the Future Value (FV) of an annuity-due, multiply the above equation by (1+ i)

The future value of a growing annuity (FVA) formula has five (5) variables, each of which can be solved for:-

Where, $i \neq$ g

$$FV(A) = A\left[\frac{(1+i)^{n} - (1+g)^{n}}{i - g}\right]$$

Where, i = g

$$FV(A) = A[n(1+i)^{n-1}]$$

Where,

FV (A) = Future Value of an annuity, value of the annuity at time = n
A = Value of initial payment paid at time 1
i = Interest rate that would be compounded for each period of time.
g = Growing rate that would be compounded for each period of time
n = Number of payment periods.

Example 7

What is the present value of an annuity of N500 per annum received for 10 years when the discount rate is 10%.

Solution

Annuity Table examined for the 10% for 10 years = 6.145

$$PV(A) = ₦500 \times 6.145$$

$$PV(A) = ₦3{,}072$$

Example 8

What is present value of a five (5) year annuity with annual interest rate 12% and monthly payments of ₦100?
(Given Annuity of interest rate 1% for n = 60 months = 44.9549)

Solution

(a) $$PV(A) = \frac{A}{i}\left[1 - \frac{1}{(1+i)^n}\right]$$

Where,
A = ₦100
$i = {}^{12\%}/_{12} = 1\% = 0.01$
n = 5 × 12 = 60 months

$$PV(A) = \frac{100}{0.01}\left[1 - \frac{1}{(1+0.01)^{60}}\right]$$

$$PV(A) = ₦4,495.50$$

(b) Annuity Table examined for the 1% for 60 months = 44.9549

$$PV(A) = ₦100 \times 44.9549$$

$$= ₦4{,}495.50$$

Example 9

Calculate the present value of a stream of deposits of N1,000 every year for 20 years earning 7% interest.

Solution

$$PV(A) = A\left[\frac{1 - \frac{1}{(1+i)^n}}{i}\right]$$

Where,

A = N1,000

i= 7% = 0.07

n = 20 years.

$$PV(A) = 1000\left[\frac{1 - \frac{1}{(1+0.07)^{20}}}{0.07}\right]$$

$$PV(A) = 1000\left[\frac{1 - 0.258}{0.07}\right]$$

$$PV(A) = 1000 \times 10.594$$

$$PV(A) = ₦10.594$$

Exercises for Chapter Two

(1) a. What is an Annuity?
b. State and explain the relationship between discounting and compounding.
c. Explain three (3) reasons why money has a time value.

(2) What is the present value of ₦200 per annum received for 10 years at 10% discount rate.

(3) Find the present value (PV) of ₦100 that will be received in five (5) years. assuming a 12% per year interest rate.

CHAPTER THREE

UNDISCOUNTED MEASURES OF PROJECT WORTH IN PROJECT ANALYSIS

3.1 Concepts of Investment, Investment Appraisal and Project Appraisal

Investment can be defined as an increase in the stock of physical assets. In fact, the term investment as used by economists may include such activities and events as the purchase of real estate, shares and or bonds. In economics, the notion of (productive) "investment refers to the flow of resources into the production of new (physical) capital". First, it is a flow concept; it is measurable over a period of time and refers to changes in the level of capital stock. Secondly, it refers to physical assets as distinct from financial assets. The economic notion of investment thus takes a variety of forms, which include the following: (a) net additions to stocks this include changes in inventories and work in progress as that part of current output which is not consumed, (b) plant and machinery, the acquisition of lathes, computers, lorries etc which includes both replacement and additions to the capital stock, (c) construction comprising houses, factories, offices, shops, storage etc. In finance and business contexts, the term investment is used rather more widely to refer to "any new activity or group of activities, investment projects to which an enterprise can commit its resources in anticipation of rewards". As in economics, this concept too distinguishes resource commitments for increasing current consumption from those intended for increasing or improving production capability at some future date. Even more broadly "investment may be defined as an activity for which the required outlays and the benefits are not expected to be concurrent". This notion stresses the importance of the investment horizon, or the time period over which the rewards of investment are expected. As stated above, in the world of business and finance as distinct from the world of economics, not all investment takes the form of additions to real physical assets. It is often just as worthwhile to consider financial transactions which involve diversifying an enterprise's assets portfolio such as the purchase of shares and bonds, art collections, foreign currency etc. financial transactions may well arise independently of real investment considerations and, in practice, broaden substantially the full array of investment decisions open to an enterprise. Here are a few examples of different types of investment activities.

i. Building a factory
ii. Extending a warehouse
iii. Instituting a staff training programme
iv. Buying or leasing a new machine
v. Improving a delivery and distribution service
vi. Launching a new product line
vii. Automating process etc.

It is convenient to consider investment project as a distinct subdivision of investment. This is seen as a set or group of interconnected activities that are typically considered together and will be accepted or rejected as a set. For instance, a plant automation programme would involve the installation of physical machinery, together with possible changes in factory floor layout as well as staff training. In practice, there are alternative investment packages or projects, and the role of investment appraisal would be to assess the soundness of investment decision(s) across the full spectrum of possibilities against a background of well-defined objectives. Investment opportunities vary considerably in nature. Investment appraisal techniques are needed to help investors or their financial managers and agents make sound based decisions and select the best investment projects. The list (a-h) below categories different types of investment activities and gives an idea of the range of the tasks to which the methodology of investment appraisal may be applied. (a) Expansion establishing the viability of expanding existing product lines, (b) Diversification – appraising the soundness of investment into new products/services. (c) Cost saving – some investment activities are expected to result in cost savings and such decisions need appraisal just as diversification and expansion of product lines. (d) Replacement not all investment decisions result in net additions to the capital stock, so deciding whether and when to replace existing capital, equipment and building constitutes another type of consideration in investment appraisal. (e) Research and Development – This can affect enterprise productivity, competitive position and ultimately, financial performance. These activities, too, need appropriate assessment before resources are devoted to them. (f) Alternative choice – This type of investment decision requires choosing between alternatives that achieve the same ends e.g. purchasing outsourced inputs from an external supplier or else producing the good or service in-house. (g) Financing – comparison of the benefits of purchasing as asset against leasing it. (h) Others – such as expenditure on complying with health and safety standards, a pollution control device, etc. this categories of different types of investment given above shed some light on the function and significance of investment appraisal. Another term used to refer to 'capital investment' and the analysis surrounding it is 'capital budgeting'. Broadly, investment appraisal or capital budgeting is concerned with the selection and use of criteria and methodologies to guide the allocation of investment expenditure. It thus focuses on alternative measure of project acceptability.

For both private and public sector enterprises and firms, the decisions involved are important not only because the expenditure involved can be very large, but also because the decisions made are often irreversible, and the uncertainties regarding their future benefits may be considerable. Suppose an office automation programme costs ₦65, 000 and is expected to result in cost savings of ₦15, 000 per annum for so many years. The question for the

managers to address is whether a decision to commit so much of the firm's resources is justified in the light of its expected benefits.

Similarly, a public sector investment project such as the upgrading of a particular section of a railway line or a road improvement scheme has to rely on a methodology of investment appraisal to help with the investment decision. The essence of all investment appraisals is the assessment of the worthwhile of proposals that require economic and financial resource commitment, by taking into investment decisions can result in poor economic and financial attracting new investors or the dissatisfaction of existing owners (shareholders). Similarly, in the public domain, the future viability of an enterprise may depend critically on the decisions made today to commit resources for future benefits.

At macroeconomic level, the overall performance of an economy both in terms of growth and efficiency of resource allocation depends on the micro level investment decisions, their benefits and demands on resources. As we have seen, the nature of investment opportunities available to firms varies considerably: from expansion and diversification projects to cost saving investments and capital replacement decisions. In all such cases, specific and defined decision criteria are required to help investors decide whether required outlays are justified by the expected benefits or returns on capital committed. It is of course worth nothing that investment decision will never be made by companies purely according to financial decision criteria, consideration of how the proposed investment fits with the company strategy would be paramount. Here, however, it is the financial appraisal of investment opportunities that we are concerned with. Project appraisal which is the responsibility and primary concern of the lender. Its purpose is to establish the worthwhile of a prepared project in the light of its resource commitments and expected benefits. In practice, this is an intricate and sophisticated process of enquiry into the viability of the project that may require the specialized services of appraisal missions, professionals and appointed consultants.

Undiscounted Measures of Project Worth in Project Analysis

The techniques of project appraisal can be discussed under two headings (a) Undiscounted (b) Discounted. Undiscounted techniques include:- (i) Value-Added (ii) Capital-Output Ratio (iii) Proceeds Per Unit Outlay (iv) Average Annual Proceeds per Unit of Outlay. (v) Inspection method (vi) Payback Period (vii) Accounting Rate of Return (viii) Return on Investment.

These techniques are discussed below:-

3.2 Value-Added

Value added is the amount of economic value generated by the activity carried out within each production unit in the economy. In any production unit, value-added is measured by the difference between the value of the output of the firm and the value of all inputs purchased from outside the firm. The capital

and labour attached to each firm are considered internal inputs. Thus, value-added is the value that has been added by the labour and capital of the enterprise to the economy. Gross value added includes payment for taxes, interest, rent, profits, and reserves for depreciation. Deducting depreciation gives the net value-added. The sum of all the net value-added is referred to as net domestic product. So the more value added by the project, the more it will be justified economically.

3.3 Capital – Output Ratio

The capital – output ratio is defined as the average value-added produced per unit of capital expenditure. Project with low capital-output ratio are favoured.

3.4 Proceeds per Unit of Outlay

Proceeds per unit of outlay are calculated by dividing total net value of incremental production by the total amount of investment. So the higher the proceeds per unit of the outlay, the higher the economic viability of the project. This criterion does not take into consideration the time value of money.

3.5 Average Annual Proceeds per Unit Outlay

To calculate this measure, the total of the net value of incremental production is first divided by the number of years during which it will be realized and then this average of annual proceeds is divided by the total capital cost. So if average annual proceeds per unit of outlay are high, the project will be economically justified for implementation.

Table 1:- Flow of Capital Costs and Benefits of Projects

	Projects					
Year	A	B	C	D	E	F
0	-1000	-1000	-1000	-1000	-1000	-1000
1	+300	+4000	+400	+200	+500	+400
2	+300	+300	+300	+200	+500	+300
3	+400	+300	+300	+200	+500	+300
4	+400	+400	+400	+200	-	+700
5	+300	+300	+300	+400	-	-
6	φ	φ	+300	+1000	-	-

3.6 The Inspection Method

As the name implies, it is an approach which does not require much computation in assessing the relative profitability of a number of projects. We can tell by simply looking at the investment costs and the shape of the cash flow stream that one project is better than another. To use this method either of two (2) conditions must be satisfied:-

(a) The project must require equal investment but with different lives (life-span), benefit must be equal each year through the final year of the shorter of

shortest loved projects, with the long-lived project earning further benefits in subsequent year.

(b) The project must require the same investment, the same lifespan and the same total-benefits but with some project earnings more in one of the earlier years than others which is later compensated for. Table 1 shows that projects A and B satisfied the second condition and without any computation, it can be easily shown that project B is more desirable than project A. project B yields ₦100 more than project A in the first year, although project A compensate for this in the third year. Similarly, projects B and C satisfied the first condition. Again without any computation, project C is seen to be more profitable than project B since project C yields ₦300 in sixth year in which project B yields nothing while projects B and C yields the same amount each year through the fifth year.

Inspection method is of limited use in real-life situation, since project is very rarely satisfied either of the two conditions, what is more is the additional difficulty of assessing the relative profitability of more than two projects.

3.7 Pay Back Period

The payback period refers to the length of time required to recover the capital cost of the project. In other words, it is the length of time from the beginning of the project until the net value of the incremental production stream reaches the total amount of capital investment (Net Value of incremental production = Value of incremental production less operation and management, production cost). According to this criterion, the shorter the period for recovery the more profitable is the project. The payback period can also be defined as the length of time from the beginning of project before the net benefits return on the cost of the capital investment. The method measures the time required to recover the amount invested in the projects. The method estimated the time required for the net additional cash inflow per year to equal the cost of investment.

Where annual cash flows are equal, payback period can be represented thus:-

$$P = \frac{I}{CF}$$

Where,

P = Payback period

I = Investment

CF = Net Cash flow

Where annual cash flows are unequal, it is the number of years it takes the cumulative cash flow to equal the initial cash outlay. Payback period can be calculated thus;-

$$P = b + \frac{a - c}{d}$$

Where,

P = Payback Period

a = Initial Cumulative Cash Flow

c = Cumulative Cash Flow before Recovery Period

d = Cash Flow Recovery Year.

This is the simplest method of assessing the desirability of project in real-life. The method measures the time required to recover the amount invested in the projects. Thus in spite of the limitations of this payback period method, the method could be appropriate when investors are interested in project which will generate funds for other projects. It is thus a yard-stick that could be used to guide the sequence of project decisions. From Table 1 the payback period is three years for projects A, B, C and F, five years for project D and two years for project E. based on this measure therefore project E is the most attractive while projects A, B, C and F are equally desirable. This conclusion shows the limitation of payback period method. Project E which is supposed to be most attractive promises a return of ₦500 (₦1, 500 - ₦1, 000) while project C which is not supposed to be as attractive promises a return of ₦1,000 (₦2,000 – ₦1,000). Similarly projects B and C are supposed to be equally attractive, even though project C has a return of ₦1000 as against project B of ₦700. This conclusion can only be valid if we ignore the benefits after the payback period, to the extent that the earnings after the payback period affects profitability, the measure does not really measure total profitability and it is therefore inadequate method where investors want to select a project on the basis of its total profitability. Payback period revealed that projects A and B are equally attractive. The return on each of projects A and B is ₦700 but without any computation project B should have being shown to be more attractive than project A since project B return ₦100 more in the first year which is not compensated for until the third year. For projects A and B to be said to be equally attractive, it must be assumed that money has no time-value. According to the payback period criteria, the shorter the payback period, the more desirable the project. Firms using these criteria, generally specify the maximum acceptable payback period. If this is ‘n’ years, projects with a payback period of ‘n’ years or less are deemed worthwhile, and projects with a payback period exceeding ‘n’ years are considered unworthy.

Advantages of Pay Back Period Method

(1) Payback period is simple, both in concept and application. It does not use complex concepts and tedious calculations.

(2) It is a ready method for dealing with risk. It favours projects which generate substantial cash inflows in earlier years and discriminates against projects which bring substantial cash inflows in later years but not in earlier years. now, if risk tends to increase with futurity, in general, this may be true, the payback criterion may be helpful in weeding out risky projects.

(3) Choosing projects which payback quickest will tend to minimize those risks facing the company which are related to time. Since it emphasizes earlier cash inflows, it may be a good criterion when the firm is pressed with problems of liquidity.
(4) Uses project cash flows, hence payback period is more objectively based.
(5) Payback period favours quick return project which may produce faster growth for the company.

Disadvantages of Pay Back Period Method

(1) Payback period fails to consider the time value of money. Cash inflows, in the payback calculation, are simply added without suitable discounting. This violates the most basic principle of financial analysis which stipulates that cash flows occurring of different points of time can be added or subtracted only after suitable compounding/discounting.
(2) Payback period does not measure overall project worth because it does not consider cash flows after the payback period. The earnings after the payback period. The earnings after the payback period affects profitability. Payback period ignores cash flows beyond the payback period, this leads to discrimination against projects which generate substantial cash inflows in later years.

Example 10

A machine for producing GSM recharge card is available at a total cost including installation of ₦10,000,000. It is expected to have a life span of 8 years and during that time produces a net cash inflow as follows:-

Yrs	**Net Inflows (₦)**
1	500,000
2	1,000,000
3	3,000,000
4	4,000,000
5	4,000,000
6	2,000,000
7	2,000,000
8	2,500,000

Calculate the Payback Period.

Solution

Yrs	Cash flow (₦'000)	Cumulative Cash flow ₦'000
0	(10,000)	(10,000) (a)
1	500	500
2	1,000	1,500
3	3,000	4,500
4(b)	4000	8,500
5	4,000(d)	

$$P = b + \frac{a - c}{d}$$

b = 4, b = 10,000c c = 8,500, d = 4,000 P = Payback period

$$\text{P} = 4 + \frac{10{,}000 - 8{,}500}{4{,}000}$$

$$= 4.375 = 4\ years\ 4\ months$$

3.8 Accounting Rate of Return

The accounting rate of return, also referred to as the average rate of return is a measure of profitability which relates income to investment, both measured in accounting terms. The accounting rate of return that are employed commonly in practice are

$$ARRR_1 = \frac{Average\ income\ after\ tax}{Initial\ Investment}$$

$$ARRR_2 = \frac{Average\ Income\ after\ tax}{Average\ Investment}$$

$$ARRR_3 = \frac{Average\ Income\ after\ tax\ but\ before\ interest}{Initial\ Investment}$$

$$ARRR_4 = \frac{Average\ Income\ after\ tax\ but\ before\ interest}{Average\ Investment}$$

Where,

$ARRR_1$ to 4 = Accounting Rate of Return

Accounting rate of return is superior to the payback period. While it does take account of the earnings over the entire economic life of a project, accounting rate of return does not specify adequately the relative attractiveness of alternative proposals or projects. Accounting rate of return is biased against short term projects in the same way that payback period are biased against longer term projects. The accounting rate of return method uses accounting information as revealed by financial statements to measure the profitability of investments.

Advantages of Accounting Rate of Return

(1) Accounting rate of return is simple to calculate, understand and use.
(2) It is based on accounting information, accounting data which is readily available and familiar to investors and businessmen.
(3) It uses the entire stream of incomes in calculating the accounting rate. It considers benefits over the entire life of the project.
(4) Since it is based on accounting measures, which can be readily obtained from the financial accounting system of the firm, it facilitates post-auditing of capital expenditures.
(5) Income data for the entire life of the project is normally required for calculating the accounting rate of return, one can make do even if complete data is not available. For example, when due to indeterminacy of project life a complete forecast of income cannot be obtained, the accounting rate of return can be calculated on the basis of income for some typical year or income for the first three to five years.

Disadvantages of Accounting Rate of Return

(1) Accounting rate of return is based upon accounting profits not cash flow.
(2) It does not take into account the time value of money.
(3) There are, as we have seen, numerous measures of accounting rate of return. This can create controversy, confusion and more confusion and problems in interpretation.
(4) Accounting income, whatever particular measure of income we choose is not uniquely defined because it is influenced by the methods of depreciation, inventory valuation and allocation of certain costs. Working with the same basic accounting data, different accountants are likely to produce different income figures. A similar problem, though less severe, exists with respect to investment.
(5) The argument that the accounting rate of return measure facilitates post-auditing of capital expenditure is not very valid. The financial accounting system of a firm is designed to report events with respect to accounting periods and for profit centers but not for individual investment.

Example 11

A firm is considering a project with an initial investment of ₦1,000 and a life of 5years. The profits generated by the project are given below. Calculate the accounting rate of return (ARR) on:- (a) Initial Capital (b) Average Capital.

Yrs	Project Profit (₦)
1	200
2	200
3	200
4	200
5	200
Total	1,000

Solution

$$\text{(a) } ARR = \frac{Average\ Profit}{Initial\ Capital} \times 100$$

$$= \frac{1000/5}{1{,}000} \times 100$$

$$= 20\%$$

$$\text{(b) } ARR = \frac{Average\ Profit}{Average\ Investment} \times 100$$

$$= \frac{1000/5}{1{,}000/2} \times 100$$

$$= 40\%$$

3.10 Return on Investment

Return on investment considers the total profitability of a project. It expresses total earnings as percentage of capital invested. This measures attempt to rectify one of the defects of the payback period method, in that it considers the profitability of the project. From Table 1, we can observe the rate of return from projects A to F as well as their relative attractiveness. Return on investment can taken either of two (2) forms: (a) The rate of return, (b) The annual rate of return.

Project	Rate of Return (%)	Relative Attractiveness
A	70	3
B	70	3
C	100	2
D	120	1
E	50	6
F	70	3

As shown above, project D is the most attractive, project E is the least attractive, while projects A, B and F are equally attractive. This conclusion shows the major weaknesses of his method. The first weakness is that the time value of money is ignored. Consequently, projects A, B and F are assumed to be equally

attractive whereas based on the inspection method project B is more attractive than project A. Similarly, project F is more attractive than project B, since project F earns ₦300 more in the fourth year than project B. This problem is taken care of by discounting techniques or concepts.

Exercises for Chapter Three

(1) a. Define the Accounting Rate of Return (ARR) and give its advantages and disadvantages

b. Calculate (i) Payback Period (ii) Accounting Rate of Return (ARR) on initial capital, for the following two (2) projects:-

Year	**1**	**1**	**2**	**3**
Project A(N)	-24,000	+8,000	+12,000	+16,000
Project B(N)	-24,000	+16,000	+10,000	+8,000

c. Using your results calculated in 1(b) above, rank the two(2) projects in order of their relative attractiveness.

(2) a. Define Return on Investment (ROI) and state it's formula.

b. Consider the following cash flow

Year	**Cash Flow (₦)**
0	-60,000
1	+27,000
2	+31,740
3	+36,501

Calculate (i) Return on Investment (ROI) (ii) Payback Period (iii) Accounting Rate of Return (ARRR) on Initial Capital

(3)a. The cash flows for a project are shown below. Calculate (i) Payback period (ii) Accounting rate of return on average capital.

Year	**0**	**1**	**2**	**3**	**4**	**5**
Cash Flows (₦)	-10,000	+2,000	+3,000	+2,500	+3000	+3,500

(c) Comment briefly on your results in 3(a) above.

CHAPTER THREE

DISCOUNTED MEASURES OF PROJECT WORTH IN PROJECT ANALYSIS

A means of measuring cash that allows for the importance of time is needed. This is provided by the discounting methods of appraisal. Discounted measures meet the objections to the payback period and the average rate of return methods.

4.1 Net Present Value (NPV)

The net benefit of the project each year is discounted back to the present using the selected discount rate hence the term discounted cash flow. The formula for calculating the Net Present Value is given by:-

$$NPV = \sum_{t=0}^{t} \frac{B_t - C_t}{(1+r)^t}$$

Or

$$NPV = \sum_{t=0}^{t} \frac{C_i}{(1+r)^t}$$

Where,

NPV = Net Present

B_t = Benefit accruing in Period t

C_t = Cost incurred in Period t

r = Discount rate

t = Life of the Project

C_i = Net cash flow in the period i

Decision Rule:-

NPV > 0 Accept

NPV = 0 Indifferent, Break even Project

NPV < 0 Reject

The decision rule of this criterion, given the discount rate is to execute all projects with a positive NPV. In this case of competing projects, that they all qualify on account of having a positive NPV, the decision rule is to choose those projects that have the highest NPV.

Net present value or Net Present Worth (NPW) is simply the present worth of the incremental net benefit or incremental cash flow. it is the difference between discounted between discounted benefits and discounted costs of a project. Net present worth criterion suggests us to accept all independent projects with a zero or greater than zero net present worth when discounted at opportunity cost. No ranking of acceptable, alternative independent project is possible with the present worth criterion because it is an absolute and not relative measure. A small, highly attractive project may have a

smaller net present worth than larger marginally acceptable project. If both have positive NPV or NPW then both projects should be undertaken. It is because the opportunity costs of capital have been estimated to be low. Then the correct response is to raise the estimate of opportunity cost until we have only the selection of projects with NPV or NPW that are zero or positive and for which, in fact, there will be just sufficient investment funds. The net present value of a project is equal to the sum of the present value of all the cash flows associated with the project. One of the most important concepts originating from the time value of money, NPV is calculated by subtracting the present value of the cash outflows (investment) from the present value of the cash inflows (income).

Advantages of Net Present Value (NPV)

(1) Net present value takes into account the time value of money.
(2) It considers the cash flow stream in its entirety.
(3) Net present value meets neatly with the financial objective of maximization of the wealth of stockholder. The net present value represents the contribution to the wealth of stockholders.
(4) The net present value of various projects can be added. For example, the present value of package consisting of two projects A and B, will simply be the sum of the net present values of these projects individually:-

$$NPV\ (A + B) = NPV(A) + NPV(B)$$

The additivity property of net present value ensures that a poor project, one which has a negative net present value will not be accepted just because it is combined with a good project which has a positive net present value.

Disadvantages of Net Present Value (NPV)

(1) The ranking of projects on the net present value dimension is influenced by the discount rate. Consider two mutually exclusive projects A and B. looking at the behavior of net present values as shown below:-

Discount rate	**NPV(A) (₦)**	**NPV(B) (₦)**
(a) 10%	36,622	29,180
(b) 12%	20,390	17,658
(c) 14%	5,318	6,828

When the discount rate is 12%, the net present value of A is greater than the net present value of B. when the discount vat is 14%, the net present value of B is greater than the net present value of A.

1. The net present value measure an absolute value, does not appear very meaningful to businessmen or investors who want to think in term of rate of return measures.

Example 12

A labour saving machine costs ₦60,000 and will save ₦24,000 per annum. The machine is expected to have a three (3) ear life span and zero scrap value. The firm's cost of capital is 10%. Calculate the project's Net Present value (NPV) and interpret your answer.

Solution

$$NPV = \sum_{t=0}^{t} \frac{B_t C_t}{(1+r)^t}$$

(All symbols are as earlier defined)

Annuity of 3 years @10% = 2.487
NPV = - ₦60,000 + 24,000 x 2.487
NPV = - ₦-60,000 + 59,688
NPV = - ₦ 312,000
Interpretation:- The project is not worthwhile, negative NPV
Project is unacceptable

Example 13

Consider the following cash flow:-

Year	**Cash Flow (₦)**
0	-60,000
1	+27,000
2	+31,740
3	+36,501

Calculate Net Present Value (NPV) given discount rate of 10%

Solution

$$NPV = \sum_{t=0}^{t} \frac{C_i}{(1+r)^t}$$

(All symbols are as earlier defined)

Year	**Cash flow (₦)**	**Discount factor at 10%**	**Present Value (PV) (₦)**
0	-60,000		-60,000.00
1	+27,000	0.909	24,543.00
2	+31,740	0.826	26,217.00
3	+36,501	0.751	27.412.00

NPV ₦18,172.00

Example 14

The cash flows for a project are shown below:-

Year	**0**	**1**	**2**	**3**	**4**	**5**
Cash Flows (₦)	-10,000	+2,000	+3,000	+2,500	+3000	+3,500

The cost of capital is 10%. Calculate Net Present Value (NPV).

Solution

$$NPV = \sum_{t=0}^{t} \frac{C_i}{(1+r)^t}$$

(All symbols are as earlier defined)

Year	**Cash flow (₦)**	**Discount factor at 10%**	**Present Value (PV) (₦)**
0	-10,000	-	10,000.00
1	+2,000	0.909	1818.00
2	+3,000	0.826	2476.00
3	+2,500	0.751	1877.50
4	+3,000	0.683	2049.00
5	+3,500	0.621	2173.50

NPV = ₦394

Example 15

Calculate Net Profit Value (NPV) for the following two (2) projects:

Year	**0**	**1**	**2**	**3**
Project A (₦)	-24,000	+8,000	+12,000	+16,000
Project B (₦)	-24,000	+16,000	+10,000	+8,000

(Given 10% discount rate)

Solution

$$NPV = \sum_{t=0}^{t} \frac{C_i}{(1+r)^t}$$

(All symbols are as earlier defined)

(a) Project A

Year	Cash flow (₦)	Discount factor at 10%	Present Value (PV) (₦)
0	-24,000	-	-24,000.00
1	+8,000	0.909	7272.00
2	+12,000	0.826	9912.00
3	+16,000	0.751	12016.00
		NPV_A	**₦5,200.00**

(b) Project B

Year	Cash flow (₦)	Discount factor at 10%	Present Value (PV) (₦)
0	-24,000	-	-24,000
1	+16,000	0.909	14544.00
2	+10,000	0.826	8260.00
3	+8,000	0.751	6008.00
		NPV_B	**₦4812.00**

1.2 Benefit – Cost Ratio

The benefit-cost ratio is the ratio of discounted costs to discounted revenue and the formula is given by:-

$$B/C = \frac{\sum_{t=1}^{n} \frac{B_t}{(1+r)^t}}{\sum_{t=1}^{n} \frac{C_t}{(1+r)^t}}$$

Where,

B/C = Benefit-cost ratio

B_t = Benefits in each project year
C_t = Costs in each project year
n = Number of years
r = Interest or discount rate

Decision-Rule

A project should be undertaken if the benefit-cost ratio is greater than 1. If the benefit-cost ratio is exactly 1, it means that the project just breaks even. That is, it is making neither profit nor loss.

Benefit-cost ratio (BCR) is obtained when the present worth of the benefit-stream is divided by the present worth of the cost-stream. The absolute value of benefit-cost ratio will vary depending on the interest rate chosen. The higher the interest rate, the smaller the resultant benefit-cost ratio and, if a

higher enough rate is chosen, the benefit-cost ratio will be driven down to less than 1.

The benefit-cost criterion suggests to us to accept all independent projects with a benefit-cost ratio of one or greater than one, when the cost and benefit streams are discounted at the opportunity cost of capital. The benefit-cost ratio discriminates against projects with relatively high gross returns and operating costs, even though these may be shown to have a greater wealth-generating capacity than that of alternatives with higher benefit-cost ratio.

Example 16

A firm is considering a project with the following cash flows discount rate of 10%. Calculate benefit-cost ratio and explain your results.

Year	**Project Cost (₦)**	**Project Benefit**
1	20,000	22,000
2	22,000	24,972
3	24,000	28,500
4	24,000	33,500

Solution

Year	Costs	Benefits	Discount Factor (10%)	Discounted costs	Discounted Benefits
1	20,000	22,000	0.909	18180	19998
2	22,000	24,972	0.826	18172	20626.8
3	24,000	28,5000	0.751	18024	21403.5
4	24,000	33,5000	0.683	16392	22880.5
			Total	70768	84908.8

$$B/C = \frac{\sum_{t=1}^{n} \frac{B_t}{(1+r)^t}}{\sum_{t=1}^{n} \frac{C_t}{(1+r)^t}}$$

$$B/C = \frac{84908.8}{70768}$$

$$B/C = 1.199 = 1.20$$

The project should be undertaken because the benefit-cost ratio is greater than 1.

4.3 Internal Rate of Return (IRR)

The internal rate of return can be defined as the discount rate which gives Zero Net Present Value (NPV). Present value of the expected benefit equal to capital cost of the projects. Internal rate of return can be stated thus;-

$$\sum_{t=0}^{t} \frac{B_t}{(1+r)^t} = K_0$$

Where,

r = Discount rate

K_0 = Capital cost

B_t = Benefit accruing to the project in period t

Decision Rule

Once 'r' is determined, adopt any project which has an internal rate of return in excess of the predetermined discount rate. Alternative names for the internal rate of return (IRR) include:- Discounted cash flow yield, marginal efficiency of capital, trial and error method, discounted yield and the actuarial rate of return. Internal rate of return (IRR) is the discount rate that makes the Net Present Worth (NPW) or Net Present Value (NPV) of the incremental net benefit-stream or incremental cash flow equal to zero. It is the maximum interest that a project could pay for the resources used if the project is to recover its investment and operating costs and still break even. It is the rate of return on capital outstanding per period while it is invested in the project. IRR criterion suggests to us to accept all independent projects having internal rate of return equal to or greater than the opportunity cost of capital. In case of mutually exclusive projects, IRR can lead to an erroneous investment choice. This danger can be avoided either by using Net Present Worth (NPW) criterion or by discounting the differences in the cash flow of alternative projects. An internal rate of return of a series of values such as cash flow can exist only when at least one value is negative. Although IRR of different projects will vary, a project cannot with confidence be ranked on the basis of IRR. Only a very general way will the IRR tell us that one project is better than another, in the sense that it contributes more to national income relative to resources used. If the discount rate remains 12%, we cannot know with certainty that the project with 25% return contributes relatively more to national income than the one with 15% return, and we cannot say with confidence that we should implement the project with 25% rate of return first. If we raise the opportunity cost (cut-off rate) to 18%, then the project with 15% economic rate of return drops out of the investment net and judgment in favour of a 25% IRR project will be easy. One cannot simply choose that discount rate which will make the incremental net benefit-stream equal to zero. There is no formula for finding the internal rate of return straightaway. We are forced to resort to a systematic procedure of trial and error to find that discount rate which will make the net present worth of incremental net benefit-stream equal to zero. The most difficult aspect of the

trial and error procedure is making the initial estimates. If the estimate is too far from the final results, then several trials will have to be made to find two rates close enough together to permit accurate interpolation. Interpolation is the process of finding a desired value between two other values. In practice, it is better not to interpolate between intervals greater than about five percent because the wider intervals can easily introduce an interpolation error. The formula of interpolation is given below:-

$$\text{IRR} = \begin{matrix}\text{Lower}\\ \text{Discount}\\ \text{Rate}\end{matrix} + \begin{matrix}\text{The Difference}\\ \text{Between Two}\\ \textit{Discount}\\ \textit{Rates}\end{matrix} \left[\begin{matrix} \textit{Present Worth of}\\ \textit{Incremental Net}\\ \frac{\textit{Benefits stream (cash}\\ \textit{flow at lower discount}\\ \textit{rate}}{\textit{Sum of the present}\\ \textit{worth of incremental}\\ \textit{net benefit} - \textit{streams}\\ \textit{(cash flow)at the}\\ \textit{two discount rates}\\ \textit{(signs ignored).}} \end{matrix} \right]$$

$$\text{IRR} = \begin{matrix}\text{Lower}\\ \text{Discount}\\ \text{Rate}\end{matrix} + \begin{matrix}\text{Difference}\\ \text{Between the}\\ \textit{Discount}\\ \textit{rates}\end{matrix} \left[\frac{\textit{NPV at lower discount}\\ \textit{factor}}{\textit{Absolute difference}\\ \textit{between the two}\\ \textit{NPV}} \right]$$

When the present value of cash inflows is exactly equal to the present value of cash outflows we are getting a rate of return which is equal to our discount rate. In this case the rate of return we are getting is the actual return on the project. This rate is called the internal rate of return (IRR). IRR will be the return when the NPV is equal to zero as only then the present value of cash inflows will be equal o the present value of the cash outflows. In the net present value calculation we assume that the discount rate (cost of capital) is known and determine the net present value of the project. In the internal rate of return calculation, we set the net present value equal to zero and determine the discount rate (internal rate of return) which satisfies this condition. Both the discounting methods NPV and IRR relate the estimates of the annual cash outlays on the investment to the annual net of tax cash receipt generated by the investment. As general rule, the net of tax cash flow will be composed of revenue less taxes, plus depreciation. Since discounting techniques automatically allow for the recovery of the capital outlay in computing time adjusted rates of return. It follows that depreciation provisions implicitly form

part of the cash inflow. Internal rate of return method consists of finding that rate of discount that reduces the present value of cash flows (both inflows and outflows attribute to an investment project to zero. In other words, this true rate is that which exactly equalizes the net cash proceeds over a project's life with the initial investment outlay. If the IRR exceeds the financial standard i.e. cost of capital, then the project is acceptable. Instead of being computed on the basis of the average or initial investment, the IRR is based on the funds in use from period to period. The actual calculation of the rate is hit-and-miss exercises because the rate is unknown at the onset, but tables of present values are available to and the analyst. These tables show the present value of future sums at various rates of discount and are prepared for both single sums and recurring annual payments. There are two possible economic interpretations of internal rate of return:- (a) internal rate of return represents the rate of return on the unrecovered investment balance in the project, (b) internal rate of return is the rate of return earned on the initial investment made in the project.

The internal rate of return (IRR) take full recognition of time value of money, it attempt to find a break-even discount which will make the present value of the expected benefit equal to the capital cost of the projects. If the investment on a project is 'c' Naira and the net benefit for so many years (n) for project life are R_1, R_2, R_3…R_n, then the internal rate of return (r) is obtained by solving the equation:-

$$C = \frac{R_1}{(1+r)} + \frac{R_2}{(1+r)^2} + \frac{R_3}{(1+r)^3} + \ldots\ldots\ldots \frac{R_n}{(1+r)^n} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$\frac{R_1}{1+r} + \frac{R_2}{(1+r)^2} + \frac{R_3}{(1+r)^3} + \frac{R_n}{(1+r)^n} \cdot [c]^{Transpase} O \ldots\ldots\ldots\ldots\ldots 92)$$

The limitation of this approach is in the difficulty encountered in computation, since C and R are constant, equation (1) is polynomial in which there are 'n' different values of r. some of the value of 'r' may be unreal and could be easily eliminated, but the choice among more than one real value may present a problem, even if it is only a minor one. In real life 'r' is arrived at by trials and errors. This approach tries to solve the equation using different values of 'r' and with assistant of discount-table.

Advantages of Internal Rate of Return (IRR)

(1) Internal rate of return takes into account the time value of money.
(2) It considers the cash flow stream in its entirety.
(3) Internal rate of return makes sense to businessmen who want to think in terms of rate of return and find an absolute quantity, like net present value, somewhat difficult to work with.

Disadvantages of Internal Rate of Return (IRR)

(1) The internal rate of return figure cannot distinguish between lending and borrowing and hence a high internal rate of return need not necessarily be a desirable one.

(2) The internals rate of return criterion can be misleading when choosing between mutually exclusive projects that have substantially different outlays.

Example 17

Consider project A of Table 1. Calculate internal rate of return of project A.

Solution

$$C = \frac{R_1}{(1+r)} + \frac{R_2}{(1+r)^2} + \frac{R_3}{(1+r)^3} + \ldots\ldots\ldots + \frac{R_n}{(1+r)^n}$$

$$1000 = \frac{300}{1+r}\frac{300}{(1+r)^2} + \frac{400}{(1+r)^3} + \frac{400}{(1+r)^4} + \frac{300}{(1+r)^5}$$

Assuming r = 20%.

The discounted-stream of benefits or the right-hand side of the equation is 1, 0004. This suggests a higher value of 'r' than 20% should be used.

Assuming 'r' = 21%

The discounted benefits to the right-hand side of the equation are ₦982 which is lower than ₦1, 000.

The break-even value of 'r' is therefore between 20% and 21%. The actual value of 'r' can be only interpolated, since the discounted-table does not provide any value between 20 and 21.

Method of Interpolation

The method of interpolation can be shown thus:-

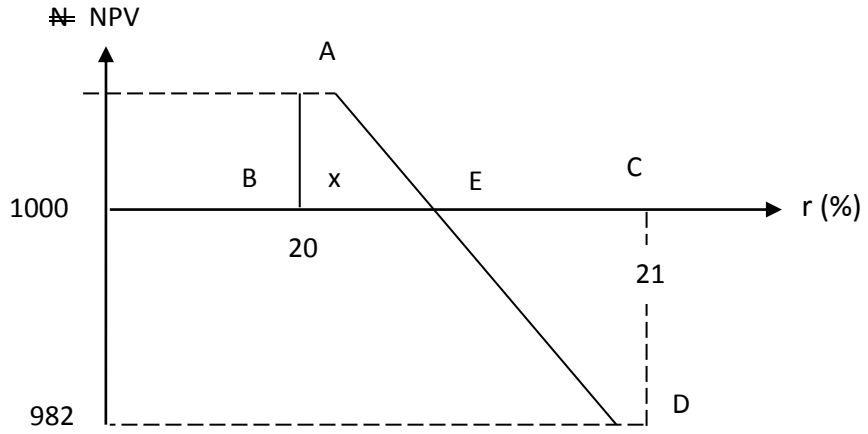


Figure 1:- Determination of Internal Rate of Return (IRR) Using Method Interpolation what has to be calculated is the value 'BE' which we assumed to be 'x'. This is done by using the principle of similar triangle. Since triangles ABE and DCE are similar:-

$$\frac{BE}{AB} = \frac{EC}{DC}$$

Where,
BE = x
AB = 4 units
DC = 18 units
And EC = 1 – X units.

$$\therefore \frac{X}{4} = \frac{1-X}{18}$$

$$18x = 4 - 4x$$

$$22x = 4$$

$$x = {}^{4}/_{23} = 0.18$$

$$OE = 20 + 0.18$$

$$Irr = 20.18 = 20.2\%$$

The value of 20.2 can be put down as the internal rate of return of Project A. Computations of Irr of projects B,C,D,E and F in Table 1 are shown below;-

Projects	**IRR**
A	20.2
B	21.3
C	25.3
D	20.43
E	23.37
F	22.52

Example 18

Engineers Advice

(i) A promising type of chemical and fertilizer plant will be constructed during the years 1997 and 1998 at the total initial cost of ₦10 million covering design, supervision, construction and contingencies of this total ₦5 million is payable on December 31st 1997. Therefore 1997 is our year 't_1' the other ₦5 million for December 31st 1998 (t_2).

(ii) Physical life of his facilities is 5 years after its completion, that is the project expires on December 31st year 2003.

There are scrapage costs (Dismantling and site clearance). There are scrapage cost of ₦1 million.

(iii) Continue-cost (operations, maintenance and administration) are ₦1 million per annum, always payable on December 31st of each of the production year (5 production year).

(iv) All inputs are measurable in market value terms. There are no-non-market cost at all.

The Market Researches in Conjunction with Engineers Advice as follows:-

(i) The plant will yield no output during 1997 and 1998, and will go to productive operation in January 1 1999.

(ii) Expected product sales assuming most suitable pricing, market strategy etc are ₦2 million in the year 1999 and 3 million in the year 2,000, ₦5 million in each of the year 2001 and year 2002, ₦3 million in the year 2003. Revenues are always collected on December 31st of each year.

(iii) A firm estimate ₦1 million can be realized from project scrapage (sales of salvage materials and equipment, disposal of site etc) on December 31st year 2003.

(iv) All outputs are measurable in market-value, there are no-non-market gain.

***The Financial Expert Advice as Follows*:-**

(1) That the plant entrepreneur himself could obtain loan at open money market at 8% interest per annum.

(2) That the industrial development bank might grant a more favourable loan at 3% interest per annum.

A consultation with the two decision makers, it is decided that this rate should alternatively be applied for project screening purposes. There are no limits on the total size of the loan.

Solution

(1) End of Year	(2) Analytical Time	(3) Revenue (Output)	(4) Costs (Inputs)	(5) Net Revenue (Net Cost)	(6) Discount Factors r = 3%	(7) = 5×66 P.V of Net Revenue	(8) Discount Factor r=8%	(9) = 5×8 P.V of Net Revenue
1996	t_0	0	0	0	1	0	1	0
1997	t_1	0	5	[5]	0.971	[4.855]	0.926	[4.630]
1998	t_2	0	5	[5]	0.943	[4.715	0.857	[4.285]
1999	t_3	2	1	1	0.915	0.915	0.794	0.974
2000	t_4	3	1	2	0.888	1.776	0.735	1,470
2001	t_5	5	1	4	0.863	3.452	0.681	2.724
2002	t_6	5	1	4	0.837	3.348	0.630	2.520
2003	t_7	4	2	2	0.813	1.626	0.583	1.166

Decision-Variables

Total Present Value of Project-Life

Interest Rate	0	0.03	0.08
Net Revenue or Loss	3	1.55	[0.24]
Policy Advice	Accept	Accept	Reject

Example 19

The Manager of a small-tomatoes' packing company is contemplating the purchase of new grading and sorting equipment. The equipment will cost ₦26, 000 and the manager feels that it will resolve in reduced labour requirement and higher prices will add an estimated ₦4, 800 per year to the company net after tax-income over a period of 8 years. At the end of its 8 years useful life, the equipment will have an estimated salvage value of ₦2,000, if the company opportunity cost of capital is 10%. Use the net present value method to determine whether or not this grading and sorting equipment should be purchased.

Solution

t_0	t_1	t_2	t_3	t_4	t_5	t_6	t_7	t_8
26,000	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800

Annuity Table Value 8years @ 10% = 5.335

Present Value = 4,800 × 5.335 = ₦25, 608 = Discount Table Value 8years @ 10% = 0.467
Present Value = 2,000 × 0.467 = ₦934.00
Total Net Present Value = ₦26, 542.00
Net Profits = N26, 542 – ₦26, 000
Net Profits = ₦542 (Grading and Sorting Equipment should be purchased)

4.4 Sensitivity Analysis (Treatment of Uncertainty)

Several times when the project is under execution, certain things go wrong with the project with the result that the desired benefits cannot be achieved within the stipulated time frame. For example the actual execution of the project is delayed or the cost exceeds the original estimated cost (cost-over-run). In such cases, the results get fairly changed. Many times, the IRR and net present worth or net present value thus get reduced or the benefit-cost ratio becomes negative from positive. In order to take care of this problem, while the projects are under preparation or under examination, certain assumptions are applied for testing the viability of the project. For example, it is at times assumed that there will be a cost over-run by say 25% or a reduction in revenues, say, by 10% or a delay in getting the benefits, say by three years and so on. Keeping one or two or all such assumptions in view, the streams of costs and benefit are re-drawn and the figures of costs and benefits are discounted and the net present worth, benefit-cost ratio and internal rate of return are re-worked out. This gives a fairly good picture as to what will be the fate of the project if such mishaps occur. For the sensitivity analysis, it is very essential to carry out such an exercise in projects where high financial stakes are involved.

4.5 Choosing Between Mutually Exclusive Alternative Projects

The preferred discount measure of project worth for choosing between mutually exclusive projects is the net present worth. Direct comparison of internal rate of return, benefit-cost ratio can lead to an incorrect investment decision. This is so because undertaking a small, high-paying project may preclude generating more wealth through a moderately remunerative but larger alternative. Sometimes what may at first be posed as a pair of mutually exclusive project can, instead, be seen as successive phases of development. Although net present wroth or net present value is the preferred criterion for choosing between the mutually exclusive alternatives. To use internal rate of return (IRR) for mutually exclusive project selection, the cash flow of the smaller alternative is subtracted year by year from the cash flow of the larger alternative. This stream of differences is then discounted to determine the internal rate of return of the stream. This is the financial or economic rate of return to the additional resources necessary to implement the larger alterative as opposed to the smaller one. This method is only applicable for a single pair of mutually exclusive projects.

Exercises for Chapter Four

(1) A farm operator is contemplating an investment in some feed handling facilities for his beef operation. He has estimated that this equipment will cost ₦40, 000 and the reduced labour cost and increased efficiency will add an estimated ₦6, 000 per year to his net-income for a 10 year period. There will be no salvage value for his equipment at the end of 10years. He wants to know what rate of return this investment offers.

(2) You are given the following data on the proposed irrigation scheme on the 'X' dam to be situated on the lower Benue River.

Year	Capital Cost	Operation and Management Cost	Production Cost	Total Value of Crop Production
1	7,000	-	-	-
2	15,000	-	-	-
3	4,000	-	-	-
4	2,000	-	-	-
5	2,000	-	-	-
6	-	70	-	-
7-30	-	70	80	7000 for each year
31		-	-	7 350

(a) Suppose the opportunity cost of funds used by the Federal Government on this project is 12%. What is Net Present Value (N.P.V)?

(b) Find the N.P.V at 5%, 15% and 20%

(c) Estimate the IRR by interpolation arithmetically.

(3) Olajubu Poultry enterprise consists of raising broilers by buying day old chicks and selling them to consumers when they attain the weight of 2kg. suppose this project has an NPV of N45000 at 5% discount rate, ₦1880 at 10% and – ₦1444 at 20%. Plot this on a graph and find the IRR by graphically interpolation.

(4) Consider two (2) mutually exclusive projects one small project A and the other big project B. you are to submit a proposal to the Federal Government for funding. Which project will you choose and why? Federal Ministry of Finance advises you to use a discount rate of 12%.

Year	Project A(₦ Million		Project B(₦ Million)	
	Gross Cost	Gross Benefit	Gross Cost	Gross Benefit
1	30.5	-	915	-
2	3.1	85.4	61	-
3	3.1	85.4	61	213.5
4	3.1	;85.4	61	274.5
5	3.1	85.4	61	225.5
6	3/1	85.4	61	402.6

(5) Certain projects require or need periodic replacements as in the case of a pump irrigation project where you have to replace old pump with a new one.

Year	Capital Cost (₦ Million)	Operation and Management Cost (₦ Million)	Value of Production (₦ Million)
1	500	-	-
2	750	-	-
3-16	-	75	300
17	250*	75	300
18-31	-	75	300
32	250*	75	300
33-36	-	75	300
37	250*	75	300
38	-	75	450**

* - stands for pump replacement

** - includes a salvage value of ₦150

(a) Estimate the IRR

(b) Suppose a state Government obtained a loan from the capital market at 8% interest, calculate BCR and NPV.

(6) (a) Distinguish between discounted and undiscounted measures of project worth in project analysis

(b) Discuss the advantages and disadvantages of net present value, the benefit-cost ratio and the internal rate of return as investment in agricultural project analysis.

(7) Consider the following Agricultural Development Project

Year	Cash Flow (₦'000)
1	-920
2	-569
3	-566
4	-492
5	-360
6	-164
7	30
8	372
9	563
10	560
11	710
12	951
13	781
14-25	844 (in each year)

(a) Calculate the NPV at 10% and 15% Discount rates

(b) Estimate the IRR

(c) Now, assume project life is doubled

Year	Cash Flow (₦'000)
26-50	844 (in each year)

(i) Calculate the NPV at 10% and 15% discount rates.

(8)(a) Write short notes on the following:-

(i) Sensitivity Analysis and Analysis of Project under conditions of uncertainty

(ii) Mutually Exclusive and Independent projects.

(b) A young and enterprising farmer is seriously considering investing in farm real estate. One of the options open to him is an investment in a small orchard. The property in question has 25 hectares of young trees that will reach production after three years. It is estimated that until the trees mature the revenue will just cover expenses but thereafter, the net income will be N100 per hectare for years 4 through 20. The property will be worth an estimated N200 per hectare 20 years from now. If the prospective purchaser requires an 8 percent return on his investment, how much should he pay for the property?

(9)(a) Explain and Contrast the following terms:-

(i) Benefit/Cost ration

(ii) Internal rate of return

(iii) Net present value.

(c) The following data relate to a proposed irrigation project by Obalagbe Farms Limited

Year	Capital Cost (₦'000	Operation and Management (₦'000)	Production Costs (₦'000)	Total Value of Production (₦'000)
1	14,000	-	-	-
2	30,000	-	-	-
3	8,000	-	-	-
4	4,000	-	-	-
5	4,000	-	-	-
6	-	140	-	-
7-30	-	140	160	14,000
31	-	-	-	14,000

(a) Calculate the Net Present Value when the opportunity cost of capital is (i) 15% and (ii) 20%.

(b) Calculate the internal rate of return for the project

(10) You have been exposed to different methods of analyzing and comparing investments. Assume you have only ₦20, 000 to invest and must choose between the two investments below. Analyze each using all known methods. Assume an 9 percent opportunity cost of capital. Which investment would you select and why?

	Investment A(₦)	Investment B(₦)
Initial Cost	20,000	20,000
Net Cash Revenues		
Year 1	6,000	5,000
Year 2	6,000	5,000
Year 3	6,000	6,000
Year 4	6,000	5,000
Year 5	6,000	5,000
Terminal Value	0	8,000

(11)(a) What is Project Appraisal?

(b) The manager of a small tomato packing company is contemplating the purchase of anew grading and sorting equipment. The net cash flow have been estimated as follows:-

Year 0	1	2	3	4
-25,000	+4800	+5200	+5600	+6000

If the company opportunity cost of capital is 10%. Use the Net Present Value method (NPV) to determine whether or not this grading and sorting equipment should be purchased.

(12) (a) What are the major differences between NPV and IRR.

(b) A firm is considering a project with a cash outlay of N1, 000 now and 5 yearly cash inflows of N500. What is the Net Present Value (NPV) at 10% discount rate?

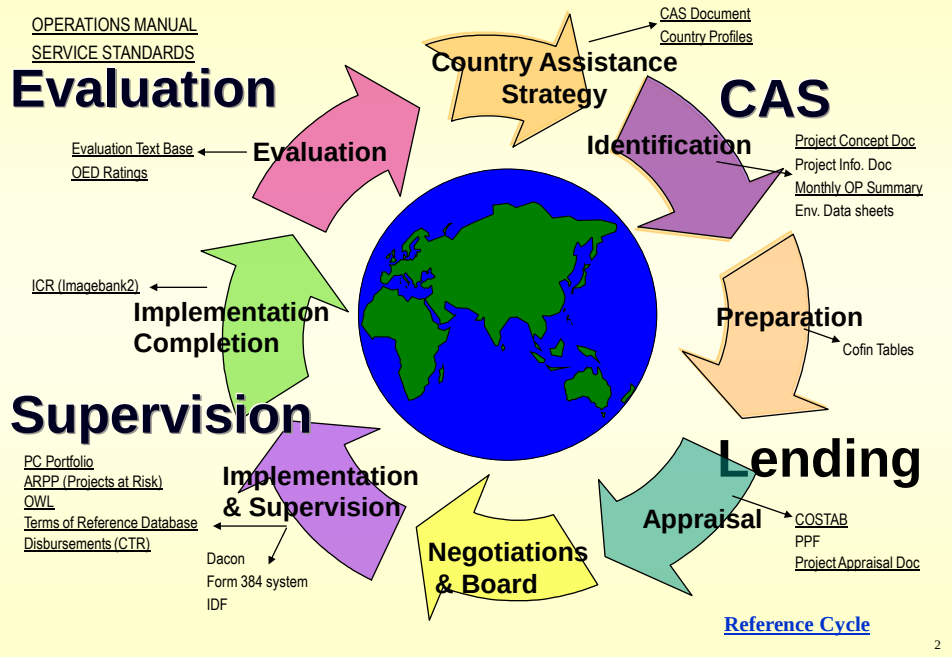
CHAPTER FIVE

5.0PROJECT CYCLE AND ASPECTS OF PROJECT PREPARATION AND ANALYSIS

5.1 Definition and Benefits of Project Cycle

Projects usually pass through several distinct and logically related stages in their development phase; these stages are termed the project cycle. The project cycle has also been severally described as a series of activities that provide solution to human problems. Though, different institutions world over have peculiar definition of these stages, all are equally valid. Worthy of note is that the series of activities that make up the cycle are generally related and logically linked to each other. Adherence to the project cycle has been imperative given that it provides a common avenue for the development of the project from initiation to post evaluation. The cycle also has the tendency of clearly specifying the various milestones within the cycle, while improving communication, feed-back, effective control and improved project implementation efficiency (African Development Bank Institute, 2010). The widely known classification include identification, preparation and analysis, appraisal, implementation and evaluation (Gittinger, 1984). However, several modification have been undertaken to include stages such as negotiation, monitoring and supervision, implementation completion, amongst others. A typical cycle and the linkage between the various stages within the cycle are depicted in Figure 1 below.

Figure 1: Typical Project Cycle of an Agricultural Development Project



Source: African Development Bank Institute (2010)

5.2 The Sequence of Project Cycle

The sequence of activities within the project cycle entails numerous sub-activities that go into the final actualization of the cycle. These are explained in details within the sub-sections of this section.

5.2.1 Project Identification

This is the commencement phase of project preparation and normally, the phase provides the opportunity to identify worthy and viable projects. The phase is also termed the initiation stage and it involves identifying projects of top priority to which the country's resources can be deployed. Generally, the idea of new projects will normally come from participatory needs assessment processes, preceding selection of the most needed alternatives in order of priority. Ideas for new projects can also emanate from community local leaders and informants, technical specialists, availability of a resource in a particular location and even from proposals to extend an existing project and in certain instances when certain wants are in short supply. Projects are also known to emanate from the sector strategies of development organizations or even from countries economic development plans. For instance, numerous projects emanated from the Nigeria Agriculture Investment Plan (NAIP) which was proposed for implementation under the framework of the Comprehensive African Agriculture Development Project, before the coming of the Agricultural Transformation Agenda in Nigeria. The sector survey also provides another avenue where projects can spring up. The survey will normally provide the situation on ground and an assessment of wants based on the gaps observed.

5.2.2 Preparation Phase

The project preparation stage comprises the design and the appraisal stage, and thus they naturally follow each other.

Project Design Stage

The project design stage is usually the responsibility of the government and it involves making a decision as to whether or not to continue investment in the project. This stage requires the preparation of a feasibility study which will entail comparison of project cost and benefits, with the mind of choosing the most viable alternative. The stage undertakes the design of the project with respect to the technical, environmental, commercial, economic, financial, social and institutional aspects of the project. Activities under this stage of the cycle are usually undertaken by technocrats from the country and specialists from donor organizations. The exercise involves visiting the targeted states, local Government Councils and communities to assess the situation on ground, discuss with relevant stakeholders and collect information.

Participants from the government side will normally include representatives of the relevant federal or state ministries. For an agricultural related project

for instance, participants will be drawn from the Ministry of Agriculture and Rural Development, Ministry of Water Resources, Ministry of Women Affairs, National Planning Commission, Ministry of Finance, while from the side of the Donor, participants includes the Country Programme Manager or Country Representative of the donor organization(s), technical specialists from the Donor Headquarters, Non Governmental Organizations and Researchers from the Universities, with knowledge in the thematic areas of the proposed project. Specialists from the Projects Coordinating Units are always handy for this exercise if this organization exists in the country. Donor Agencies such as FAO also readily offer project preparation assistance, which are often undertaken with the view to developing local capacities. For donor assisted projects and programmes, it is worthy of mention that most donor bodies have their own preparation team which they depend on, particularly during the appraisal stage.

Project Appraisal Stage

The appraisal stage is usually undertaken by an independent body to allow for a neutral and more detailed analysis of the project. For a donor supported project, and given the critical nature of this stage, most donor agencies are usually closely involved with the support of government counterparts. The key aspect of this stage is to ascertain whether the assumptions taken during the design stage subsist and to assess the overall soundness of the project, given the enormity of resources to be invested in the project. The success of this phase of the cycle will normally depend on how sound the design stage was undertaken. This stage of the cycle allows for a second look at the project plan to see whether there are flaws which may necessitate review or the development of a new plan. This stage normally comes before funds are committed into the project. The end product of this stage is usually an appraisal document which details the project goal and development objectives, components and implementation arrangements, procurement plan and procedures, social and environmental impact assessment, cost table and monitoring and evaluation plan of which the logical/result Framework is cardinal. Recent appraisal documents will also detail the impact assessment arrangement.

5.2.3 Project Implementation

This is the most critical aspect of project implementation, particularly in most developing countries where implementation is constrained by internal and external factors such as human factors, weak capacity of implementers, political interference, budgetary delays and bureaucratic bottle necks, amongst others. This phase covers the period of project activities till they actually become operational. It is normally termed the mini-cycle within the

larger project cycle (Gittinger, 1984). The stage covers three main phases, namely: (i) first phase; (ii) second phase and (iii) third phase.

(i) First Phase

This naturally commences with the loan disbursement effectiveness of the project, precedent to which all necessary loan disbursement effectiveness conditions have been met by the project team. Loan disbursement effectiveness duration varies and in some cases takes about 6-8 months for some development countries precedent to project take-off depending on the experience of the project team. This normally signals the commencement project implementation. This phase relates to the period of fund disbursement for planned implementation activities. For most donor supported projects/programmes, investment continues pari-passu with the development phase of the project, till project closure. Sustained investment is however contingent on stakeholders being able to meet up with the agreed financial commitments as detailed in the loan agreement document. It is also at this stage that arrangement for the project implementation manual is prepared if not done during appraisal; baseline survey, beneficiary needs assessment and participatory rural appraisal are undertaken, with a view to ascertaining the situation of project beneficiaries before project intervention.

(ii) Second Phase

This phase logically follows the first phase, given that development continues as investment is assured all things being equal. This phase relates to the development stage of the project, when physical activities like construction, services, adoption are already taken place. As implementation proceeds, the project team learns on the job and makes corrective action as implementation continues. During this stage, the requisite planning, monitoring and evaluation framework must have been put in place. This includes the Project Result/Logical Framework, Monitoring and Evaluation Plan, monitoring and supervision visits and reporting mechanisms and the feed-back processes. Reports being generated are expected to primarily guide the project management and forwarded to other requisite stakeholders for purposes of accountability. Quick monitoring studies are also undertaken feasible at this stage of the project to enable prompt identification and diagnosis of identified problem; even though this can as well come at any stage of the cycle. It is also at this stage that the mid-term review of the project is undertaken to assess the performance of the project mid-way into the project life and ascertain the continued relevance of the project assumptions.

(iii) Third Phase

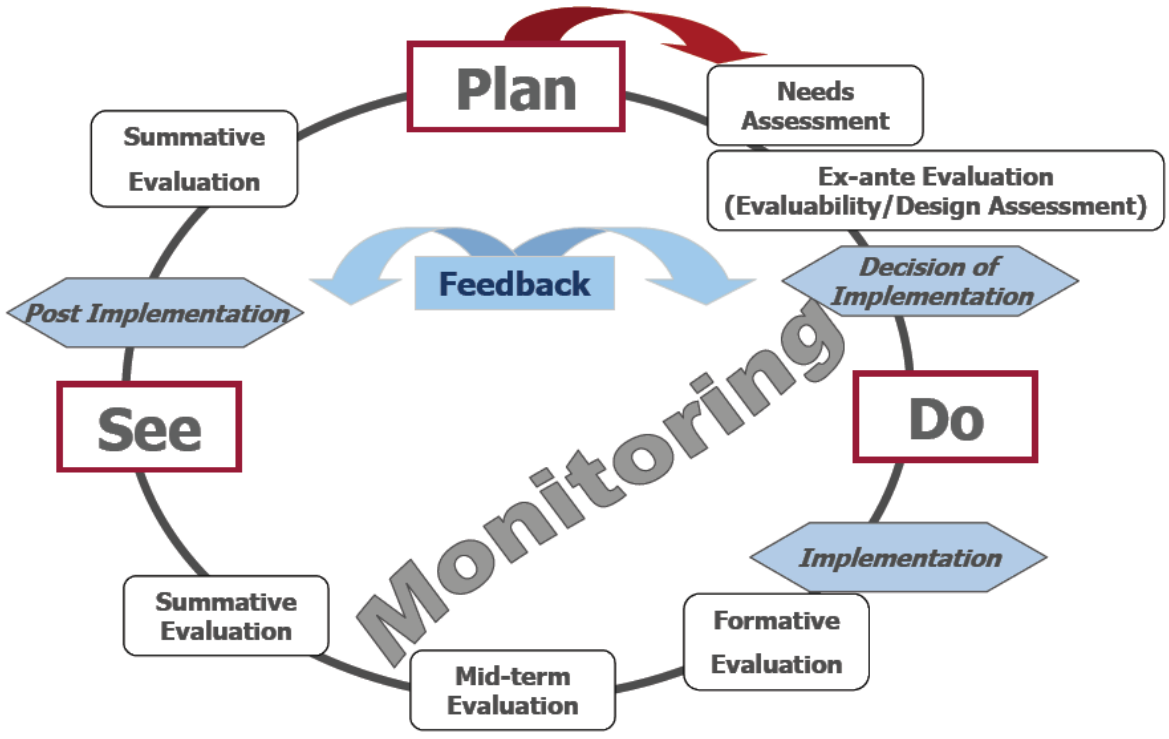
This relates to the terminal part of the project, when the loan becomes ineffective due to exhaustion or closure date. Though, the implementation team may have wound up implementation activities, it is expected that arrangement for sustainability must have been made at the implementation level. The normal thing usually is to hinge the continued implementation of the project on the organized beneficiary groups or the lower tier of governance. It is however worthy of mention that for normal project analysis, the normal life of the project is tied to the life of major assets, which is about 25 years, a period in which the project financial and economic analysis relate to. At project closure arrangements are usually made for terminal evaluation to assess the extent of project implementation viz-a-viz its set objectives and targets. For the IFAD Assisted Community Based Agricultural Development Programme (CBARDP), it is at this stage that arrangement for project extension are muted and necessary arrangements put in place for preparation of the next phase based on the lessons learnt from the on-going phase.

5.2.4 Evaluation

The evaluation phase is a key phase of the agricultural project cycle. This is without prejudice to the fact that evaluation activities within the cycle generally relates to various key milestones of the project, starting with the ex ante evaluation, which is aimed at conjuring and fine-tuning the project design, baseline study, aimed at collecting start off information on the beneficiary status and practices before project intervention. The beneficiary assessment is also undertaken to update the baseline survey and assess the performance of the project at a point in time. The mid-term review is also part of the regular project evaluation, which is a formative evaluation exercise undertaken amongst other benefits take stock of the project activities at mid way into the project life, assess the relevance of the assumptions made at project start-off, with a view to fine tuning project design and implementation arrangement. Some projects also witness the technical review aimed at assessing the performance of the project, while the terminal evaluation (summative evaluation) comes at the end of the project, immediately after project closure or loan termination (See Figure 2). The ex-post evaluation is undertaken several years after project termination, usually 7-10 years after project closure to assess the impact and sustainability of the project. However, it should be noted that impact assessment could be undertaken before project closure, as soon as project impact begins to accrue. Some of these impact indicators could include the food security and poverty status of beneficiaries, employment created, and asset ownership, amongst others.

Effective project evaluation should be guided by the KPIs developed in the project Monitoring and Evaluation Plan and Logical Framework. For the impact evaluation, there is the need for a baseline study which incorporated all the relevant impact indicators of the project which can be compared with the impact study to assess the changes in the relevant indicators. Consideration for counterfactual (situation without the project) will also be very useful during this exercise. There is also the meta-evaluation, which is increasing becoming popular to confirm the outcome of the ex post evaluation, particularly when in doubt as to the effect and impact. Generally, project evaluation should generally incorporate both qualitative and quantitative approaches, with a view to answering the 'what', 'where' 'how' and 'why' evaluation questions. Though, most projects have monitoring and evaluation mechanisms instituted to enhance the periodic evaluation activities of the project, most of the various evaluation described are usually done by the project team in conjunction with consultants.

Figure 2: Evaluation in the Project Cycle (from World Bank Institute)



Source: World Bank Institute

5.3 Aspects of Project Preparation and Analysis

The preparation of agricultural projects and programmes involve numerous inter-related stages, which must be critically reviewed to ensure the success of project preparation and analysis.. These include the following aspects:

(i) Technical Aspect
(ii) Institutional Aspect
(iii) Organizational Aspect
(iv) Managerial Aspect
(v) Social Aspect
(vi) Commercial Aspect
(vii) Financial Aspect
(viii) Economic Aspect

5.3.1 Technical Aspect

This aspect looks into technical specification of the proposed project, such as the inputs to be used by beneficiaries and the output expected as a result of project intervention. It focuses on the suitability of the breeding stock, fingerling types, soil types, crop varieties, water source, their accessibility and how sustainable the supplies would be. It entails looking into the potency of these inputs to guarantee that the envisaged productivity increment will manifest from their adoption by the farmers. Effective review of these issues may induce the need for project specific or thematic surveys to actually ascertain the true situation of things and the areas the proposed project should focus on. For instance, a detailed soil survey preceded the implementation of the FAO supported National Programme for Food Security in Nigeria for instance. The essence was to ascertain the soil type, guide fertilizer and crop recommendations in the 327 sites covered by the programme. This aspect of the analysis further entails reviewing the envisaged output from these inputs relative to the old practices of the farmers and the impact of this output on farmers' enumeration in the case of the financial analysis and the economy, with respect to economic analysis.

The comprehensiveness of this aspect has become imperative given that key assumption regarding the yield and remuneration accruable to the farmers will stem from some of these issues. The conduct of this aspect will normally involve thematic specialists with knowledge of the various aspects of project analysis. They are expected to discuss in details with the proposed beneficiaries on their existing practices, their current level of awareness, adoption and the challenges which they currently face that the project will likely address.

5.3.2 Institutional Aspect

To ensure effective implementation, the project must relate to the local institutions such as the Community Development Associations and Unions, the body of the established government institutions, including the Local Government Councils, States and Federal/Central Government. Issues that are of essence here include the suitability of the local institutional settings for the proposed project, that is, whether the project aligns with the socio-cultural setting of the farmers in terms of the operations of the local institutions, the willingness of beneficiaries to organize themselves and participate, land tenure arrangements, conflict scenarios and redress mechanisms available on board. Focus will also be on the willingness and capability of the established government institutions to support and participate in the funding of the project. Normally, the preparation team will relate to all the existing institutions to ascertain the situation on ground and get the commitment of the tiers of government. Focus will also be on the regular steering committee meetings at all levels of implementation, be it at the Federal, State and Local Government Levels. These committees are mainly responsible for project oversight and steering activities and hold the mandate the review and approval of the annual work plan and budget.

5.3.3 Organizational Aspect

This aspect endeavors to ascertain how manageable the project will be during implementation and after closure. The analysis looks into the organizational set up of the project, the composition of the implementing team, the line of authority and delegation of responsibilities. Key staff for most projects will include a Project Coordinator, Financial Controller, Monitoring and Evaluation Specialist, thematic experts in key project intervening areas. Aside these, most projects also recruit several support staff depending on the size and areas of coverage of the project. It is also imperative at this stage to fashion out how the project will fit into the existing institutions at all levels of implementation.

5.3.4 Managerial Aspect

This aspect relates to how the implementing team and established institutions are able to manage the project to deliver its intended output and outcomes to the beneficiaries. It is under this aspect that a detailed review of staff capacities is undertaken to ascertain whether they have the carriage to effectively implement the project or determine whether trainings will be required, especially where capacities are limited. To ensure smooth project implementation, recruited staffs are expected to be those well experienced in project implementation, given that the duration of implementation may not allow for too many mistakes to be made in the course of implementation. It is also during this phase that the capacity and managerial skills of the beneficiaries are assessed to ensure that that the intended intervention relates to the capacity of the farmers, as it may take time

for farmers to relate to areas which they are not used to. To enhance effective preparation of the Local Development Plans for instance, the World Bank Assisted Fadama II Project in Nigeria made provisions for facilitators to support the participating groups in developing and implementing their development plans.

5.3.5 Social Aspect

This covers the social aspects of the proposed investment especially with regards to how the project will actualize the social objective of the country's development goal, probably that of equitable income distribution, employment creation and food security among the targeted beneficiaries. Focus under this aspect will involve careful analysis of the type of intervention to be proposed, bearing in mind that some interventions carry along with them beneficiary displacement as it relates to large projects such as irrigation intervention or job losses due to the adoption of new technologies, especially with regards to the introduction of mechanization. The issue of environmental impact assessment is also imperative here, with the view to mitigating the negative tendencies of such interventions and enhancing their positive aspects.

5.3.6 Commercial Aspect

Focus here relates to the arrangements made for input and output supplies, value addition and marketing activities under the proposed interventions. Analysis here will relate to how inputs will be sourced, the issue of subsidy on inputs and their effect on the farmers' enterprise and the economy at large. Focus here should be on ensuring how the beneficiaries will operate the adopted enterprises on a profitable basis, without losing focus of the development aspect of the project. The issue of sustainable input procurement and supplies also deserves attention, given the need for project sustainability. It must however be noted that procurement is a key issue under this aspect and detailed arrangement should be made for the various types of procurement which will enhance implementation, while also meeting the legal requirements of the project setting, that is the country setting. Procurement choice will depend on the goods to be purchased and the agreement in the project loan agreement. Procurement activities will relate not only to physical goods such as equipment and vehicles, but also to services like technical assistance, capacity building, technical reviews, implementation support, engineering designs, amongst others. Procurement types such as the competitive shopping, local competitive bidding, national competitive bidding and international competitive bidding are procurement options available for project use. For some donor supported projects, donors normally insist on the type of procurement they desire. These are always specified in the project loan agreement amongst other issues.

5.3.7 Financial Aspect

The financial aspects of agricultural projects and programmes are mainly concerned with ascertaining the benefits that accrue to individual project participants such as the farmers in the case of production related enterprises and other key actors such as input suppliers, marketers (assemblers, retailers, wholesalers, etc), and processors with respect to a value chain project. For the financial and economic analysis of the IFAD Assisted Community Based Agricultural and Rural Development Programme-II in Nigeria undertaken by the Specialists from FAO Investment Center and thematic specialists in 2013, analysis covered both production and processing and was carried out on two levels, firstly at the small scale enterprise level, looking at the cost and price margins from production to retail and then secondly on individual production at farm gate.

Generally, the financial analysis is undertaken to ascertain the financial viability of the project to participants. Specifically however, the analysis aims to amongst other reasons assess the: (i) financial efficiency and sustainability of enterprises or modules promoted by the projects; (ii) project incentives to participants; (iii) credit worthiness' liquidity of enterprises and debt repayment; (iv) possibility of further subsidy leverage to project participants; (v) investment and operating requirements for project; (vi) need for equipment replacement; (vii) manner in which project investment is to be financed; and (viii) the fiscal impact of the project from the individual point of view, especially with the view to ascertaining whether envisaged incremental benefits or income will yield new revenue.

Procedure for Financial Analysis (Computation of the Net Present Value (NPV) and Financial Internal Rate of Returns to Project Participants for Development Projects)

i. The financial analysis should commence with the adoption of the 'with project' and 'without-project' approach and identifying the project life span. This is recommended in this text, given the need to identify benefits that may or may have arisen without the project. Do note that the project life span is usually tied to the life of the key capital assets of the project. However 20-25 years is internationally accepted for development projects.
ii. For an intervention based agricultural project, the derivation of input usage per production unit (hectare in the case of crop production) should follow for all envisaged enterprise of the project, such as crop production, livestock, fisheries, agro-forestry; social and economic infrastructures like schools, roads, bore-holes and markets; including non-farm

enterprises like craft making, blacksmithing, tailoring, depending on the focus of the project under consideration (Table 1).

iii. For crop based intervention, projection of area, yield, production and consumption of output follows logically. This is not limited to crop, but all other farm enterprises like livestock, fisheries, agro-forestry, etc (Table 2).

iv. The projection of investment and operating costs of enterprises for the life span of the project for all enterprises supported by the project (Table 3).

v. This is followed by the derivation of the cash flow for each enterprise promoted by the project.

vi. The incremental net benefits should be estimated for each enterprise (that is difference between the benefits from the 'with project' and 'without project' scenarios).

vii. The net incremental benefits obtained for the average beneficiary are then aggregated to obtain the flow of incremental net benefits for the projected number of project participants.

viii. Financial Rate of Return (FIRR) and Net Present Value (NPV) are then estimated for all project beneficiaries either manually or using excel analytical package for large analysis (Table 4).

Assumptions Guiding Financial Analysis

The computation of the financial rate of returns for projects and programmes is predicated on some project specific assumptions. For a poverty alleviation and food security related project, some of these assumptions could include (i) how project inputs are to be sourced and whether project output will expand supply to domestic markets; (ii) the targeted numbers of beneficiaries project will reach; (iii) the expected level of productivity envisaged from the improved technology introduced; (iv) extent or level of reduction in unit cost of production and increased capacity utilization due to project intervention; (v) quantum of output beneficiaries are to sell from their marketable output and (vi) whether investment by project beneficiaries are from equity rather than from borrowed funds. It is worthy of mention that these assumptions are not sacrosanct and will largely depend on the type and objective of the project or programme. Thus, the estimation of the project impact on the beneficiaries' income could be ascertained from this approach using the NPV and IRR procedures. This can be estimated by deriving the incremental (growth) in income between the 'with project intervention and the 'without project' intervention and then multiplying by 100 percent. Also, the quantum of employment generated by project can be derived by multiplying the job per enterprise coefficient (jobs created by an enterprise based on the assumption of

minimum 21 working days assumption) with the units of enterprise supported by project (hectares of crop supported by project) in the case of crop production. It is also worthy of note that estimates under this approach are mainly from direct impact, while indirect impact of project activities on income levels of non-project beneficiaries is expected to make the project impact even higher. These impacts can to come from other social and economic interventions of the project, such as rural access, road and energy which will go a long way in reducing transportation and production costs.

Table 1: Sample of Crop Inputs per Ha for Yam

			Without	With NPFS Project				
	Unit	**Price (N)**	**1-15**	**1**	**2**	**3**	**4**	**5-15**
Operating Costs								
Cash Inputs								
Yam sett	No	25.0	3500.0	5250.0	6125.0	7000.0	7000.0	7000
Urea CAN)	Kg	2000.0	1.5	2.3	2.6	3.0	3.0	3.0
Compound	Kg	2400.0	2.0	3.0	3.5	4.0	4.0	4.0
Herbicides	Lt	950.0	1.5	2.3	2.6	3.0	3.0	3.0
Stakes	Bundles	200.0	17.5	26.3	30.6	35.0	35.0	35.0
Hired labor	PDs	500.0	35.0	52.5	61.3	70.0	70.0	70.0
Transportation	Days	600.0	15.0	22.5	26.3	30.0	30.0	30.0
Containers	Naira	30.0	15.0	22.5	26.3	30.0	30.0	30.0
Fuel	Naira	50.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-cash inputs								
yam sett	Kg	25.0	3500.0	1750.0	875.0	0.0	0.0	0.0
Manure	Kg	8.00	100.0	150.0	175.0	200.0	200.0	200.0
Family labour	PDs	500.0	20.0	10.0	5.0	5.0	5.0	5.0

Source: National Programme for Food Security Working Papers (2006)

Table 2: Projections of Area, Yield, Production and Consumption for Yam Based Module

Yam Based Model: Yam-Maize-Cassava							
			Without NPFS	With NPFS			
Year		**Unit**	**1-15**	**1**	**2**	**3**	**4-15**
Cropping Pattern							
	Yam	Ha	0.1	0.1	0.1	0.1	0.1
	Maize	Ha	0.5	0.5	0.5	0.5	0.5
	Cassava	Ha	0.4	0.4	0.4	0.4	0.4
Sub-Total Cropping Area		Ha	1	1	1	1	1
Yield							
	Yam	kg/ha	6000	9000.0	10500.0	12000.0	12000.0
	Maize	kg/ha	1,250	1875.0	2187.5	2500.0	2500.0
	Cassava	kg/ha	7,500	11250.0	13125.0	15000.0	15000.0
Total Production							
	Yam	Kg	600	900	1,050	1,200	1,200
	Maize	Kg	625	938	1,094	1,250	1,250
	Cassava	Kg	3,000	4,500	5,250	6,000	6,000
Family Consumption							
	Yam	Kg	360	540	630	720	720
	Maize	Kg	250	375	438	500	500
	Cassava	Kg	1,200	1,800	2,100	2,400	2,400
Production sold							
	Yam	Kg	240	360	420	480	480
	Maize	Kg	375	563	656	750	750
	Cassava	Kg	1800	2700	3150	3600	3600

Source: National Programme for Food Security Working Papers (2006)

Table 3: Projections of Investment and Operating Costs for Cassava Based Module

	Baseline	**During Project Period**		
Year	**1-15**	**1**	**2**	**3-15**
Investment Inputs				
Land improvement		10000		
Seeds investment (N/ha)		16025		
Agro-chemicals inv. (N/ha)		20588		
Group registration	0	2,000		
Tools(hoes+matchet)	0	3,000	0	0
TOTAL INVESTMENT COST	**0**	**51613**	**0**	**0**
Operating Inputs				
Cash Inputs				
Yam Sett	8750	13125	15313	17500
CAN	300	450	525	600
Compound	480	720	840	960
Herbicides	143	214	249	285
Stakes	350	525	613	700
Hired labour	1750	2625	3063	3500
Transportation	900	1350	1575	1800
Containers	45	68	79	90
Sub-Total Operating Costs	12718	19076	22256	25435
Sub-total labour	2750	3125	3313	3750

Source: National Programme for Food Security Working Papers (2006)

Table 4: Cash Flow Projection for Cassava Based Model

	Without NPFS	With NPFS		
Year	**1-10**	**1**	**2**	**3-15**
Production sold :				
Cassava	30,311	37,897	47,306	47,306
Maize	4,190	5,118	6,249	6,249
NET VALUE OF PRODUCTION	**34,501**	**43,015**	**53,555**	**53,555**
On Farm Use :				
Cassava	20,207	25,265	31,537	31,537
Maize	9,776	11,941	14,581	14,581
Sub-Total On Farm Use	29,984	37,206	46,118	46,118
Total Value of Production	**64,484**	**80,221**	**99,673**	**99,673**
Production costs :				
Total Investment Cost	0	9000	0	0
Total Operating Cost	24,889	38,761	50,284	54,244
TOTAL OUTFLOWS	**24,889**	**47,761**	**50,284**	**54,244**
Cash flow before financing	**39,595**	**32,460**	**49,388**	**45,429**
Financial inflows :				
Disbursements from project loan :				
Loan		8,100	0	0
Transfer from previous period		39,661	50,284	54,244
Sub-total Financial inflows :		**47,761**	**50,284**	**54,244**
Financial outflows :				
Debt Service				
Farm Production Loan		3,257	3,257	3,257
Transfer to next period		50,284	54,244	54,244
Sub-Total Financial Outflows :		**53,542**	**57,501**	**57,501**
Net Financing	0	-5,781	-7,216	-3,257
Cash flow after financing	**39,595**	**26,679**	**42,172**	**42,172**
Farm benefits after financing	39,595	26,679	42,172	42,172
Incremental benefits		**-12,916**	**2,577**	**2,577**
NPV (12%)	**16,086**			
FIRR (15 years)	**31%**			

Source: National Programme for Food Security Working Papers (2006)

5.3.8 Economic Aspect

The economic aspect of project appraisal deals has to do with ascertaining the contributions of the project to the economy as a whole, unlike the financial analysis which focuses on contributions to the individual project participants. The analysis assesses the benefits expected from the project and finds out whether the costs to deliver these benefits are justified to the economy. In a nut shell, the economic aspect determines project viability based on the ability of the project to generate net positive externalities to the agricultural sector of the participating states or and the country at large. The methodology is to assess the economic viability of the project through a cost benefit analysis. This involves the computation of the net incremental benefit streams of the project over its life span, usually between 20-25 years for development projects, but may vary depending on the type of project under consideration. These net incremental benefits are then used to define the viability indicator of the project, that is the: (i) Economic Internal Rate of Return (EIRR); (ii) Economic Present Value (ENPV); (iii) Benefit-Cost Ratios (B/C).

The computation of the Economic Internal Rate of Returns (EIRR) involves:

(i) Aggregating the net incremental benefits of all enterprises (farms) under the project phased according to the year of the project in which they are expected to be implemented, removing all taxes and subsidies from the enterprise budgets and applying the appropriate prices, such as the import parity price in the case of the traded goods or re-valuing the relevant element of financial analysis to reflect their economic values;

(ii) Integrating the estimate above into the costs of technical support and programme management activities converted into economic values either through manual adjustment of prices which could be tedious or using the COSTAB computer software developed by the World Bank (WB) in conjunction with Asian Development Bank (ADB) readily available on-line. These costs are expected to be phased according to when they will be incurred during the project life. The number and phasing of project productive activities is normally done putting in mind the life span of the project;

(iii) Estimating the Net Present Value (NPV) and Economic Internal rate of Return (EIRR) of the project (See Chapter four which deals with the calculation of NPV and EIRR). The excel data analytical package comes really handy in generating these indicators, especially for large and complex analysis;

(iii) Ascertaining project economic viability by comparing the calculated economic internal rate of return usually in % (for the required life span of project) to the internationally accepted opportunity cost of capital of 12%. The project is accepted if the calculated economic internal rate of return is greater than the opportunity cost of capital or in the case of choice amongst alternatives, the project with the highest economic rate of returns is selected.

The calculation of the economic rates of return is usually premised on numerous assumptions, depending on the peculiarity of the project being appraised. Some of these assumptions cover the following areas:

(i) Determining whether to use the market prices of non-traded goods as the true reflection of opportunity cost, for instance, if it is taken that the output and input markets are perfectly competitive (recall that the import parity prices are to be applied to the traded goods);

(ii) Taking assumption on the expected percentage increase in enterprise scale over the life of the project;

(iii) Ascertaining the number of participants (beneficiaries) to be reached by the project under each area of intervention;

(iv) Ascertaining the average enterprise scale to be implemented.;

(v) Determining the shadow prices of traded goods. In some instances, the shadow prices of traded goods are taken to be similar with the market prices if there is a convergence between the official and parallel markets for foreign exchange in the country. Do note that for the economic analysis, it is the usual practice to base the price estimates for tradable commodities on the Global Commodity Price Projections, prepared by the World Bank. Local costs including unskilled labour and other non traded goods can also be converted into their approximate economic values using a Standard Conversion factor (SCF). Economic prices of traded goods can be sourced from Food and Agriculture Organization (FAO) food security portal (http:/www.foodsecurityportal.org) or http:/www.fao.org/giews/pricetool/, price tool and at http:/www.indexmundi.com/commodity;

(vi) Ascertaining the percentage/quantum of subsidy operational. However, this may be discountenanced if the subsidy does not get to the intended beneficiaries due to the imperfection in the system;

(vii) Determining the pattern of phasing of project and the entry point of project beneficiaries;

(viii) Treatment of taxes and subsidies, of course, this is treated as transfer payment and excluded from the economic analysis. However, in situations where the subsidies, do not get to the intended participants, little adjustments may need to be made.

It is worthy of mention here that given the quantitative nature of this approach, other potential economic benefits, including benefits of indirect beneficiaries, multiplier effect from jobs and employment opportunities, benefits of service providers and their impact may be difficult to consider in a swoop, but needed to be taken cognizance off.

Differences between Financial and Economic Aspects of Agricultural Project Analysis

Generally, the methodology for the financial and economic analyses is similar, except that the definition of costs and benefits are different. Specifically, the difference relates to the following:

(i) In financial analysis, taxes are treated as cost while subsidy is taken as benefit while these are treated as transfer payments in economic analysis and as such excluded from the analysis, except in instances where subsidy may not have reached the intended beneficiaries and adjustment needed to be done;

(ii) Market prices are normally used in the analysis while in economic analysis, adjusted prices called shadow prices or efficiency prices are used.

(iii) Interest on capital is taken together with the gross return because it is part of the total return to capital. In financial analysis however, interest paid to borrowers is deducted to determine the benefit streams available to the lender.

Exercises for Chapter Five

1. Discuss the aspects of a typical agricultural project or programme cycle
2. Discuss the benefits and stages of the project cycle? Which face do you think is the most important in the developing country
3. Discuss the procedure for the financial and economic analysis of a typical donor supported projects like Fadama-III, National Programme for Food Security, Rural Finance Institution Building Project, Commercial Agriculture development Project
4. Explain the differences between the financial and economic analysis of agricultural projects.

CHAPTER SIX

6.0 INVESTMENT PROJECT EVALUATION FROM STANDPOINT OF A PRIVATE ENTERPRISE AND NATIONAL ECONOMY

6.1 Evaluation of Projects from the Standpoint of a Private Enterprise.

The evaluation of project consists of two fundamental activities:-

(a) The systematic, compilation of certain information and data about the investment schemes.

(b) The analysis, evaluation and formulation of the collected information for the purpose of determining the probable output on the basis of the inputs.

The two activities should not be conceived as going on in an absolute separated ways independent of one another, the evaluation process must begin by compilation of information which is to serve as the basis of the evaluation during the course of evaluation both activities mutually penetrate into each other, there are information which by itself expresses certain aspect of the projects thus enabling a certain evaluation during the course of the compilation of data. On the other hand it may become necessary during the course of evaluation to seek further information or to check the original data.

The aim of a private entrepreneur is to acquire the highest possible profit of capital employed, the decisive questions for him well therefore be:-

(a) How much profit?

(b) What time the profits will be received?

(c) With what risk the invested capital will be utilized, in other words, profitability criterion naturally determined the kind of information required. In the course of many years of practical evaluation activities a system for acquiring and presenting information needed for evaluation purpose of private enterprise project has being developed. The practice of banks which in the course of time has required more and more information concerning project they were asked to finance contributed to systematization of data.

Investment appraised in the private sector, where there are complete and well-functioning capital markets, the mangers of private-sector firms will maximize the welfare of shareholders by undertaking all projects that increase shareholder wealth. A project's contribution to shareholders wealth, its net present value (NPV) is calculated by discounting the project's expected cash flows by the return expected on capital market securities of equivalent risk. It is generally agreed that investors require a premium for bearing risk. This risk premium takes the form of a higher required return and depends on the project's non-diversifiable (on factor) risk. Of course, the fact that managers can best help shareholders by accepting all positive Net Present Value (NPV) projects.

The data and information required for evaluation of private enterprise project in general can be systematized.

(a) Data Needed for Technical Feasibility Study

1. Manufacturing Process

Detailed data about the technology with a justification for its selection, flow-chart showing the various stages of the production process, data concerning the technical services to be used.

2. Equipment

Detail list of machines and equipments required in the process of production, data concerning possible supplier-prices, delivery schedules with particular about competitive offers in national currency as well as in foreign exchange. Expected procurement and delivery schedules with data supported if possible by suppliers pro-forma-invoice containing detail about payment conditions. Estimate of spare parts required and mode of securing their delivery, data concerning the expected guarantees for the satisfactory performance of delivery equipments.

3. Capacity

The total capacity according to individual produce line with a justification for the scale chosen, number of working days, expected number of shifts, estimated daily, monthly and yearly production.

4. Location of the Enterprise

Description of location and its surrounding, data about size of covered area and its position, data concerning transport facilities and distances to raw-material sources, such raw-material sources are:- power, water, labour and market. Justification for the selection of the proposed location and comparison with other possible locations.

5. Raw Materials, Fuel and Utility

Quantity, specification, sources and availability of necessary raw-material, semi-finished products, energy, water etc. Data about the expected suppliers, their reputation and reliability and the way in which continuous delivery will be ensured.

6. Organization of the Operation

Description of the management of the enterprises, names, qualification and experiences of key administrative and technical personnel's, employees according to the qualification they are, administrative, Technical, skill and unskilled, seasonal and permanent as well as vocational workers.

7. Construction Works

Information concerning construction works including characteristics of the respective construction firms, construction plans of factor, buildings, warehouses and auxiliary equipment with their respective budget, data about already completed test of a soil, data on climate and other conditions, data concerning availability of cements, steel, water and other construction materials,

time schedules of construction works employing if possible the critical path network method.

(b) Data Needed for Economic and Financial Feasibility Study

(1) Data about the Market

Trends of the national and foreign market for the main products in the last five(5) years and estimate for the next five(5) years with data concerning national production, import and export, local consumptions and the expected demand in the next five(5) years. also required is a list of the main customers and the description of how to secure continuous delivery goals of national development plan as for as given products are concern, we need a copy of report on the preliminary market survey indicating the sources of the data, the report on government price policy and control, import-restriction, custom-tariffs, taxes, other consideration affecting the product and their sales and of course purchases of raw-materials.

(2) Competition

Names, addresses, present and future output, cost of production, selling prices of present local competitors, prices of imported products according to terms of delivery. Data on selling prices, information about all expected changes in competition e.g. expansion of production, modernization, construction of new plans, introduction of new similar competing products, availability of new technology etc. also provide data on information about competition abroad and all anticipated changes in legislation which might affect volume of imports, provide data on minimum expected selling prices (Ex-plan), how much you want to sell commodity. Competitive advantage of proposed projects from standpoint of availability of labour and the wage and salary level, supply of raw materials, the quality of production etc.

(3) Commercial Prospect

Expected sales of main products in the internal and foreign markets, possibility of securing custom protections against foreign competition, estimated export to foreign country according to the main purchasing country with data about the quantity achievable, prices and the obstacle exportation we have to cope with summary of the provision of the commercial agreement and contracts concerning the import and export of the given products.

(4) Sales and Marketing Organizations

We are concerned with description of the sales organization for national as well as for export purposes.

(5) Data on Profitability

We want to present data for the profitability of project, it is divided into two:-

(i) Data necessary for calculation of profitability coefficient, here we are interested in calculation of expected cost of production and selling

prices, composition of the fixed and circulating capital, composition and conditions of he expected loans, expected sales, profits, rebates, taxes, duties, custom-tariffs, amortization-quotas, other data include length of productive life of investments etc. these are emphasis o type of data to calculate profitability coefficient.

(ii) Mai indications of commercial profitability. The main indicators are annual rate of return, annual average profitability, internal rate of return, Discounted cash flows (money revenue maximization at present value, benefit-cost criterion, net present value), payback period, break-even points etc. (see section D and chapters three and four on formulae).

(6) Data Necessary for Financial Feasibility Study

Data about how the cost of the investment will be financed, structure of the capital participation and of credit (debt), dynamic balance of assets and liabilities in the next three-five years.

(7) Equity-Debt Ratio

Data concerning how the covering of unforeseen expenses and contingencies is assured, insurance on machineries, insurance on workers.

(c) Additional Data Required by Financing and Public Institutions

(1) In the case of a project which is to be submitted to a bank for the purpose of acquiring credit or other forms of participation in financing, the complete report will also include data about the firm (Entrepreneur of the projects). The data are:-

(a) Basic data about the firm i.e. the objectives of the enterprise, capital structures, invested, capital, Equity capital, shares, debentures.

(b) Annual accounts for the last five years, if there are any unpaid taxes should be stated.

(c) Characteristics of people actually holding or who are candidates proposed for key management post. In this respect we are interested in data about their experiences in the line of business of the projected enterprises.

(d) Data on the relationship of the entrepreneur to the person(s) elaborating the projects or carrying out feasibility study.

(e) Data on what risk does the entrepreneurs recognize with and how does or are the possible risk covered. Agricultural risks like diseases, drought, risks of drop in price due to favorable conditions, stock infestation, rodent infestation, risks of markets.

(2) **Data Required by State or Public Institutions**

State or public institution required that the report contain data concerning social aspects. The following data are usually required:-

(a) A detailed calculation of the impact of the project on foreign exchange, in this regard, the state will like to see single purpose as well as continuous

cost calculated in foreign exchange of imported equipments, repairs to be carried out by foreign-firms, permanent import of raw materials, semi-finished products etc. as part of this, expected transfers of profits and installmental payments on invested foreign capital, salaries of foreign experts and employees, estimate of the total yearly savings in foreign exchange due to return of exports.

(b) We need to record how the project will directly or indirectly take advantage of local natural resources.

(c) How many and what kind of new employment opportunity will the project directly or indirectly create.

(d) Is the project included in national development plan, if so, what priority was assigned to it?

(e) What possibility does the project create for further development in investment?

(f) Details of other advantages for National economy to be derived from the projects.

(d) Some Formulae Employed for Calculation of Commercial Profitability of a Project

(1) Annual Rate of Return (ARR) or Profitability Percentage it can be calculated in three (3) ways:-

(i) Annual rate of return is the enterprise ÷ we have:-

$$ARR = \frac{P \times 100}{K}$$

Where,

P = Annual net profits including depreciation

K = Aggregate capital invested including equity capital and loan-funds

(ii) Annual rate of return to the entrepreneur:-

$$ARR = \frac{P^n \times 100}{K^n}$$

Where,

P^n = Annual net-profits including depreciation less amortization payment

K^n = Aggregate capital invested by the entrepreneur

(iii) Annual average profitability to the enterprise as per average investment.

$$Average\ Profitability = \frac{\sum_{t=0}^{N} P_t \times 100}{N.\ I/_2}$$

Where,

P_t = Aggregate profits including depreciation for the life of the enterprise.

I = Aggregate investment including equity capital and loan funds.

N = Length of life of the enterprise in years.

(2) Money revenue maximization at present value.

$$P\ [q, N] = \sum_{t=1}^{n} \frac{N_t}{(1+q)^t}$$

Where,

P = Present value of N at rate q

N = Net revenue (annual gross revenue-annual cost in year t)

q = Rate of interest

n = Anticipated length of life of the enterprise in years.

Note – Any project that has a positive 'p' will justify itself at the 'q' rate of interest from the point of view of commercial profitability.

(3) Net present Value, Internal rate of return, benefit-cost criterion, Payback period, check chapters three and four.

6.2 Evaluation of Projects from the Standpoint of a National Economy

Generally speaking evaluation of investment projects comparison of ends and means that is comparison of benefits and costs and this comparison pertain to both the entrepreneur as well as national economy. In the entrepreneurs case benefit mean the return on capital, however at the National economy level, we are faced with important questions namely:-

(a) What are costs?

(b) What are benefits?

Government undertakes a variety of activities. They are responsible for setting macroeconomic policy, they seek to promote equity by aiding the poor and the disadvantaged and they provided a variety of services such as education, health, defense, infrastructure, police and postal services. Many of these activities involve large investments public and private sectors undertake projects that require making some initial investments and are expected to provide benefits over a number of years. Both sectors must choose between making these investments and returning the cash to be invested to their beneficiaries, the shareholders in the case of private-sector firms, and the citizenry in the case of governments, who can then invest the cash directly in the capital merits or spend it on current consumption. One important point that should be stressed is that in any case of project evaluation at national economy level, the evaluation of the point of view of entrepreneur is indispensable. Since any society is interested in knowing whether and to what extent a proposed enterprise will be viable, it is necessary to work out the previously mentioned set of feasibility study. Whenever a project is being considered from a social point of view, it becomes indispensable to see it as a part of the economy as a whole, any single realized project is linked to national economy in several ways. Its construction as well as operation will exercise effects on many other units, as well as on the national economy as a whole, some of this effect will be direct and some

indirect. Some of the indirect effect will be backward oriented and some forward oriented, some of them will bring about external economy and other perhaps dis-economy. The most severe problem faced by evaluation when appraising project from social point of view are those connected with quantification of the indirect effects. Precise, there is also the problem of weights and priority which should be attached to such effects. Apart from the effect of complementary nature, there exist a whole range of competitive effects and it becomes necessary to decide which of his competitive effects are more or less important.

6.2.1 Some Examples of External Economy and Dis-Economy

Some examples of external economy and diseconomy may help to clarify this problem, the examples are as follows:-

(a) Production of swamp-rice on formerly unused land in the vicinity of a rubber plantation may bring about the following incidence:- The slow moving water pools to be created by the rice-cultivation are likely to provide breeding places for mosquitoes, the result will be an increase of malaria among workers followed by a decrease of productivity of labour in the neighboring rubber plantation (External Diseconomy).

(b) An anti-malaria project financed by rubber-plantation will bring about decreased in malaria and consequently increased of productivity of labour in the plantation itself (Internal Economy or Direct Effect) as well as in other units in the adjacent area (External Economy or Indirect Effect).

(c) A hydro-electric plant project may bring about as an indirect effects floods control which in turn may result in the following external economy:-
    (i) Decrease of expected losses (External Economy for the society (incommensurable).
    (ii) Higher protection of private property means decrease or risks for individuals leaving along the streets which may leads to decrease of insurance premium (External Economy that is measurable).

(d) The construction of an airport will bring about discomfort of airport noise to those who lived in the area, there are two (2) possibilities of measuring this external effects (Diseconomy)
    (i) Access the expected fall in the residential land values in the area.
    (ii) Calculate the cost of sound proofing the noises in the area.

(e) Industrial plant requires concentration of labour and hence increases urbanization. Urbanization in turn imposes real cost on society for additional law enforcement and other public functions (External Diseconomy). There is need of schools, health, postal services, and social-activities.

6.2.2 Interdependencies among Projects

The problem of interdependencies among projects can be explained with the help of simplified illustrative examples as follows:-

Suppose that the highest priority is given to a project of construction of a power plant which should help to promote the construction of various industries of given region of a developing country. In the cost of preparation of the technical, economic and financial feasibility study, the following problems emerged:-

(1) The decision must be taken as to what kind or type of power plant is to be constructed whether hydro or thermal plants. In the latter case there is the question of whether the thermal energy is to be obtained on the basis of coal, oil, gas or atomic energy, even this first basic question makes it necessary to work out optimal solution taking into account many factors e.g. the availability of fuel, the location of coal, oil, gas etc. as the case may be. Their distance to the future consumption center etc. in the case of hydro-power, there is the necessity of preparing hydrological, geological, topographical and meteorological studies. Apart from many technical questions which must be resolved there is also the problem of supply e.g. cement supply for the construction of the dam, the following questions will emerge:
   (a) Should the cement demand be covered by import?
   (b) Should the present capacity be extended?
   (c) Should a new cement plant be constructed?

In other to answer these questions, a new set of feasibility study will be necessary.

(2) Should the dam to be constructed be a multipurpose project P e.g. if it would provide simultaneously power, irrigation, flood control etc. there will emerge the problem of differentiating the benefit from joint investments and the problem of rates to be charged for the various services to be produced by multipurpose projects.

(3) In the case of installation of thermo-plant based on local resources of coal, there could arise the question of how to secure sufficient supply of coal. His could mean considerable increase of man power (employed people), new-investment into coal mine, import of mining machinery etc. the increase in employment may mean solving the problem of housing services, there is also the problem of coal transportation from the mine to the plant and with it connected investments which in turn will involve increase consumption of cements, machinery, labour requirement etc. if the countries in question were exporting coal for which it has an established foreign markets, the coal consumption of a thermal power station might represent a loss in foreign exchange owing to lower exports. Consequently the country must have address question of whether to base foreign exchange through importing

mining machinery for the purpose of increasing the output of coal or through reduction of coal exports.

(4) In any case there is the problem of fixing electricity rate according to the needs of overall development of the National economy. This may involve considerable subsidy. But subsidized rate actually mean subsidy o all the electricity consumers. It may therefore become necessary to apply the real and not subsidized projects. The above examples shows that there are several kinds of interdependencies among projects:-

(a) Demand and Supply Interdependency

Demand for output of project A is dependent on the existence of project B which in turn will be dependent on the supply of project A for example demand of motor-car depend on Iron and steel industries and cares to convey this iron and steel product.

(b) Conditional Interdependency

It is necessary to construct a dam, project 'X' before an irrigation system, project 'Y' have to be built.

(c) Blocking Interdependency

In this case raw-materials needed for plant A precludes its use to plant B.

(d) Economic Interdependency

In this particular instance, from the construction of plant A, some other plants may derive benefits (External Economy) and some other may suffer losses (External Diseconomy).

i. Cost interdependence: - The magnitude of cost in project A depends on the prices to be charged by project B for supply to project A for example flour-mills depend on NEPA power-supply, magnitude of cost of flour mills depend on cost form NEPA.

All the above mentioned problem should be considered only as illustrative examples that do not exhaust more than a fraction of actual inter relationship that exists among projects and between effects and factors that might emerged when preparing a projects. If we take into account the fact that there are several projects to be evaluated in other to make the best possible choice, the number of inter-relationship could really be of infinite magnitude, the task confronting those who evaluate project from social point of view could then become an impossible one if they are to given certain guidelines which will help them to determined the most important criteria to be used in selecting projects. Such guidelines are usually fixed by the government and his is usually done by way of comprehensive planning.

6.2.3 Project Evaluation and Macro Planning (Comprehensive Planning)

For most developing countries, comprehensive planning becomes necessary for the starting point and the framework of project evaluation, the target indicated in the plan determines the basic criteria for the choice of projects. But this does not usually work in one direction namely:- that plan

determine projects. In reality, the formulation of a plan depends to a great extent on the experience acquired in project evaluation. Project evaluation help to determine the targets of the development plan from the point of view of their practical realizability. Project evaluation supplies information throughout the whole process of planning and this information could be of crucial importance in determining the development strategy of a country, thus comprehensive planning shows the features of a chain like cycle in which project evaluation represent an important link.

1. **Resources and Demand Analysis:-** This is a reconnaissance of the economy in which the assets and liabilities of the economy are noted and indication for actions are determined. An important results of such an analysis is a flow of prospect projects and clusters of projects thus the arrow from resource and demand analysis directly to project evaluation.

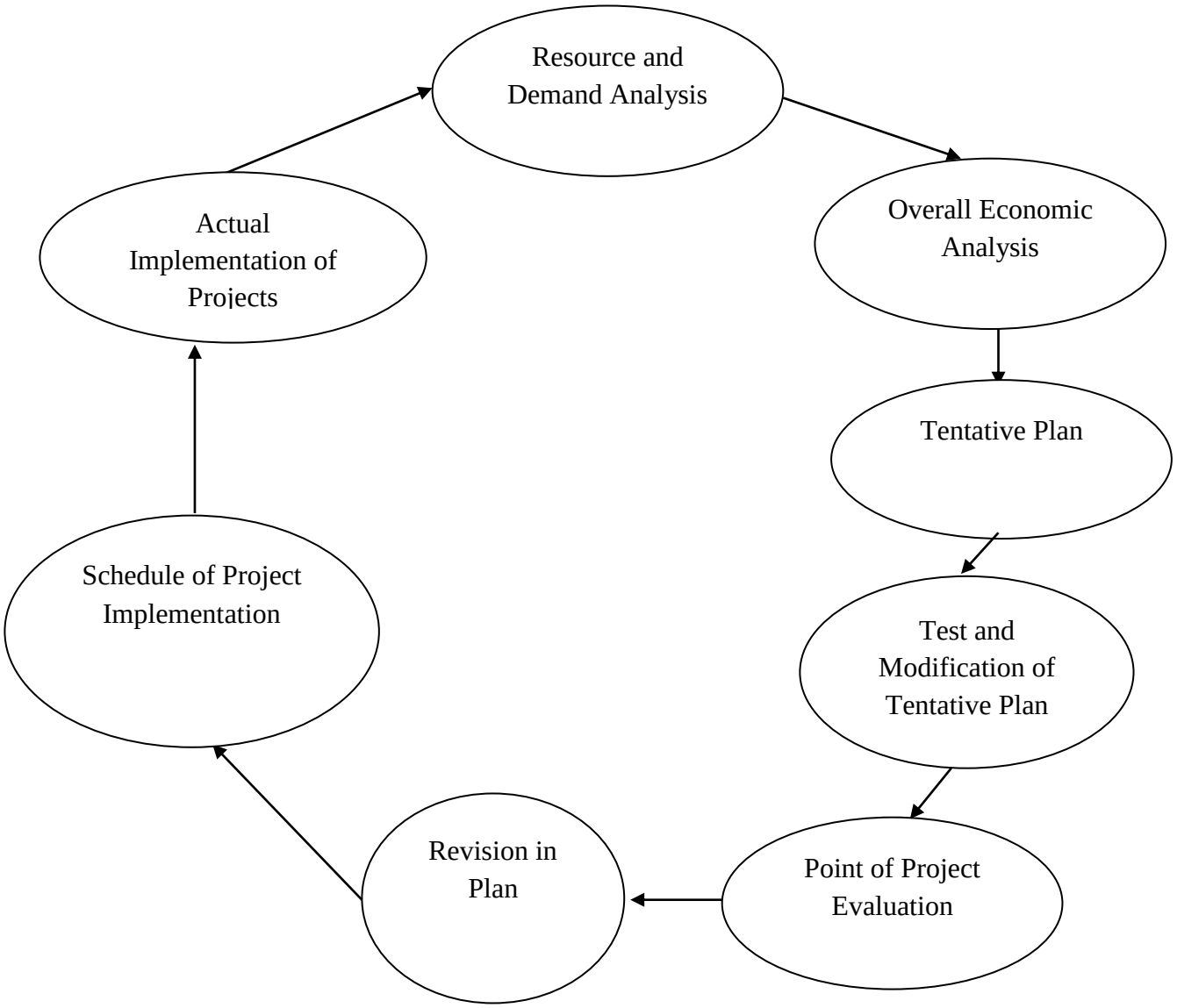


Figure 2: Steps in Comprehensive Project Planning

2. **Overall Economic Analysis:-** Is a macro analysis in which aggregates such as income, savings, investment, foreign exchange and foreign and are projected, so that the limit of the total plan can be set, in addition to the aggregates estimates are made of sub-aggregates such as component of government expenditures, health, education, roads and other investment by area as well as by sources or taxes and savings by area can be construction of Agricultural industries. Results from other steps such as project implementation, project scheduling etc will affect this aggregates and sub-aggregates. Therefore we could draw arrow from overall economic analysis directly to scheduling of project implementation and actual implementation of projects, from other steps to overall economic analysis likewise if we want to take those steps into account.

Although the chain life cycle start with the steps, resource and demand analysis, in practice all the steps are going on simultaneously in the sequence shown in the cycle with permanent interaction between steps (shown as dotted-lines). Another feature of this cycle is the fact that it represents a combination of macro and micro planning, all the steps has some elements of both micro and macro planning.

Macro and Micro planning are complimentary and mutually supporting since they supply each other information and neither is useful without the other. In any case evaluation must be made from both points of view i.e. the enterprise and its profitability then the national economy as a whole. The cycle shows a type of planning in which the plan actually represents a universe of project which is consistent with one another. Its strongest advantages lie in the fact that it considers planning to be continuous or permanent process.

It is possible to show the position of project evaluation as a part of a method of formulating a long-term plan. This method could be demonstrated in the form of six (6) steps in a very simplified ways.

6.2.4 Steps in formulating a Long Term Plan.

Step 1

This steps, exercise start by fixing the average rate of growth and he capital coefficient related to the rate, this give us the first approximation of the annual productive investment say at the beginning, in the middle and at the end of the plan period.

Step 2

In other to check the consistency and industrial structure of the national income, at least a general line is established. Consistency can be defined briefly as follows: “Consistency means that inputs needed are available and output offered are required. The structure could be broken down into:- (a) productive investment (b) increase of inventory (c) unproductive investment (d) consumptions. The structure should provide rough estimate of the home demand

for the product of individual branches of the national economy on the basis of technical coefficient of the production with allowance for future technical progress and possible technological changes. This is achieved by working out inputs and output tables and material balances which should also provide information on how much of the output is left for export or how much it is necessary to import. Commodities which cannot be manufactured at home at all will have to be included in the import requirement, in this way; the first approximation of the total demand for import will be established. After deducting from total imports, the value of exports provided out of the supplies determined industries, it may be found how much is still to be covered by the export of the demand determined industries. Now, the production of these industries must be fixed in such a way that:-

(a) They should cover the domestic demand
(b) The total of their contribution to export should cover the remaining part of import requirement mentioned above.

The total output of all branches of the national economy determined in this way is equivalent to the national income for it covers the demand generated by the four (4) major domestic components of national income either directly or providing for export which are required in other to cover the remaining demand by imports.

Finally, the balance of supply and demand for labour has to be considered, for this purpose a forecast of supply of labour based on demographic considerations and taking into account industrial structure of national income, the demand for labour broken down by the required skills is to be approximately ascertained allowing for the increase in productivity resulting from technical progress.

Step 3

A revision of industrial structure follows, the revision is made on the viewpoint of:-

(a) Constraints impose on the structure by various factors such as limited natural resources i.e. capital, skill man power, foreign exchange, and possibility of securing outlets for exported products.
(b) National economic efficiency

The revision of industrial structure is the planning stage where the project evaluation comes into the pictures. In other to make the plan targets realizable, consistent and efficient from the point of view of the most rapid growth i.e. use the available resources optimally. The choice between various technological alternatives and various possibilities of earning foreign exchange by means of exports or substituting domestic production for imports will be made. The evaluation will help to make the decision as to what to produce at home and what to import. The ideal solution will be to prepare evaluation of all possible projects (project – universe) which will enable the choice of the optimal set of

projects as the backbone of long-term plan. However, since the elaboration of complete set of project is a time and money consuming exercises, it may be out of the question for many developing countries to provide for evaluation of a universe of projects. It is therefore up to the central planning authority to decide what project out of the whole set should be worked out or elaborated or evaluated, of great help in this respect is the preparation of preliminary study of charts which does not involve expensive field work.

Step 4

New estimate of total productive investment follows based on the result of project evaluation and taking into account all the constraints affecting the industrial structure as well as the efficiency criteria. This new estimate and the adjusted new rate of growth and capital co efficiency may differed considerably from the initially compiled

Step 5

Formulation of the revised long-term plan comprising the set of project selected in the previous steps.

Step 6

Implementation of projects within the plan period according to the time-tables.

As in the already mentioned chain-like cycle of the planning process, the sequence of the above six (6) steps in formulating long-term plan should also be understood, so that continuous interaction among steps takes place at the same time e.g. interactions of steps 1 and 6 or interactions of steps 2 and 5 etc. Any realistic plan must reflect important information supply by the evaluation process, since this process is of permanent character, t he revision of the plan and the planning itself must be of continuous nature there is an interdependence between fixing the objective of a plan and project evaluation.

6.3 National Economic Efficiency of Investment Project

6.3.1 The Dual Significance of Efficiency

National economic efficiency is an aggregate indicator which is usually used to express the quality of economic activity in general, it provide answer to the question of how a society or a nation make use or should make use of its resources at his disposal for meeting his needs. National economic efficiency has dual characters; first and foremost, point of view is appraised from both the short as well as long-term aspect and point of view. This naturally involves the questions:-

(a) What are the needs that must be met now or in the nearest future?
(b) What are the heeds that must be met in the long run e.g. in the next five or ten years.

If a nation has taking a decision to increase considerable the standard of living of his population in the next decades as an example, that nation knows that he has to make considerable savings now in other words, it must consume less today in other to consume more in the years ahead. This means that he has to

make a choice amongst needs to be met at presents and needs to be met in the future. if the needs of a society to be met at present and in the long run are established, a closely connected issues has to be addressed namely:-

(a) What and how much should be produced currently as well as in the long-run? (Issues of consistency).

(b) How do we secure this production economically? (Once we asked this type of question, we are dealing with national economic profitability).

Both component of national economic efficiency namely:-

(i) Consistency (ii) and profitability are theoretical in separable, each of them being valued only in conjunction with the other. This interdependence of the two (2) items can be demonstrated as follows:- "There can be no high national economic activity if such activity does not comply the consistency of an economic – development" and vice-versa. This is quite obvious because gains attained on the basis of profitability can be offset by loss incurred due to shortages and bottlenecks resulting from inconsistency. On the other hand, huge investment and operational losses will create condition for future inconsistency. Theoretically, the magnitude of national economic efficiency can find its expression in the rate of growth of national income for a sufficiently long period of time to proof whether the growth is a sustained one or not. Obviously, a high rate in certain period could have been achieved at the expense of low rate in another period, but the possibility of applying one aggregate criterion and indicator for measuring the national economic efficiency is real only if the national economy is treated as a whole, only in this case does the rate of growth of national income for a period covers both profitability and consistency.

National economic efficiency in the case of a single-economic activity or of a single project cannot be expressed by means of one aggregate indicator since very good result of one activity or project could have been achieved at the expense of other activities either currently or in the long-run. Thus, in the case of single project or activity, it is evitable to find separate criteria for consistency and profitability (national economic). Consistency is usually expressed by fixing in a development plan items to be produced in quantity and quality terms. This is done on the basis of system of balance and input-output analysis. The national economic profitability considerations supply information on the most economical ways of their production of this activity. From all we have said so far follows that the degree of profitability can be expressed only in the form of indices or coefficients showing the ratio between benefit and cost.

6.3.2 National Economic Profitability of Investment Projects and Pricing Problems.

Profitability in general means comparison of benefits and costs, from the view point of commercial enterprise, profitability can be easily ascertained by comparing returns with capital outlay. However, it is extremely difficult to calculate profitability from the social point of view, since there is problem of finding out what actually are social benefits and social costs. The severity of

this problem becomes more evident if we recall the indirect effects and external economies and dis-economies involve in any projects. The basic criterion of national economic efficiency is the increment of national income achieved under the condition that a sustained and rapid economic growth is secured. The second part of this criterion i.e. to secure a sustained and rapid economic growth refers to the consistency while the first part namely the increment of national income refers to national economic profitability. Since this increment can be considered as the basic social benefits which should be compared with social costs. The increase of national income should be understood to comprise all the direct as well as indirect results affecting national income achieved throughout the economy as a whole. In the case of an individual projects, this means that the evaluator should try to estimate and measures the total contributions to the national economy to be brought about by the facility. Therefore, we used the term 'benefits' rather than increase of national income. Benefits done cannot say anything about social profitability; you must know how much has being sacrificed in other to achieve benefits. So, benefits must be compared with costs and the benefit – cost ratio calculated. The indices of national economic profitability are usually hampered by the problems of (i) determination and (ii) quantification of social benefits and costs in each case.

In practice social benefits and costs are usually derived from social objectives fixed by the government in general or for the project in question. In doing this, the following concept of social benefits and costs are applied:- "Costs and benefits are simply two (2) sides of the same point at benefit measure the contribution of projects to an objectives, costs represent payment for resources that could have been used elsewhere if not for the projects". Benefits represent contribution to national income which will be produce by the projected union for example if the national income is presently 1,000 monetary unit and if diverting to the project resources now earning 10 monetary unit, the national can produce benefits of 30 monetary units the national income has increased to 1020 monetary units. The benefits of 30 monetary units compare with the cost in national income figure of 10 monetary units represent a benefit-cost ratio of 3:1. The second problem namely that of quantification of social benefits and cost is usually solved by (i) computing and applying the accounting-prices, wages and rates and by (ii) estimating indirect effects (external effects), we estimate such indirect effect in money-terms in other to facilitate comparisons and (iii) by establishing financial equivalent taking into account time factor.

(a) Accounting Prices at Approximation of Shadowed Prices

In the literature on project evaluation, there are several concepts of prices namely:- shadowed, equilibrium, opportunity, official, market and accounting prices. This is frequently used in a confusing and inconsistent ways. The following definitions and explanations will bring about some clarifications in the pricing problems.

i. Market Prices: - Is any price which is actually paid.
ii. Official Prices: - Official price is market price which was fixed by an official body and government and consequently does not follow demand-supply mechanisms e.g. NEPA prices, fertilizer prices.
iii. Shadowed Price:- shadowed price is any price other than an observed market prices.
iv. Equilibrium Price: - Equilibrium price is price corresponding to equilibrium of demand and supply.
v. Opportunity Cost/Price: - These are prices which buyers are willing to pay for resources to be employed in the best possible alternative use. If a balance and or equilibrium is assumed, opportunity costs are equal to equilibrium prices.
vi. Accounting Prices: - Accounting price is an approximation of shadowed, equilibrium and opportunity prices. They are the prices used in project evaluations.
vii. Social price: Social price is price employed in quantifying a value from the social point of view.

The interrelations between these prices, the following can be said:- shadowed, equilibrium and opportunity prices are in a sense synonymous. Their common quality being their abstract nature for example if market prices are distorted it is assumed that there must exist other set of prices which are different from the market price and which in the case of perfect competition will equilibrate demand and supply. To imagine the existence of prices which are different from the actual market price is the abstract way of conceiving equilibrium prices. At the same time, we can consider the same equilibrium as shadowed prices, if we just generally want to admit that besides actual price there exists others, the same thing applied opportunity cost. Shadowed (equilibrium and opportunity) price can be quantified with more or less accuracy depending on data used and method employed. The concrete price thus obtained is called Accounting prices. The basic difference as well as the relationship between shadowed (equilibrium and opportunity) prices on the one hand and accounting price on the other is that the latter are approximations to the former. The term social price is usually used in the two following ways:-

(a) In the sense of prices that are equal to social prices. If t he social function of the former is stressed.

(b) In the sense of social price that are equal to accounting price. This is in the case that the calculation of the latter was done from the national economy point of view.

As a rule, equilibrium-prices as well as opportunity cost considerably differed from the actual market-prices including rates and wages. The deviation of market prices from the equilibrium prices can arise from a variety of reasons e.g. imperfect functioning of the market due to the presence of monopolistic elements, administrative measures design to keep market prices at an artificial level; the necessity to quantify external effects and to fixed future-prices. If for example the official rate of foreign exchange is kept at an artificial level, it will considerably deviate from its opportunity cost. Export and import control usually tend to keep the official rate under the opportunity cost. If there is an excess supply of unskilled labour, which has resulted in unemployment, the opportunity cost of unskilled labour is well below in the market-wage. The collective preference of the population for present over future consumption find its expression in social rate of discount (accounting rate of interest) which may considerably deviate from the official as well as private rate. Equally the marginal rate of return on investment. Market prices of raw materials and machineries are usually distorted by different magnitude of taxation components if for example the price of raw-material A includes tax and custom-duties amounting to 40% and the prices of raw material B includes a subsidy of 10% and this components do not reflect the scarcity of factors, it is obvious that both prices deviate considerably from their equilibrium prices or opportunity cost.

(b) Methods Employed in Calculations of Accounting Prices

(i) Linear Programming Method

Theoretically, accounting prices as the most precise proxy of shadowed prices can be found by means of linear programming techniques where shadowed prices represent a set of value parameters of the dual solutions to a given overall development programmes. In practice however, because of the lack of adequate data, this procedure is in applicable, even if data were to be available, there are certain problem inherent in linear-programming which may require the application of non-linear techniques.

(2) Trial and Error Method

A second approach represent a trial and error method, in this method we assume the existence of universe of candidates projects namely a sufficiently wide range of suggested project with regard to available resources. This method has to do with successive approximation and it could be described as follows:-

(i) A random set of accounting prices is assumed.

(ii) The profitability of all candidates project of universe is calculated on the basis of these prices and the projects are now ranked in other of declining profitability.

(iii) A set of project is then selected in this order until one of the resources is exhausted.
(iv) The aggregate yield of this project is determined
(v) The same process is repeated with different assumption regarding the set of accounting prices.
(vi) The procedure is continued until the maximum aggregate yield is reached.
(vii) The respective set of project will then represent the optimum set and the corresponding prices the accurate accounting-price.

This method though practically applicable, is very tedious and the results attained by it may not justify the extent of labour involved.

(4) Correction of Market Prices

In practice accounting price (rates) can roughly be estimated through correction of market prices that deviate from corresponding social equilibrium prices or opportunity cost to such an extent that the necessity of their correction is beyond any doubt. The market wages of unskilled labour usually needs downward corrections because the social opportunity cost of labour in developing countries with large unemployment is very low.

(c) Financial Equivalents

In pricing benefits and costs, the time factor plays very important role nominally the same amount of money have different value if paid or received at different dates, the difference being the interest representing the preference between present and future use of the money involved. In other words, financial equivalents between different amount of money paid or received at different or various dates could be achieved by employing the respective interest-rates. Financial equivalent can be established by using specific factor, the value of which can be achieved by employing the respective interest-rates. Financial equivalent can be established by using specific factor, the value of which can b found in special financial tables.

6.4 Criteria of National Economic Efficiency of Investment Projects.

The increment of national income achieved under the condition that a sustainable and as rapid as possible economic growth at present and in the long-run is secured is the basic criteria of national economic efficiency in general. Usually it is quantified in the form in the form of growth rate for the individual years to come for the planning period. The fact that the increment of national income is made dependent on the development of national economy makes this criterion covers both consistency and profitability. This general aggregate criterion can be applied only in measuring efficiency of national economy as a whole. For measuring national economic efficiency of individual investment projects we have to employ a variety of criterion which if taking together gives the complex picture of national economic efficiency of individual projects. These criteria may be divided into two (2) main groups:-

(a) Those covering consistency
(b) Those covering national economic profitability.

(a) Criteria covering consistency

Criteria showing how a project fit to a development pattern of the economy as a whole usually take the forms of objectives and measures fixed by the government in the development plan. The government may attain weight and priority to development of selected sectors, branches of economic activity or regions (geographic) in other to bring about changes that are considered necessary for a sustained and rapid economic growth. For example the government of a developing may fix the following objectives to:-

(1) Increase employment and consumption particular in sector an e.g. Agricultural sector or in branches 1, 2, 3 River basin authority etc.
(2) Allocate in the budget specific sum for a program of promotion for sector A (e.g. NDE programme).
(3) Give priority to public investment in region X.
(4) Improve balance of payment (a) by giving priority to import substitution industries X,Y,Z. in Nigeria, it can be industries manufacturing cornflakes, milk etc (b) by allocating public investment funds to branches 1,2,3 etc, for example to generate electricity, to provide water, to provide roads (transportation).
(5) Grant preferential treatment in fiscal policy to private investment in branches of economic activity A, B, C, D etc.
(6) Other specific target fixed in the development plan. It is practically impossible to quantify these criteria for the purpose of evaluating individuals' projects; they are usually expressed in the form of comments explaining how the objectives are reflected in the projects in questions.

(b) Criteria Covering National Economic Profitability

Profitability criteria always take the form of coefficient or ratio expressing the relationship between benefits and costs. The coefficient of national economic profitability may be dived into two (2) main groups:-

1. **Integral Aggregate Coefficient:** Which measure the total contribution of a project to the increment of a national income by means of comparing the total social benefits with total social costs?
2. **Partial Coefficients:** Which offers various yard stick for measuring only certain components of the total contributions? It must be stressed that both groups of coefficient should be treated as complementary to one another; in other words both the aggregates as well as the partial coefficient are necessary and none of them should be omitted in calculating national economic profitability.

There is a great variety of methods employed in calculating coefficient of national economic profitability

(1) Benefit-Costs ration which equals direct and indirect value added. Direct and indirect cost of total resources.
(2) Net present social value of the projects
(3) National gross rate of return at present value.
(4) Marginal social productivity of capital and its contribution to national income.

Integral Aggregate Coefficient and Partial Coefficient

The aggregate integral criteria or coefficient of the national economic profitability offers yard stick for measuring the total quantifiable contribution of a project to national income. The partial criteria on the other hand provide various yard sticks for measuring only certain component of the aggregate contribution. In other to establish a coherent evaluation system, the partial criteria must be combined in some ways and some weights attached to them. There two (2) main groups of partial criteria.

(1) Quantifiable
(2) Non- quantifiable

The latter usually covering the external economies and diseconomies which cannot be quantified, for example non-quantifiable criteria are:-

(a) Non-quantifiable influence of the project on the performance of other project/plans, branches, sector etc.
(b) Non-quantifiable effect on training of personnel and the experience obtained in preparing and realizing the projects.
(c) Non-quantifiable social economic effects brought about by the project e.g. improvement in standard of living.

The non-quantifiable criteria can be considered only in the form of descriptive comments where as every effort should be made to quantify where possible at least presented in the form of coefficient or ratio and they can be divided into several groups according to the aspect or resources involved namely:-

(a) Commercial Profitability:- In which case we calculate the profitability percentage, annual rate of return, payback period, break-even etc.
(b) Capital-Labour Ratio:- (i) Investment per unit of labour (ii) Investment per job created in the project (iii) investment per productive worker (iv) Total skilled worker per total capital (v) Total unskilled workers per total capital.
(c) Capital – Output Ratio:- The yard stick for measuring growth.
(d) Productivity of Labour:- (i) Value added per employee (ii) Value added per man-day (iii) Value added per worker (iv) Gross annual Sales value per total number of persons employed.

Examining the criteria for public-sector investment, a rule that requires the government to make only pare to-improving investments that is, investments that make at least someone better off and no one worse off-is clearly too

restrictive for practical use. An alternative rule, which was suggested by Hicks (1940) and Kaldor (1939), would require the government to value all the benefits and costs of proposed investments and make those investments that offer the largest net benefits. Under the Hicks – Kaldor criterion, a project should be undertaken by the government if those who benefit from the project can afford to compensate those who suffer, that is, those who bear the direct costs of the investment or are exposed to its negative externalities. However, since such compensation may not always be paid, the government needs to recognize the distributional effects of the investment it makes. This may be achieved by postulating a social welfare function that summarizes the relative merits of alternative income distributions, but it is unclear how such a function should be determined. Moreover, it would clearly be suboptimal to take distributional considerations into account on a project-by-project basis. In the face of these difficulties, it is common simply to calculate the net benefits of an investment and to make a separate judgment as to its distributional consequences.

6.5 Environmental Impact Assessment

The need to consider the present resources at the expense of fullest of future needs warrants the concern for the future for instance fertilizer production and usage has been associated with environmental pollution consequences upon Nitrogen and Urea Output which comes in various forms such as gases, liquid and solid. Discharge of this pollutant does adversely affect the community and affect sustainability of the fertilizer project just like any agricultural project. The concern for environmental management attempt to reconcile the demand of socio-economic system of projects with the constraints of the biosphere. Environmental managements has three (3) major precepts:- (a) Environment is useful in that it supplies natural resources and materials for man's industrial and economic growth as may be found in project formulation, implementation and execution. Therefore, man needs to exploit the natural environment and the use of available resources with care so as not to damage the natural environment. This is because the natural environment is man's life support; this is the second precept of environmental management. The environment according to Essiet 1987 is man's life support system in that it provides:- (a) man's living and capacity space (b) it is the source of man's food (c) it is the medium for those biological process and gaseous emission, to this extent, agricultural project for the third precepts. Environmental impact assessment is the act of given direction and control to the use of the environment of which planning is an integral-part. Good management principle requires that plan for the avoidance and mitigation of losses and other negative impacts are put in place. Environmental impact assessment is the planning kits for the reduction on the environment and the social cost/risk associated with a proposed project, action or programme. Environmental impact assessment attempt to capture the totality of values

relevant to decision making as affected by a development projects e.g. irrigation projects and stipulates appropriate measures for avoiding or minimizing the effects on biotic and abiotic system. Therefore, environmental impact by definition is therefore any alteration of environmental conditions or creation of new sets of environmental conditions adverse or beneficial, caused or induced by a project, a programme or a plan or a set of project. In project analysis the relevance of the environment al can e diagnosed from the human point, ecological and institutional view point. The human interest are those of people of the project area, countries, while the ecological interests could either be specific or extend to large areas, apart from the inter-generated nature of some ecological impact as shown in Figure 3. The institutional dimension involves the agencies concerned with the project, guiding such an agency are legal, and policy statements.

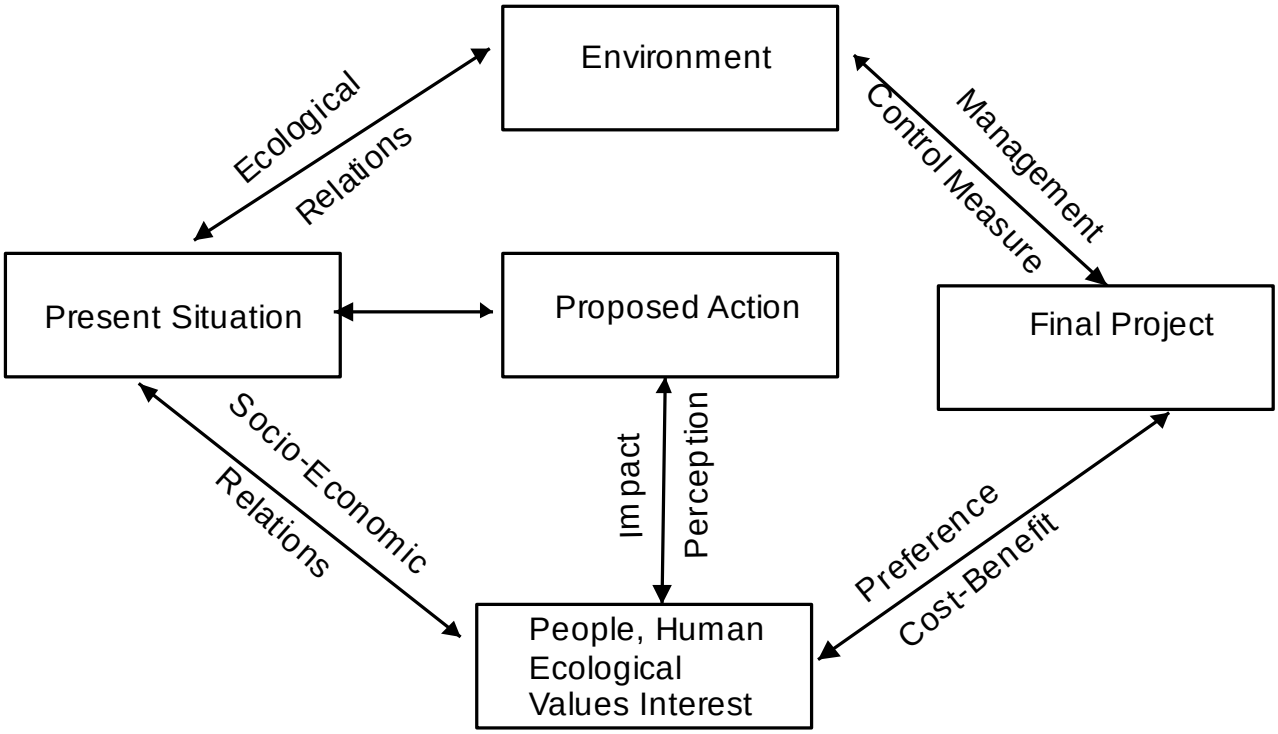


Figure 3: Environmental Impact Assessment: A Conceptual Framework

6.6 Sensitivity Analysis

Given the exigencies of economic situation and the need to be realistic in project formulation and analysis, there is need to carryout sensitivity analysis for instance you want to ask yourself how sensitive is the project(s) net project worth at the financial price and economic value or its financial and economic

rate of return or net benefit investment ratio under varying cost. The technique of computing of sensitive analysis has to do with calculating the project worth over and over again using new estimate of one or other elements of costs and returns, choosing among mutually exclusive projects, different cases of project, different timing of project, choice of technology in project analysis, applying contingencies allowances. Assumed only one price in estimating the costs and revenues, it is better to assume various prices depending on evaluators' experience. This price may range from 5% to as high as 50%, when this is done, the calculation of internal rate of return, net present values, benefit-cost ratio are re-calculated and compare with the cost of capital. The investors would have to watch very closely those sensitive variables which may render profitable projects unprofitable.

6.7 Format for Feasibility Report

a) Chapter One (Executive Summary)
   (i) Project Highlight
   (ii) Market Evaluation
   (iii) Project Total Cost
   (iv) Manpower Requirement, Organization and Training of Human Resources.
   (v) Economic and Financial Evaluation
   (vi) Implementation - plan.
b) Chapter Two (General Consideration)
   (i) Project Background, Location, and History
   (ii) Purpose of the study/Objectives of the study
   (iii) Methodology Adopted.
c) Chapter Three (Technology of Production)
   (i) Farm Capacity/Firm Capacity
   (ii) Farm/firm Layout (Design)
   (iii) General Production Description
d) Chapter Four (Labour and Management)
   (i) Brief of Farm or Firm/Organization of Farm/Firm
   (ii) Farm/Firm Manager
   (iii) Farm/Firm Supervisor
   (iv) Account/Record Clerk
   (v) Storekeeper
   (vi) Management Team
   (vii) Manpower
   (viii) Driver
   (ix) Securities/General Labour.
e) Chapter Five (Commercial Aspect)
   (i) Input Supply
   (ii) Output disposal

(iii) Market and Customers
(iv) Price of Output
(v) Packaging/Labeling/Transportation.

f) Chapter Six (Capital Investment)
(i) Land
(ii) Buildings
(iii) Farm Machines
(iv) Power Supply
(v) Motor Vehicle
(vi) Furniture
(vii) Fittings and Office Equipments
(viii) Initial Working Capital
(ix) Contingencies
(x) Summary of Total Investment Cost
(xi) Interest on Expenditure
(xii) Expenditure

g) Chapter Seven (Financial and Economic Evaluation)
(i) Financing Project
(ii) Profitability Analysis
(iii) Sensitivity Analysis

h) Chapter Eight (Implementation Plan)
(i) Implementation Management
(ii) Environmental Impact Assessment of the Project

6.8 Project Planning Techniques

Strength, Weaknesses, Opportunities and Threats (SWOT) analysis, problem Tree, and LOGICAL framework Analysis are all built into the development of the project cycle. This includes the setting of project objectives to meet defined problems and the establishment of any analytical framework. In the appraisal and evaluation of the project cycle, financial and economic analysis and impact analysis have a role to play. Other techniques that may be used in project identification and preparation include methods that are used in operational research. These methods are network, critical path (CPA) and programme evaluation and review technique (PERT) analysis and linear, non-linear programming and other optimization useful in that they adopt a logical approach from project identification through the project monitoring and evaluation. However, once the project is operational there are other techniques that concentrate on planning and scheduling individual project components or jobs. One of the basic techniques, used on large engineering, production and physical infrastructure projects, is network analysis or critical path analysis (CPA).

6.8.1 Critical Path Analysis (CPA)

Network analysis is developed to aid management to plan and control projects. Network analysis is a family of related techniques these techniques show the interrelationship of the various jobs or tasks which make up the overall project and clearly identify the critical parts of the project. They can provide planning and control information on the time, cost and resource aspect of a project. Network analysis is likely to be of most value where projects are: (a) complex i.e. they contain many related and interdependent activities, and/or (b) large i.e. where many types of facilities, high capital investments, many personnel are involved; and or (c) where restrictions exists i.e. where projects have to be completed within stipulated time or cost limits, or where some or all of the resources, material, labour are limited.

Critical path Analysis is the organized application of systematic reasoning to planning, scheduling and controlling practical situations where many separate jobs, which make up the whole task, can happen simultaneously, almost simultaneously or in sequence such that it is difficult intuitively to establish the relationship between the separate jobs or project components. Critical Path Analysis identifies three phases:-

(a) **Planning Phase: -** This clarifies the objective of the project and the arrangement of project tasks into an order of precedence. Some tasks will be carried out in parallel, others in series.

(b) **Scheduling Phase: -** This develops from the planning phase and coverts the plan into a feasible and readily implemented schedule, having analyzed the path with reference to the optimum use of available resources such as time, human, resources and equipment.

(c) **Control Phase:** - This develops from the scheduling phase and allows actual progress to be monitored and corrections to be made to ensure adherence to the schedule or modified schedule.

6.8.2 Programme (Project) Evaluation and Review Technique (PERT) Analysis.

Another component of network analysis is Programme Evaluation and Review Technique (PERT). PERT analysis differs from CPA in that it allows for uncertainty by building into the project scheduling time constraints for each activity, including:- quickest reasonable time, most likely time and worst time. An activity is a task or job of work which takes time and resources. An activity is represented in a network by an arrow (→). The head of the arrow indicates where the task ends and the tail where the tasks begin.

6.8.3 Strengths, Weaknesses, Opportunities and Threats (SWOT Analysis)

SWOT analysis is a very basic evaluative tool. It is the analysis of an organization's strengths and weaknesses and the opportunities and threats that it faces. While strengths and weaknesses tend to concentrate on the internal characteristics of an organization, opportunities and threats are more orientated

at looking at the external resource, financial, economic and competitive environment. SWOT analysis is used in the private sector when considering a company or organization's competitive position in a particular market. It may also be a useful tool in corporate planning.

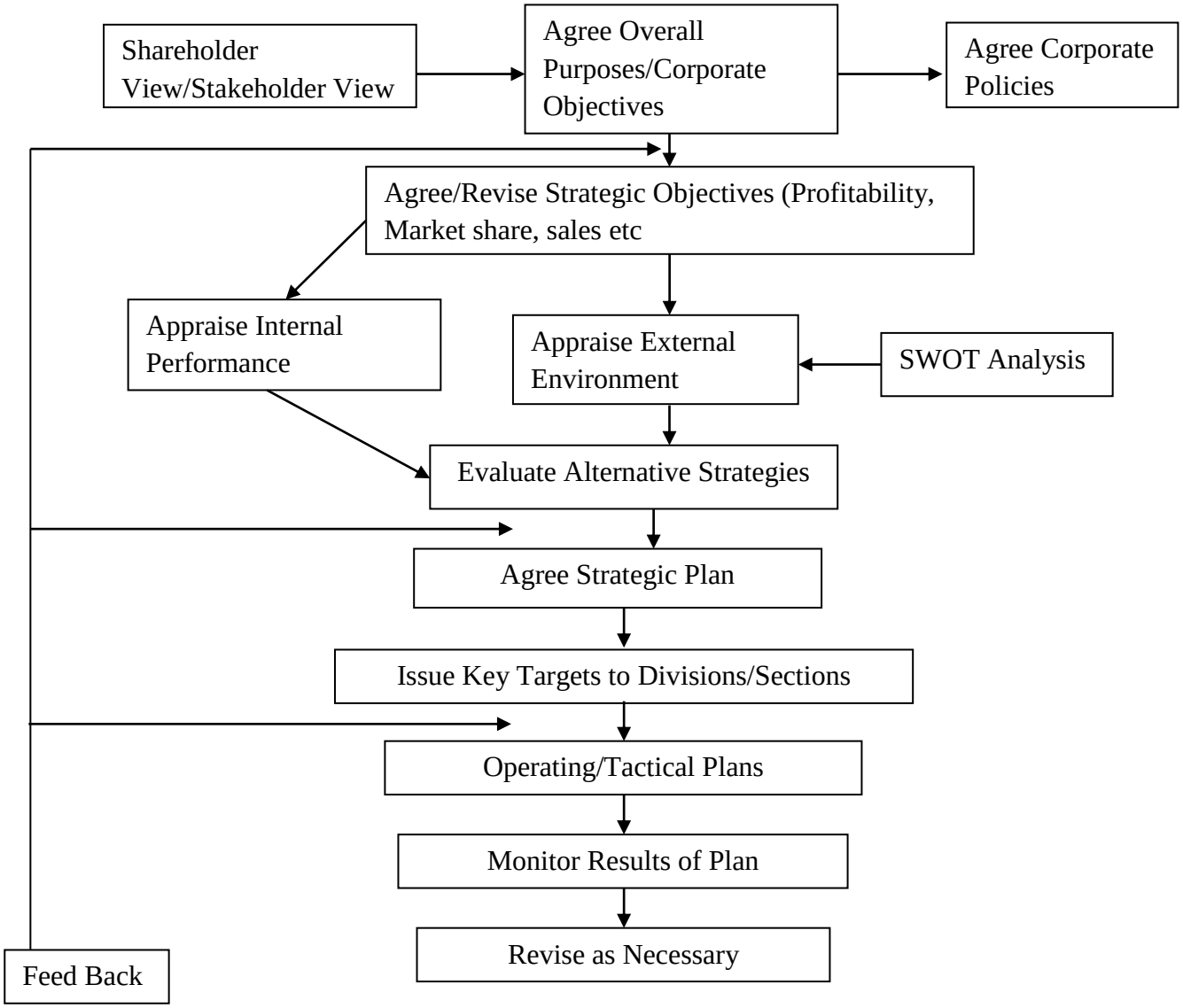
Example an international manufacturer of dairy products is considering investing in a dairy plant to manufacture pasteurized milk and cheese products in Kenya. The manufacturer will wish to know the strengths and weaknesses of this plant compared to existing and potential producers in the country, as well as competition from imported products. The manufacturer will look at a number of factors before deciding to invest in the plant. This will include current milk production within the country, the pricing policy for milk where there is government intervention and, of course, estimated current and projected demand for milk and dairy products. Other issues will include the internal production costs and market price for milk as well as the possibilities for importing powdered milk, which may provide difficult competition for a local production facility. A SWOT analysis by the manufacturer will play an important role in the overall project evaluation.

SWOT analysis may be useful for both public sector and public private sector investment projects. Further examples of its use include:-

(a) A public sector-led investment programme in integrated economic, social and environmental development in a rural region of Cornwall in the U.K.
(b) Preparation of an action plan for environmental management in a coastal zone of Brazil where there is need to balance environmental protection with economic and social development, including poverty alleviation, there is a major sources of income generation-fisheries and natural resources extraction, agriculture, small business development and tourism.
(c) Balancing the advantages and disadvantages of investing in centralized health service delivery as opposed to investment in lower cost decentralized health care delivery based on clinics and preventative medicine.

In each of these projects stated above, SWOT analysis was carried out early in project preparation to assesses how a project or development programme should use strengths in a project area (natural resource base, skills, stakeholder commitment) and deal with weaknesses (poor infrastructure, low skills base, low access to basic services). In the medium to long term, project planners need to take into account opportunities (market opportunities such as the demand for project production, the development of a new port or airport) and threats (competition from other countries in the same sector or competition from other regions within the same country, technological change, economic shocks such as changes in oil and other world commodity prices).

Figure 4: Example of the use of SWOT Analysis in Private Sector Corporate Planning



6.8.4 Problem Tree Analysis

Problem tree analysis is a useful first stage in the development of a project. Problem analysis is a method of mapping out problems, showing their interconnections and predicting how a project might address those problems. The main aim is to establish the cause and effect relationships between problems that exist. It involves three main steps.

(a) Precise definition of the framework and subject for analysis
(b) Identification of the major problems faced by target groups and beneficiaries.

(c) Visualization of the problems and their contributory factors in the form of a diagram or problem tree (this may be produced in Microsoft word, PowerPoint, vision or other proprietary software).

6.8.5 Stakeholder Analysis

Stakeholders are those people or organizations who are likely to be affected by a project and or can influence the success or failure of that project. It is increasingly common in public sector and development project for planner and analysis involved in project design to undertake a stakeholder analysis. Stakeholder analysis allows project design and policies to take account of the various interests of those who have direct and indirect interests in the project, or upon whom the project may have impacts. Stakeholder analysis, can also be define as the involving the identification of all stakeholder group likely to be affected either positively or negatively by the proposed project, and the identification and analysis of their interests, problems, potentials, etc. the conclusion of this analysis are then integrated into the project design such an analysis may be a participatory process, involving stakeholders and finding their opinions and reactions, or it can be an assessment conducted by a project analyst or planner who attempt to plan for the interests of the various stakeholder groups. The first step is to identify the key stakeholders. It is common in stakeholder analysis to differentiate between primary and secondary stakeholders. Primary stakeholders are those affected by the project either in a positive or negative ways, and secondary stakeholders are those engaged in an intermediary role in the delivery of project benefits stakeholders can also be categorized according to function (contributor, implementer or beneficiary). The key stakeholder concept refers to those stakeholder groups who can influence a project significantly or who are important for the objective of the project to be met. The next step is to assess the stakeholder's interests and potential impact of the project on these interests. The identification of potential stakeholders can be done using a stakeholder matrix.

Table 9: Stakeholder Matrix (Stakeholder Table)

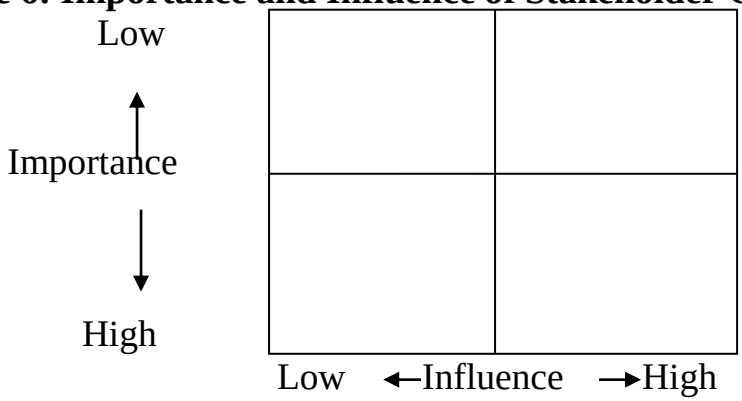
Stakeholders	Interest	Potential Project Impact (s) +/-?	Relative Priorities of Interest
Primary Secondary			

Source * ODA (1995)

UK oversea development administration (ODA) has subsequently been renamed the department for international development DFID. It is conventional to the various stakeholders and indicates their interests where these are relevant to the project. These interests could include the expectations of stakeholders, the resources they are willing to commit and any conflicts of interests. It is

conventional to show lists the potential impact(s) as positive, negative or uncertain. The indication of relative priority is normally given on a scale of I (high priority) to 5 (low priority) and usually relates to the definition of primary and secondary stakeholders. Clearly, different projects will have different stakeholder groups and different complexities. The issue is the degree to which stakeholder analysis successfully balances all the different interest groups involved in projects. The next step is to assess the importance, power and influence of stakeholder in relation to their ability to influence the outcome of the project or programme. Some stakeholders will possess formal power derived from legal sources, control of resources, leadership authority, possession of knowledge etc. whereas other may have more informal power and influence.

Figure 6: Importance and Influence of Stakeholder Group



Source: *ODA(1995).

*(Now DFID)

Figure 6 suggests that stakeholders who are in the bottom right hand quadrant are the likely stakeholders since they are affected to a high degree by the project and have a high influence on the outcome of the project, this, it would be significant for these group to be considered and involved in the project design and implementation if a participatory approach to project design is intended, a logical place to start is an assessment of the degree of participation expected of each stage of the project life. For this a participation matrix in figure 7 can be used. The participation matrix gives an indication of the roles of different stakeholders in the development of the project. At each stage of the project it is possible for stakeholders to be informed (provided with information), consulted for information or opinions, to participate actively, to be delegated a subsidiary role, to be controlled (not involved in planning but involved in implementation).

Figure 7 Participation Matrix

	Inform	Consult	Partnership	Delegate	Control
Identification					
Planning					
Implementation					
Monitoring and Evaluation					

Source: - ODA (1995)

The appropriate role for each stakeholder group will vary according to the stage reached by the project and according to the nature of the project. Stakeholder analysis is particularly important for projects where some degree of participation is expected from the beneficiary in the design and or the operation of the project it, can be used to gain a better understanding of the interest and needs of the various stakeholder groups affected, as well as to assess their capability to enhance or threaten project implementation. Stakeholder analysis may help to avoid major mistakes up front, by for example, revealing if a project has weak ownership that might threaten its implementation. It may also be useful in displaying the impacts of the project that are non-quantifiable, and also to display the distributive impacts of a project. The drawbacks to stakeholder analysis are that the data underlying the analysis is both subjective and context specific, and determination of support or opposition to a project cannot be calculated simply by adding up the groups supporting or opposing a project. While stakeholder analysis may assist in the process of making a decision as the acceptability or not of project, there are no clear guidelines as to how such an analysis can be in this regard.

6.8.6 Logical Framework Analysis (LFA)

Logical framework analysis or logical frame analysis (LFA) is a methodology for establishing a framework for the evaluation of projects and development programmes. It is a methodology for planning, managing and evaluating programmes and projects. Logical framework analysis involves stakeholder analysis, problem analysis, analysis of project objective involves stakeholder analysis of strategies, preparation of the log-frame matrix, and activity and resources schedules. The log-frame is matrix in which the project intervention logic, assumptions, objectively verifiable indicators and sources of verification are presented. The log-frame's presentation is normally in the form of a table or matrix, which includes on one axis:- (a) Overall objective (b) Specific objective (c) Result (d) Action. Against each of these headings, measurement of impact, risks and assumption are given on the other axis. These normally include the following (a) Observation verification indicator (b) the sources of verification for the indicator. The observable verification indicators are quantitative and qualitative indicators, which may be also used as benchmarks and or performance indicators for assessing and comparing project performance. The comparison of project performance, however assumes that the indications are compatible and that one is comparing like with like. Intelligent use of the logical framework should ensure that the design of the project is logical. However, it does not ensure that the project is the best one to implement. It also gives no guidance on issues such as income distribution, employment, participation and environment unless these are specifically addressed in the objective of the paper. The principal value of the logical

framework format is that it provides a clear summary of the basic features of a project proposal.

6.9 Project Quality Factor and Basic Needs

The evaluation office of the European Commission (AidCo, 2002) and the other writers have drawn attention to other factors apart from the financial and economic impacts of projects. These factor are particularly relevant to development project were the issues of project sustainability after initial finance by international financial institutions and or donors are the keys to the long-term success of the projects address the basic needs of the beneficiaries. Experience with project overtime has indicated that the long-term success of development project and the sustainability of project benefits depend on a number of project quality factors, over and above the economic and financial viability of the project. These factors such as ownership by beneficiaries policy support, appropriate, technology, socio-cultural issue, gender equality, environmental protection, and institutional management capacity are particularly relevant to development project rather than to purely commercial project. However, increasingly, commercial project have to take into account international and national legislation and the pressure of lobbying group e.g. UNagencies, Greenpeace and other development and environmental lobby groups. There have been, for example, particular pressures on mining, oil exploration and dam projects, taking account of the impacts on the environment and local communities (Dam project in Turkey, and India; oil exploration project in Nigeria and other West African countries).

6.10 The Movement of Project Performance

The measurement of project or programme performance may be undertaken using quantifiable and non-quantifiable indicators (performance indicators or PIs). These may be used to compare the project performance with other project (again, care must be taken to ensure that one is comparing like with like). Performance indicators may be defined during project design and could be taken from the logical framework matrices (observable verifiable indicators) or they may be defined separately. Some of the financial and economic indicators produce such performance indicator: - pay-back period, return on capital employed, net present value, internal rate of retune. Performance indicators are used extensively, in project management in the private sector and increasingly, in the public sector in an attempt to measure performance and improve efficiency. They are applied in many social and economic sectors: agricultural production and manufacturing, financial services (banking, insurance), the health sector, education, transport services. Each sector will require specific performance indicators that are appropriate and relevant to that particular kind of activity. Performance indicators are useful management tools, but it is important that they are developed by management in collaboration with the workforce in order to reduce the possibility of

misunderstanding; for example, it is possible for the workforce to consider that indicators may be used to reduce the number of people employed.

However, performance indicators and other measure of project performance have both strengths and weaknesses. Strengths and weaknesses of performance indicators in project management are stated below: strengths are: -

(a) Facilitates open discussion of organization's role, position in the market place easy technique to use.
(b) Indicators readily available from company account and financial statements.
(c) Useful supplement to their techniques, for example, financial analysis, cost-benefit and cost effectiveness analysis.

Weaknesses are

(a) Financial measure may be static
(b) Manipulation of financial indicators
(c) Mechanical interpretation of performance indicators may given the wrong results.
(d) Subjectively nature of same indicators
(e) Data may not directly comparable.
(f) Reliability of data source
(g) If the management does not have control over what is being measured, there is a problem.
(h) Cost of collecting data and setting up management systems to monitor data.

6.11 Distribution Weights for Welfare Analysis

6.11.1 Distribution Weights issues in Benefit-Cost Analysis

The origin if benefit-cost analysis (BCA) in both theory and practices has its historical roots in the pursuit of economic efficiency, with less attention paid to distributional concerns. Thus traditional benefit-cost analysis focuses on whether the sum of all benefit, including both market and non-market exceeds the sum of all costs (direct and opportunity costs). Projects are typically evaluated on the basis of whether the sum of monetary benefit to all persons exceeds the sum of monetary costs. Economics have pointed out that there is no reason why distributional concern should both be incorporated in project evaluation. Traditionally, few benefit cost analysis explicitly when equity was discussed it was in the context of a policy induced change in market prices, taxes or income, not changes in utility from publicly provided non-market goods like human health and environmental quality. While carrying out benefit-cost analysis, the analyst must add things which are not directly comparable. The aggregation problem comes in different forms in benefit-cost analysis and these include:-

(a) Aggregation over goods – how to compare cost which are in one form (e.g concrete used for the dam) with benefits which are in another form

e.g electricity generated from the project? Shadow prices that reflect the true value of oods are used for this purpose.

(b) Aggregation over people – how to compare costs and benefit accruing to different people. Is a N100 cost to a wealthy person to be considered on par with a similar cost to a poor person? Equity weights are sometimes use to address these distributional issues, but the standard benefit – cost analysis stays away from the distributional considerations.

(c) Aggregation over states of the world, how to deal with uncertainty and risk, looking from an environmental perspective a few issues need additional attention.

6.11.2 Equity and Benefit-Cost Analysis

Social benefit-cost analysis as actually practiced by governments and inter-governmental concerns. In evaluating projects project desirable or undesirable. Such rules include

6.11.2.1 (a) Pareto Criterion

If a project helps at least one person while hurting no one, then it satisfies pareto criterion. However, it often considered to be restrictive as if reject projects/policies that result in losses to any individual and virtually all projects affect some or other adversely

6.11.2.2 (b) Social Welfare Criterion

Where in sum of each person's net benefit multiplied by his/her marginal social significance in calculated; the project is considered as desirable if the sum is positive. This requires large amount of information

6.11.2.3 Potential Compensation (Kaldor-Hicks Criterion) Basic Rule

$$dw = \sum_{h-1}^{H} \sum_{1-1}^{N} Pi\ dX\ i^{h}\ (Efficiency)$$

Where,

dw = Change in Economic Welfare for Poor and Rich

Kaldor-Hicks Criterion ignores distribution effects. According to which a project/policy is desirable if the sum of the loser is positive. In other words this criterion explores whether the net gainers from the project can compensate the net losers so as to make them as well-off as they would be without the project/policy.

Table 10:- Project Evaluation Criterion – Illustration

Person	SMUY	Net Benefits	SMUY * Net Benefits
1	0.8	+250	+200
2	1.2	-200	-240
Total		+50	-40

Note:- SMUY – Social marginal Utility of income, that captures the weight attached to each individual in the society.

For example, consider a project that yield the net-benefits to two individuals in the society (poor and Rich as example) as shown in Table 10. As per the Pareto – criterion the project fails because person 2 is incurring negative net-benefits. As per the social welfare criterion also the project fails as the sum of SMUY x Net benefit is negative on the other hand, as per the potential compensation criterion the project is desirable since the net beneficiaries of the project (namely, person 2) for all his/her losses and still be better off. The potential compensation criterion ensures that the resources are put to their most highly valued uses and thus the total wealth of the society in maximized. While benefit-cost analysis (BCA) traditional focused on efficiency issues and hence identified desirable projects on the basis of the potential compensation criterion, its reluctance to income equity and distributional aspect in the analysis attracted criticism. Such criticism gained more momentum in the field of environmental issues as it is difficult to clearly separate efficiency from equity concerns.
Basic principle:-

$$dw = \sum_{h=1}^{H} \sum_{i=1}^{N} \left[PidX_i^h + (ai - 1) PidX_i^h \right]$$

Efficiency *Distribution*

Where,
dw = Change in Social Welfare

Thus, while applying benefit-cost analysis (BCA) to environmental issues such as climate change it is argued that it is appropriate to use some variant of social welfare criterion to assess the desirability of projects. This in turn would necessitate the analyst to identify appropriate equity weights that are applicable for the project. Distributional weights, attach explicit weights to costs and benefits accruing to different groups

$$dw = \sum_{k=1}^{K} Wk \sum_{i=1}^{N} PidX_i^k$$

dw =Change in Social Welfare, with Weight of Class K equal to Wk

Debate about what form these weights should take has surrounded different conceivable functions and forms that describe social welfare and more specifically, the measure of inequality aversion (reflecting in turn a judgment about the relatively higher value associated with say the damages due to climate change suffered by a poor compare to a rich person. Atkinson and Mourato (2008) argue that the available evidence suggests that although equity weighting could make a significant difference to benefit cost analysis (BCA) The way in which benefit cost analysis (BCA) deals with uncertainly in project appraisal has not undergone substantial changes over years. It is typically addressed

through sensitivity analysis of uncertain parameters. However, possibility of irreversible changes the environmental system has given rise to new concepts such as quasi option value (QOV) in benefit. Cost analysis (BCA) application. Quasi option value (QOV) is the difference between the net benefits of making an optimal decision and one that is not optimal because the former ignores the gains that may be made by delaying a decision and learning during the period of delay. For example, if a development option involves the permanent conversion of tropical forestland to agricultural land, then it must be debited with the potential forgone costs of not waiting to learn more about the benefits of forest conservation. Quasi option value (QOV) can only emerge if there is uncertainly which can be resolved by learning if the potential to learn is not there quasi option value (QVO) cannot arise. Potentially QOV can make a significant difference to decision making.

6.11.3 Importance of Distributional weights in Benefit-Cost Analysis (BCA).

Distributional weights are important to economists and politicians. For economists, social well being is composed of two factors, economic efficiency and equity. By efficiency, economists mean selecting policies that maximize consumer well being from use of given amount of market or non-market scarce resources. Economists talk about economic efficiency as a positive or objective analysis, and it takes the distribution of income and resulting prices as given unless there are market failures such as monopoly or pollutions, then shadow prices are used to correct for these distortion in the benefit-cost analysis (BCA). The second factors equity or fairness of the distribution of these goods and services. Many economic policies are designed to lessen the unequal distribution of income arising from the market economy. How project benefit and costs are distributed among different income or ethnicities is also a positive analysis. However, using this distribution information to assess equity or fairness is a normative one as it requires society or its representatives (usually an elected official) to compare well being of a dollars worth of benefit to one person versus another. While the choice of how to weight or trade-off benefit to people in society (but not all) would agree that publicity financed projects or policies should not seriously worsen the distribution of income. Distribution f benefit and costs matter to politician for a number of reasons. All representatives are elected from specific and often relatively democracy to ensure local concerns are reflected in national debates. If costs are concentrated in their districts, they will attempt to block implementation of an otherwise economically efficient program, policy or project, regardless of the benefits to the nations. An economically efficient project that never gets adopted is only efficient in theory. Public choice theory in economics (Buchanan and Tullock, 1965) predicts that not only will elected politicians primarily care about any benefits or cost concentrate on their electorate, but they will also be quite

sensitive to avoiding any burden on their local industries and companies that are major campaign donors. Distributional concerns in Federal decisions have made it into several federal policies. Agencies have been statutorily required to consider impacts on different groups, small businesses, children, vulnerable populations, and impact on state, local or tribal governments.

6.11.4 Approaches to Incorporate Equity to Benefit Cost Analysis (BCA)

6.11.4.1 (a) Implicit weighting by decision makers

One of the easiest ways to account for distributional issues in benefit-cost analysis (BCA) is simple to display the benefits and cost disaggregated by income classes, rural Vs urban, ethnicity, or whatever groups are relevant for this analysis (Zerbe and Dively, 1994). Most importantly, the decision makers are then allowed to apply their own weighting regarding the relative emphasis to put on each grouping. While this implicit weighting often lacks the transparency of explicit weighting, it allows decision makers to make relative judgment without having to demand a specific weighting scheme. How does the analyst know how much of the benefits received or the cost paid/incomes are associated with different income classes or ethnicities? On the cost side, some of this may be known from the project financing. If the project is to be financed by use fees, then surveys of users may reveal the income, ethnicities etc of frequent versus infrequent users. From this analyst could calculate the percentage of the project cost to be borne by each group of interest. If the project is to be financial by income taxes, sales takes or property taxes, these is an extensive literature in public finance and tax journal on how these taxes are distributed by income.

On the benefit side, survey can be used to estimate how the benefits vary with group in the distributional analysis. Most surveys contain or can be designed to contain an extensive list of demographic characteristics such as age, education, gender, ethnicity, income or whatever group the analyst thinks is relevant for distributional analysis of this project or policy e.g handicap status, single parent households etc. Once information on how benefit and cost are distributed has been assembled, a useful summary statistic might be how the difference between benefits and costs i.e. net benefits, are distributed by each distributional strata of interest to the policy makers (Graham, 2008); Hammitt, 2009). Krutilla (2005) provide a tableau format that illustrates this approach for disaggregating project benefits, cost and net benefit for groups that are classified into residents, consumers, producers, taxpayers and state government. A second way to determine if the benefits do vary with key demographic characteristics is to include them as variables in cost analysis (BCA) calculate benefits from a demand curve or supply functions. If the analyst using data to estimate these demands or supply functions, he or she can include variables such as income, age, gender, etc in the demand or supply equations to statistically test (e.g t-test) whether the usage, and hence the benefits, vary with characteristics.

If a demographic factor is significant, then the differentia benefits received by each group can be calculated by setting that variable at the different levels of interest for the group. If a particular demographic characteristic or factor is not statistically, then the fact that benefits do not vary with that demographic characteristic should be conveyed to the decision maker. Knowing what distributional factors are not important can be valuable in information to a decision maker. Inspecting that faction for significance of demographic characteristic influences the benefit of the project. If it is a dummy variable for gender, then the consumer or producer surplus could be calculated twice, once for males and once for females. Even if an analyst uses elasticity's or consumer surplus and or producer surplus per unit of output, these are often derived from an underlying statistical function which can be inspected to determine if benefits vary by demographic variables of interest. If so, the benefits can be calculated for each relevant group by setting that variable at the levels of interest (e.g income quantities). The resulting distribution of benefit then can be displayed in a table for the decision maker to review and implicitly weighted by the decision maker in any way they want (including no weights at all)

6.11.4.2 (b) Explicit Weighting of Net benefits.

One method to empirically incorporate equity r distributional concerns in the calculation of net benefits is to apply different weights to the net benefit of each group. Groups (ad-hoc) could be any subdivisions of interest to the policy maker. For example the group could be income classes (e.g. quintiles), ethnicities gender, or rural versus urban consumers. Some groups have natural divisions such as gender or ethnicities, which for others it becomes the choice of the analyst. However, in the case where the grouping is chosen by the analyst, sensitivity analysis can be performed to determine if the segmentation of groups matter to the ranking of project or policy alternatives. Applying the weighting to net benefit has the advantage of implicitly incorporating the same weights on benefits and costs together in one number. However, Adhoc weights and costs as a measure of welfare or well being. Prior to weighting, the theoretical measures of benefits and costs have a strong link to individual utility and well being. Good practitioners strive to maintain the link between theory and empirical measurement of benefits and costs through estimation of demand functions consistent with utility maximization, for example, in order to link monetary net benefits to the social welfare function, the empirical distributional weights should reflect the marginal the marginal utility each distinct group receives from their net benefits. Drawing upon Starrett (1988), one way to do this marginal utility of income. If per capital incomes utility of income, then differently in the social welfare function (Starrett, 1988). But how strong is the case for diminishing marginal utility of income? Certainly it has some intuitive appeal in terms of differences in utility of another N100 of income to a rich person versus a homeless person. In the end this is ultimately a value judgment.

Thus, with income based weights, the resulting net benefit measure is an attempt to provide a weighted sum of utilities to society.

6.11.4.3 (c) A Revealed Preference Option for calculating the weights

The differential tax rates, progressive income tax system might serve as possible source of relative income weight. Preferential treatment of capital gain and clever accounting tricks to make the effective rate somewhat less for high income households are lots of loopholes. Nonetheless, for the purpose of determining an explicit weighting of net benefit to each group, these tax rates percentage did reflect a consensus by a majority in congress, with concurrence from the president of the United State, of a relative comparison of marginal utilities of income to different income group. To use the tax rates as weights in benefit-cost analysis (BCA), one would need to calculate the relative weights as the ratio of tax rates .An advantage of relying upon on a single nation-wide weighting standard is that it provides consistency in the weighting system used across projects and allow for greater comparability of the resulting benefits- cost ratios. This avoids a concern about individual project by project weight chosen by decision makers (a local agency official or locally elected representative with a stake in the outcome) which would not be comparable across projects.

6.11.4.4 (d) A Relativist Approach to Calculating Weights

Brent (1996) discusses an approach to deal with equity in quantifying the net public benefits of reducing a health problem to patient. If a strong positive link between willingness to pay (WTP) and income is believed to be the case, Thompson et al showed two ways to minimize this effect on benefit. One is upfront in the survey itself, where in addition to eliciting the usual Naira or dollar amount of willingness to pay (WTP), they also asked for willingness to pay (WTP) as percentage of income. This willingness to pay a percent of income would not be constrained by the absolute level of income. Arraying these percentages by income class would provide class provide a relative comparison of the benefits to each income class. Second, the authors extended this first approach by multiplying the sample average percentage willingness to pay (WTP) by the total sample income to calculate the overall sample average naira or dollar amount of willingness to pay (WTP).One advantage of this method that the weight sum to one so that total benefit are not overstated as would be the case if the weights summed to more than one. Another possible advantage is that since the weight are calculated as the ratio of household income of each group to the population average income, the same weight could be applied across all project or policy benefit cost analysis (BCA's). This provides consistency in the weighting system used across projects and allows for greater comparability of the resulting benefit cost ratios. Brent (1996) suggests this approach is similar to calculating a weight for each group based on a comparison of the income to the overall average income. Any of these approaches to weighting, while fairly transparent, are not without their

limitations. As such regardless of the exact form of weights chosen, it is important to perform a sensitivity analysis using different weights to evaluate whether the ranking of projects by NPV (or BCR's) is overly sensitive to a reasonable range of weight. If the BCR's or NPV's are not overly sensitive to the different weighting schemes chosen, the analyst and decision maker can have some confidence that the ranking of policy or project alternatives is not overly sensitive to how distribution concerns are treated. However, if the ranking of alternative projects is sensitive to the choice of weights, this too is important information for the decision maker to know, as it focuses his or her attention on equity. Thus such a finding of sensitivity. Suggests the decision maker devote some serious thought to what specific weight should be assigned to each group.

6.11.4.5 (e) Lorenz Curve Based Approaches to Measure Equity Effects.

Some measures of inequality that are commonly used to measure how equal or unequal the distribution of income is, can be useful for benefit-cost analysis (BCA). The Lorenz Curve plots the cumulative percentage of income against the cumulative percentage of the population. If income was equally distributed, the relationship would be a straight line with a slope of one (i). Farrow (2009) suggests this current relationship between income and population could be compared to a similar relationship for the project. In the case of the project, presumably the plot would be the cumulative percent of the income versus cumulative percent of project beneficiaries. If there is equal distribution of project benefit across the beneficiaries then the Lorenz Curve would be a straight line with a slope on one (i). The more the actual Lorenz Curve bows or drops below this straight line, the more unequal the distribution of project benefits is. A further refinement of this procedure for policies that would have substantial effects on societal income would be to calculate what the Lorenz Curve look like before the new policy (i.e the current situation), and then what the Lorenz Curve would look like if the policy were implemented. This might provide a more complete and easily interrelated picture of the income distributional effect of such a major policy change. One often over-looked aspect feedback to project planners or policy analysts to modify the project or policy to make it more efficient or equitable. One way to apply the Lorenz Curve to evaluate the distributional aspects of a project would be to display the distribution of net benefit of a project by income class. The resulting project Lorenz Curve would be compared to the societal Lorenz Curve of how income is distributed in the population to determine if the distribution of benefits and costs of a project can be used to re-design elements of a project or it's financing to improve equity. If the project or policy has undesirable equity affects, then it may be possible to change the financing of the project to one emphasizing income takes, rather than say sales taxes (as often used to finance open space, sports stadiums) or user fees (often used to finance mass transit). Alternatively, the beneficial project such as light rail lines could have additional stops in poor

neighborhoods so that poor households without cars could walk to station of course the flip side would be projects with undesirable equity affects e.g new refineries could be locate further from poor neighborhoods summary statistics that is derived from the Lorenz Curve is called the Gini-coefficient. This coefficient is defined as the ratio of two areas under the Lorenz Curve. The numerator of the ratio is the area of the gap between the empirical Lorenz Curve and the straight line. The denominator of the Lorenz Curve is the total area under the straight line. The higher the Gini-coefficient could be compared between the project and the current income based Gini-coefficient to determine whether the project contributes to worsening or improving the distribution of income. Generating the type of data needed to calculate Lorenz Curve measures can be accomplish numerous techniques. There can be single market or multiple markets analysis or economic wide simulation models. There is an extensive literature on empirically evaluating the distribution of market benefits and market costs on everything from energy sector (i.e. natural gas-Loury, 1983; gasoline-Hughes, 1987) to minimum wages (Gramlich, 1990) to agricultural programs (Leuthold, 1969). However, for evaluating policies whose major benefits and costs are non-market based model may be limited. Adaptation of commonly used non-market valuation methods such as contingent valuation surveys and hedonic property are used.

Exercises for Chapter Six

(1) Justify the case for project analysis and appraisal as part of the wider framework of project planning and management
(2) The impact of global liberalization has reduced the necessity for shadow price techniques in project appraisal. Critically discuss this assertion.
(3) Compare and contrast any two (2) methods used for evaluating environmental attributes of investment projects.
(4) Consider the rationale for, and problems involved in, applying welfare weights in public sector investment projects.
(5) (a) Distinguish clearly between private and social cost-benefit analyses of projects.
    (b) Enumerate the logical steps involved in Agricultural planning
(6) Write short notes on the following:-
    (a) Shadow prices and Market prices
    (b) Mutually Exclusive and Independent Projects
    (c) Sensitivity Analysis and Analysis of Projects under conditions of Uncertainty
    (d) Financial and Economic Analysis of Agricultural Projects.
(7) Answer the following questions:- True, False or uncertain and explain
    (a) The essence of planning is to accelerate overall economic development.

(b) For all practical purposes, there is really no difference between programe and projects.

(c) Since economic analysis deals with economic evaluation of projects, care must be taken to value goods and services at market prices at all times.

(d) When the calculated internal foreign exchange rate of an import substitution rice project is less than the official exchange rate then the project is worthwhile from the view point of the resource costs of foreign Exchange to savings.

(8) In the literature on project evaluation, it is not uncommon to find different concepts of prices which are used in confusing and inconsistent ways. Introduce some order into the price terminology.

(9) (a) In what circumstances would you make use of prices other than observed market prices?

(b) What are these prices called and how are they derived?

(10) If you were appointed planning officer in the Ministry of Agriculture, what steps would you take in order to plan effectively for the development of the agricultural sector?

(11) Can you distinguish between the guiding criteria for evaluating a project by a private entrepreneur and by central planners evaluating investment projects from a national economy point of view?

(12) (a) What do you; understand by, the term pre-investment research?

(b) In the literature on project evaluation, we can find: shadow, equilibrium, opportunity, and official, market, accounting prices which are frequently used in a confusing and inconsistent way. Could you offer definitions and explanations to bring about some clarifications in the pricing terminology?

(c) Are project evaluation and macro-planning linked in any way?

(13) In the course of many years of practical evaluation activities, a system for acquiring and presenting information needed for evaluating purposes of private enterprise projects have been developed. Can you present in brief schematized information required for the evaluation of private enterprise project in general.

(14) (a) Project Evaluation is an art-Discuss

(b) The administration of an agricultural development plan is just as crucial to the process of agricultural development as the formulation of the plan. Discuss?

(15) What do you understand by the term ‘national economic efficiency of investment projects’? Discuss in detail the several ramifications of the concept.

(16) (a) What is the name given to prices used by national planners and how are these prices derived?

(b) Why would planners make use of these particular prices and not others?

(c) Discuss the different types of prices known to you with sufficient explanations to differentiate between them.

(17) Described in a schematic form the successive steps that must be taken to link the decision phase of a project to the production or operation phase.

CHAPTER SEVEN

COSTS, BENEFITS OF AGRICULTURAL PROJECTS AND MACRO PLANNING

7.0 Introduction

The logical starting point for undertaking economic analysis of projects is to identify and compare costs and benefits with a view to determining which among alternative projects have acceptable return on one hand, while also providing insight on the financial and economic sustainability of proposed investments. However, the over-riding factor is the objective of the proposed analysis which provides the basis on which the costs and benefits will be defined. The farmer's objective for engaging in a choice of agricultural enterprise could vary and may include such motives as the need to be food secured, raise enough money to cater for the family or even make profit. The society on the other hand may have the policy objective of wanting to be self sufficient in food production, ensuring food security for its citizens, enhancing export promotion, job creation, improving national income and probably regional integration, amongst others. In practice, it may not be possible to capture these confederating objectives in one swoop, as such, it becomes imperative to narrow or rather define the scope to which the intended project analysis relates to. Thus, the project analytical framework here will follow the approach of Gittinger (1988), where the objective of maximizing the incremental net benefits (income) of the farmer (private enterprise) will be the purpose of financial analysis. For the economic analysis on the other hand, the objective will be that of maximizing the contribution the project makes to the national income, that is the value of all goods and services produced during a particular period, generally a year, while taking other objectives as separate decisions. Such that amongst those projects that make similar contributions, these other objectives could be used to separate the options depending on the objectives of the farmer or government. In a related dimension, it is also usually necessary to undertake some adjustments before ascertaining the costs and benefits of a project. These entail integrating or excluding some costs and benefits and then revaluing inputs and output at their social opportunity costs (Pedro *et al* (1998). Normally, the focus of financial and economic analysis as explained in the preceding chapters' demand that different items should be taken into consideration when reviewing the costs and benefits of the projects. Some of these include resources that may have been provided free which needed to be valued, resources diverted from other activities that produce goods and services and economic costs that may not involve corresponding money flow from the project financial account. For instance, the payment of tax does not involve the use of resources, but a mere transfer of resources, that is, a financial but not an economic cost. Services offered free such as the services of volunteer workers which may not involve money flow, may also have to be

taken cognizance of in the economic analysis. It is worthy of mention that the objective of the society for instance extend beyond increment in national income to income distribution, creation of employment, enhanced food security, poverty reduction, reduced malnutrition, amongst others. It should however be noted that no single analytical procedure can possibly take into cognizance the objectives of all the participants in a project. Thus, what project analyses does is to identify and value costs and benefits associated with a proposed investment and to compare them with the situation without the project, with the view to ascertaining the incremental benefits arising as a result of the project (Moro, 1997).

7.1 Costs of Agricultural Projects

A cost is anything that decreases the objective of an entity or project. According to Jhingan (2008), project cost relates to the value of resources used in such activities like constructing, maintaining and operating the project. Specifically, project costs could take various forms such as financial and economic costs; indirect or secondary costs; real and nominal or pecuniary cost; primary or direct cost and then monetary and non-monetary costs. In financial analysis for instance, the interest is on financial cost, while under economic analysis, the focus is on opportunity cost for the country. While the financial cost is based on the actual prices of input and output, the economic cost relates to adjusted prices based on the opportunity costs to the country, the entity which economic analysis relates. Though, both costs are closely related given that economic costs are obtained from adjustments undertaken on the financial cost. These costs rarely correspond. The various costs which needed to be taken cognizance of in project analysis and their treatments included the following:

Sunk Costs

Generally in project analysis, focus is usually on future costs and benefits, given that empirical project analysis actually relates to determination of values of future costs now. Sunk costs are expenses incurred in the past in relation to a project. Thus, when undertaking project analysis be it financial or economic, sunk costs are always ignored, with focus wholly on future costs. Analysts have argued that it is never a point to insist that a project must be completed just because lots of money had already been committed to it, but that it is only wise to terminate a project once it is discovered that its expected future costs exceeds the future benefits.

Physical and Price Contingencies

These are exigencies or incidental allowances which are provided for during project implementation to cover adverse changes in physical conditions or prices that would add to the project baseline cost. Thus contingency allowances are an integral part of the project cost estimates. In practice, contingency allowances are basically divided into physical and price contingencies. The latter is further sub-divided into relative change in price and general price changes (Gittinger, 1988). A relative price change is the change in

the price of a commodity relative to the other while a general price change it is assumed that all prices will be affected equally by any rise in the general price level. The physical contingency represent a real cost given that it increases the use of real good and services and does decrease the national income and as such a cost to the society. Physical contingencies are an integral part of the project cost and thus should be included in the project economic analysis. On the other hand, when price contingency covers expected price increases in relative prices of project items, it should be included in the economic analysis. However, any price contingency for domestic and foreign inflation of the general price level should be excluded provided that the differential rates of inflation in supplier country are offset by currency realignments.

Transfer Payments

Transfer payments are costs which should be part of the financial cost stream but do not represent direct claims on the country's resources (that is, not an economic cost) because they are merely a transfer of the control over resources between entities in the society and not a payment for the services received but could come as gift or through legal compulsion. Transfer payments include taxes and subsidies, unemployment benefits, interest payment, depreciation allowance.

For taxes and subsidies, these could come as direct or indirect transfer payments. Direct in the sense that it is linked to the project account but has no effect on the national income. Examples are income taxes, property taxes and subsidies. Indirect means could be through sales tax; value added tax or goods and services tax. From the individual entity point of view, taxes are taken as a cost item while subsidies come in as benefit. On the other hand, taxes come as income to the government while subsidies are cost, but merely represent a transfer of resources within the economy. A complete project profile should however not only be able to identify the amounts involved in taxes and subsidies but the entities that enjoy and those that are at the receiving ends.

Unemployment benefits whether from the point of view of government relief or collected from insurance is to be treated as a transfer from the earning member of the society to the non earning entity, given that during the period of unemployment nothing is added to the market value of the aggregate product. It follows therefore that no part of this opportunity cost should be considered as the opportunity cost of being employed. Interest payment and repayment of principal merely transfer purchasing power from the borrower to the lender. According to Moro (1997) the purchasing power of the interest payment reflects control over resources but its transfer, does not use up real resources and to that extent not an economic cost. Also, the repayment of the principal are financial transfers, even though it should borne in mind that the investment or other expenditures the loan finances involves real economic cost. The financial cost of the loan could be point of loan repayment while economic cost is incurred

when the loan is spent. Do note that interest payment and repayment of principal are critical financial costs which entail cash outlay but are omitted from the financial and economic analyses of projects, given the focus on the assessment of the quality of the project independent of its financial mode. Secondly, debt service is also excluded from economic analysis since debt transfer does not entail a use of resources but only a transfer of resources between entities. Interest payment during construction is also a cost item observable during project implementation. Empirically however this interest is added to the principal sum during construction such that interest payments are ignored until the project begins to yield; otherwise known as capitalization. Interest during construction is a transfer payment and is thus omitted from the economic analysis. Depreciation allowance is another cost item that does not correspond to actual use of resources and thus be excluded from the economic analysis. Thus, the economic cost of using an asset is reflected in the initial investment cost less its discounted terminal value. To the economy as whole, transfer payments are neither costs nor benefits but a way of distributing the output of the economy from one entity of the society to the other. Other classification of costs which needed to be taken cognizance of included direct or primary costs such as costs expended on enterprises supported by the project and infrastructures among others; indirect or secondary costs which relates to the value of goods and services meant to render indirect benefits of the project such as provision of clinic, schools, community centers not forgetting costs on intermediate products from which final products are expected. Costs could also be in real or nominal terms as it relates costs which draw opportunity cost and in the case of the former which does not. Cost streams could also come as external which could be in monetary form which has to do with loss of profit to competitors and non-monetary cost such as those from environmental effect like pollution.

7.2 Benefits of Agricultural Projects

Unlike cost, benefit enhances the objectives of the project. It forms a complement to the income accruing to a project. The benefits of agricultural projects come either in tangible or intangible forms. Tangible in the sense of forms physically observable and can be measured in terms of money, either in quality terms or quality improvement and intangible in the realm of non physical attributes. The valuation of tangible benefits could however pose some difficulties given that they are not always obvious and valuing them may be quite complicated. Some of these benefits can come in form of increased production which may manifest in terms of improvement in crop output as a result of acreage expansion or productivity improvement. Production increases can also come from livestock production increase in form of weight gains under ram fattening for instance, milk production increases from dairy animals or the prolific nature of the farm animal. These generally constitute benefit items

should be promptly taken cognizance under the project financial and economic analysis. Production increases could also include value of output consumed at home by the farming households or even values of output used to pay labourers employed on the farm. These should be aptly taken cognizance of in ascertaining the benefits arising from the project during project analysis with a view to avoiding underestimation of benefits. Benefits from projects can also come from quality improvement with respect to quality of milk for instance or the meat. The on-going National Programme for Food Security in Nigeria implemented ram fattening modules and dairy production for product quality improvement aside the output objective. Benefits could also be attributed to temporal and spatial advantages, especial with regards to provision of storage facilities which has the benefits of helping farmers keep products till peak seasons of the year when prices are favourable. The spatial benefits could also come in terms of making goods available in locations where prices would be high. The Community Based Agricultural and Rural Development Programme and National Fadama Development Programme implemented in Nigeria supported the provision of access and rural roads which greatly impacted not only brought about transport cost decreases but also higher sales price to the benefit of the participating farmers. Other manifestation of benefits could be in form of changes in product form, cost reduction arising from mechanization, losses avoided, time savings, accident reduction or development activities in areas newly accessible to the market. In a related perspective, benefits have also been classified as either real or nominal benefits. Real in the sense that if the supposed source of benefit has alternate benefits; such as the case of an irrigation dam which was constructed primarily to provide irrigation water but which also productivity increases and other external economies. On the other hand, the development of a land for agricultural productivity benefits for farmers but on which levies are simultaneously being collected can be termed to be nominal. Direct benefits on the other hand relates to values of immediate products and services for which direct costs are incurred. These include benefits of increased production from crop or livestock enterprises, aquaculture production modules, amongst others. Benefits could also come in indirect form, especially under extension project, where new innovation could be enjoyed by non-targeted farmers from the targeted farmers.

7.3 Intangible Costs and Benefits

According to Gittinger (1988), the cost of intangible benefits arising from an agricultural project, are tangible enough: construction costs for schools, salaries for nurses in a public health system, pipes for rural water supplies, and the like. The source further hinted that Intangible costs exist in projects. Such costs have been known to be incurred for instance if new projects disrupt traditional patterns of family life, if development leads to increased pollution, if the ecological balance is upset, or if scenic values are lost. Again, although

valuation is impossible, intangible costs should be carefully identified and if possible quantified. In the end, every project decision will have to take intangible factors into account through a subjective evaluation because intangible costs can be significant and because intangible benefits can make an important contribution to many of the objectives of rural development. Generally it must be noted that intangible benefits and costs are real and reflect real values. They are however difficult to value. In some cases, because intangible benefits are a factor in project selection, it is important they are carefully identified and where possible quantified, even though valuation is impossible.

7.4 Macro Planning and Projects

Macro planning is generally borne out of the need to achieve country's development objectives of food security, poverty alleviation, economic growth, reduced malnutrition, reduced maternal mortality, regional integration amongst others. Macro planning therefore stems from the setting of macroeconomic policies and strategies in consultation with key stakeholders within the economy. It focuses on development of policies which are being supported by plans, data collection, analysis, forecasts and research in macroeconomic indicators and accounts within the various sectors, agriculture inclusive. Thus, sustained national development requires effective planning within the macro planning framework. This will only be possible with successful and effective implementation of projects and programmes. Expectedly, it is only through sound project appraisal that relevant information can be generated to reinforce macro planning. In most countries, there is a Central or National Planning Commission which works closely with the ministries or sectoral planning departments to coordinate macro planning activities within the country. Donors like World Bank, Food and Agriculture Organization of the United Nations, International Fund for Agricultural Development, African Development Bank and Islamic Development Bank also have their Country Strategic Papers which aligns with countries' strategic planning priorities, especially with regards to areas of intervention and priority projects and programmes. It must be noted here that for most developing economies, planning have most times being robust, but implementation has always been the problem. The planning process consists of directly managed activities involving interaction with financial institutions and other private economic agents. Effective project planning demands that there is a good feasibility study, proper technical and economic underpinnings, collection of basic information and sufficient project monitoring and evaluation. Development stems from macro-planning and generally, most development runs through a cycle which passes through five planning process of (i) project identification; (ii) project preparation and formulation; (iii) Approval; (iv) implementation and Project monitoring and evaluation. These stages are interconnected and a stage has to be completed before the other.

Projects unlike programmes are limited in time and are staff-intensive. They usually involve a significant investment component which is part of the planning process. But while projects utilize the government capital budget programmes make use of the current account budget. Both programmes and projects are usually fall out of macro planning.

Exercises for Chapter Seven

1. What is meant by the term macro planning? Discuss the relationship between macro planning and project cycle.
2. Explain the differences between benefits and costs of agricultural projects and programmes.
3. Discuss the various costs under the agricultural projects and their treatments in agricultural project analysis.
4. Identify and explain the benefits accruable to the agricultural projects and programmes and their treatments in project analysis.
5. Discuss what is meant by transfer payments and their treatments in agricultural project analysis.
6. Identify and explain the various intangible cost incurred and benefits accruing to agricultural development project and their treatment in project analysis.

CHAPTER EIGHT

8.0 AGRICULTURAL FINANCE AND FINANCIAL NEEDS OF FARM BUSINESS

8.1 Agricultural Finance and Credit

Agricultural finance can be defined as the economic study of the acquisition and use of capital at national or at farm level. At the national and state levels, agricultural finance is concerned with agriculture's contribution to, and share of the national or state resources as well as the roles banks and other financial institutions play in the financing of agriculture as a sector of the economy. At the farm level agricultural finance refers to the financial management of the farm. It is the study of the acquisition and use of capital on the farm in keeping with the goals of the farm which are profit maximization or satisfaction. Agricultural credit on the other hand is the process of obtaining control over the use of money, goods and services in the present in exchange for a promise to repay at a future date. This means that a lender forgoes the use of his money or its equivalents in the present by extending credit to a borrower who promises to repay on terms specified in the loan agreement. However, these two words- agricultural finance and agricultural credit are used interchangeably. This is because the study of the acquisition and use of capital naturally leads to the process of obtaining and using the capital.

8.2 Meaning of Micro credit & Microfinance

In agricultural finance, the terms micro credit and microfinance have reportedly been used interchangeably and are assumed to refer to the process of obtaining control over the use of money, goods or services in the present in exchange for a promise to repay at some future date. However in recent times, many authors have tried to distinguish them. Microfinance is the provision of loans, savings opportunities, insurance, money transfers and other financial products targeted to the poor and low income households; while micro credit refers specifically to provision of small loans. The average loans size varies from country to country, but in most cases, the average loan is equivalent to $120-150 in the respective currency. Microcredit is also defined as the extension of small loans to micro entrepreneurs on low income and too poor to qualify for conventional bank loans, which is channel towards income generating enterprises. Most terms and conditions for micro credit loans are flexible and easy to understand and suited to the local conditions of the community. From the above definitions, three (3) features distinguish microfinance from other financial products. These are (i) the smallness of the loans advanced or savings collected, (ii) the absence of asset based collateral and (iii) simplicity of operations.

8.4 The Role of Credit in Agriculture

A vicious cycle of low level output, low level of income, low level of savings and low investments resulting again in low level output is characteristic of most developing economies and is more characteristic of the farming communities of these economies. To break this vicious cycle of poverty of farmers is one of the main aims of governments the world over. Small farmers are poor because they cultivate small areas from which they produce little output and hence sell only a very small amount, which in turn cannot help in expanding the farm or acquiring new technologies and hence the cycle continues. Agricultural credit to small scale farmers can help in breaking this cycle. Credit is also considered as a catalyst that activates other factors of production and makes under-used capacities functional for increased production. Thus, farm credit plays crucial role in agriculture as it enables farmers to reap economics of scale, venture into new field of production, employ new technologies and empower them to provide utilities for a widening market by bridging the capital gap that exists in agricultural production.

Microfinance is important in agriculture because of the seasonal nature of agricultural production, a particularly important feature of which is the fact that earnings do not closely match the timing of expenses, this means that borrowed operating capital is indispensable to the farm sector. Given the fact that small-scale rural producers are seldom able to take advantage of quantity discounts on inputs and that their income is highly subject to the vagaries of the weather, the availability of debt capital does not enable them to meet their physical capital needs in a timely and efficient manner. The difficulties in obtaining enough cash to meet daily living expenses does mean that rural producers are constrained to sell their products immediately after harvest, whether market prices are favourable or not. Improved access to financial services especially credit would not only mitigate these problems but also help raise the productivity and incomes of rural producers, in addition to heightening their ability to quickly respond to unexpected problems or opportunities and to changes in product demand and technological developments.

8.4 Cost of Credits/Interest Rates

Interest is the amount or price paid for the use of money, as is commonly expressed as a percentage. Thus an annual interest rate of 5% means that the borrower must pay an amount of 0.05 of the money borrowed (i.e. of the principal) if he has the use of the money for a year. In a fundamental sense interest charged tries to equate the future value of money with the present. For example a 10% interest rate tells us that ₦1.10k received or paid a year from now is equal to ₦1.00 received or collected today. The lender charges interest because of the alternative opportunities he has for the use of the fund. The lender must be rewarded because he loses control over his fund for the length of the loan agreement and because he faces the risk of loss of part or all of the money loaned if the borrower failed to repay as agreed. Similarly, the lender

will also take into account the possible loss in the purchasing power of the money he borrowed out which may result from inflation.

Elements of Interest

1. **Pure Interest**- Pure interest is the cost forbearance or delaying the use of money. It has been described as the rate charged for a loan where there is no risk of loss through inflation, default and where any administrative cost is negligible. Starting with this "pure" rate of interest as a base, the interest rate actually charged on a given loan is then adjusted upwards to allow for the risk involved, the length of the loan, administrative costs and the imperfection in the credit market.
2. **Risk of Losing Money**- If risks is high, interest rate is high and if risk is less interest rate will be low.
3. **Management and Associated Costs in Making and Serving a Loan-** Management and serving cost per naira loaned typically runs much higher than on large loans. As a result, the interest rate on small loans is higher than on larger loan. On the other hand, initial cost of making the loans are about as high as for short term than for long term loans. Moreover, short term loans with frequent payments involved much more service expense (i.e. accounting expense) and sometimes more management than long term loans with only one or two payments about a year. This is the fundamental and primary reason why interest rates on short term loans usually higher than interest on long term loans.

Demand and supply for agribusiness credit also influences the interest rates to be charged. From the classical economic view a rational farmer borrows only if the productivity of the additional capital justifies the payment of interest on borrowed funds at the existing interest rate. The demand is given as:

$$C_d = f(r,P,R) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 8.1$$

Where,

C_d = the demand for credit

r = rate of interest

P= the general price level

R= rate of returns on borrowed funds

On the supply or lender side, the traditional theory implies that lenders prefer consumption now to consumption in the future. They would therefore, surrender their right to current consumption (lend) only if they expect a positive return from lending.

Calculation of Interest Rates

There are different ways of in which interest may be computed depending on the terms of the loan and the policy of the lender. The method used determines to a large extent the actual rate to be paid. A borrower especially a farmer need to understand the various methods of charging interest on a loan in order to avoid being a perpetual debtor; some of these methods include the following:

(i) Simple Interest (S.I) - it is simply the product of the principal (P), the tine (T) in years and the annual rate of interest (R).

Therefore, S.I = P x I x R

Example 20:

Calculate the simple interest on a loan of ₦100, 000 for one year at 7.5%.

S.I= P x I x R

S.I= 100,000 x 1 x $\frac{7.5}{100}$

100,000 x 0.075 = ₦7, 500, 00

Using the simple interest method only one payment is made at the maturation of the loan. Thus, S.I is made or suitable for only short period of time usually one year or less. When simple interest is computed for a part of a year, the time becomes a fraction of a year for example 6 months = 6/12.

(ii) Compound Interest (C.I):- Compound interest is involved in savings or the use of credit whenever interest is paid more than once during the period involved. It could also be defined as an amount called principal together with interest due on such principal after a given period all reinvested at the same rate. It is calculated by this formula:

$$S= P (1+r)^t$$

Where, S= Compound interest

P= the original principal or the present value

t = number of interest (or conversion) periods involved (the interval between the successive conversion is called the conversion period. The total amount due at the end of conversion period is called the compound amount.

r = interest rate per conversion period

This is used for just one year, assuming that the compounding is to be done twice a year then.

$$S= P (1+\frac{r}{2})^{t \times 2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 8.2$$

For four times a year

$$S = P\left(1+\frac{r}{4}\right)^{t \times 4} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 8.3$$

For several times in a year

$$S = P\left(1+\frac{r}{n}\right)^{nt} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 8.4$$

Example 21 –

Find the value of ₦1000.00 at 5% when the compounding is based on a daily basis.

P= 1000, r= 5%, n = 365

$S = 1000\left(1 + \frac{0.05}{365}\right)^{365}$

$= 1000\ e^{0.05(1)}$

= 1000 x 1.0513

= ₦1050

iii) Discounting or Discount Interest Rate –discounting is the process of determining the present value of future investment (S).

$$S = P(1+r)^t$$

$$P = \frac{S}{(1+r)t} \quad \ldots\ldots\ldots 8.5$$

$= S(1+r)^{-t}$ *(all parameters as previously defined)*

On the other hand, annual rate of interest charged on a given loan could be determined, if:

a) the total charge made on a loan, including the amount for inspection fees and service charges;
b) the amount of money actually available to the borrower after deducting any interest and other fees collected in advance;
c) the length of loan expressed as a fraction of a year are known.

The interest can then be determined by the formula:

$$r = \frac{C}{PT} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 8.6$$

Where r =interest rate

C = all charges

P= amount actually received

T= time (in fraction of 1 year)

Example 22:-

If a lender charges ₦20.00 for every ₦200.00 loan for 4 months with interest deducted in advance (discounted loan), determine the interest rate charged.

P= ₦200.00-20.00, the time is for 4 months $(\frac{4}{12})$

$r = \frac{C}{PT} = \frac{20}{180\ x\ 0.33}$

$= \frac{20}{59.4} = 0.34$

= 0.34 x 100 = 34%

Exercises for Chapter Eight

1. Define the following concept agricultural finance, credit and interest.
2. Find the present value of ₦100, 000 to be paid in 6 years from now when the discount rate is 10% where the discounting is done (i) annually (ii) biannually.
3. Find the total amount due on a loan of ₦10, 000 at 18% simple interest at the end of four months.
4. Differentiate compound interest from discounting rate.

CHAPTER NINE

AGRICULTURAL CREDIT AND CREDIT POLICY

9.1 Sources of Agricultural Credit

Two (2) major sources of credit to farmers can be:-
(1) Traditional or Non-Institutional (Informal) Sources
(2) Institutional, Formal Sources

Informal sources of microfinance are provided by traditional institutions that work together for the mutual benefits of their members. These institutions provide saving and credit services to their client. The informal/traditional microfinance institutions operate under different names in Nigeria, for instance '*esusu*' among the Yorubas, '*etoto*' for the Igbos and '*adashi*' for the Hausas. The key features of these schemes are savings and credit components, informality of operations and higher interest rates are prevalent. The informal associations that operate traditional microfinance in various names and forms are found in all the rural communities in Nigeria, they also operate in the urban centres. Members of this group include individuals, friends, relatives, shopkeepers, moneylenders, landlords, cooperatives and leasing associations.

Formal microfinance suppliers are licensed, supervised and regulated by Central Bank of Nigeria to operate as financial institutions. Their key features include, taking deposits from members of the public and lending the funds to users directly or indirectly singly or in groups. They have complete management structure, specialized manpower and are generally motivated by profit drive. They may be fully owned by public or private institutions or individuals. Members of this group include Nigeria Agricultural Cooperative and Rural Development Bank (NACRDB) (now Bank of Agriculture (BOA)), Microfinance Banks (MFB), commercial banks such as First Bank Plc, Union Bank among others.The source of funds for multipurpose cooperatives is the individual membership monthly contribution, while for the organized microfinance is aid and grants which mainly come from abroad. Major donor organizations are – United Nations Development Programmes (UNDP); Ford Foundation; African Development Foundation (ADF); Community Development Foundation among others. Experiences of other African developing countries like Bangladesh, Malawi, Kenya, Tanzania and Togo in micro financing show similar trends with Nigeria. The successes recorded from these countries are as a result of the adoption of the Grameen Model (moved from micro credit to microfinance, started more individual- based lending).

9.2 An Overview of Agricultural Credit Programs in Nigeria

The main objectives of government agricultural credit policies in Nigeria over the years as reflected in successive national development plans and other official documents are to: (i) facilitate the flow of credit to farmers to enable them to adopt improved farming techniques; (ii) regulate the informal market to avoid exploitation of borrowing farmers; (iii) institutionalize credit in order to protect farmers from such exploitation; (iv) to ensure flow of adequate funds from banks and other financial institutions and (v) assist banks to aggressively support agriculture through measures to cover the risks and moderate the costs involved in such lending.In Nigeria there are both formal and informal sources of agricultural credit. Formal include government credit institution, cooperatives, and commercial banks, which are said to be formal in the sense that their operating procedures and loan terms tend to be standardized and subject to Central Bank Control. On the other hand informal sources include family members and friends who usually lend to farmers more as social obligations rather than for pecuniary benefits. The credit needs of the majority of rural poor are met in large part by informal credit sources, based essentially on personal contact. Informal credit has a low transaction cost and a short transaction time. But there are no standard terms and conditions, and there is great variation in interest rates and maturity periods.

9.3 Agricultural Finance/Credit Policies

The importance of financial and credit in sustainable development is not debatable and has been the strategy of both international agencies and the national governments to ensure the general success of development programmes. In Nigeria, successive governments have continued to hinge their strategies for transforming the economy via financing in forms of credit, grants and subsidies. The main objective of the agricultural credit policies over the years has been to make adequate credit available to the farmers in the rural area at the right time and affordable cost (concessionary low interest rate) for increased farm output. Consequently, efforts have been made to guarantee proper funding and promotion of agribusiness via public polices in Nigeria.

(1). The Agricultural Credit Guarantee Scheme fund of the Central Bank was established in 1977 with the CBN as the managing agent to provide credit guarantee on commercial banks' loans for agricultural purposes with the aim of increasing the level of commercial bank credits to the agricultural sector. The scheme is aimed at stimulation of the total agricultural production for both domestic consumption and export and the encouragement of commercial and other banks to participate in increasing the productive capacity of agriculture via increased capital investment lending. The scheme which was to guarantee 75 percent of any default in bank loans granted to agricultural sector, had it capital based increased from the initial ₦100 million in 1977 to ₦1 billion and ₦ 4 billion in 2001 and 2006 respectively. This was followed by an upward review

of credit limits. For instance the limits for guaranteed non-collateralized loan to individuals increased from ₦5, 000 to ₦20, 000 while collateralize loans in individual rose from ₦ 100,000 in 1997 to ₦1 million in 2001. The limit of loan to operations and corporate bodies were similarly increased to ₦10 million from ₦1 and ₦5 million in 1977 and 1999 respectively. Guarantees issued by the fund for 2003 had been substantively huge and has induced the commercial banks to grant to the agricultural sub-sector a loan of ₦1.164 billion which shows an increase rate of 10.2 percent.

(2). The Nigeria Agricultural Insurance Company was established in 1987 to insure agricultural crops so that farmers would be protected against losses arising from natural or man-made hazards beyond their control. By 1990s, the scope of this insurance outfit was extended to cover livestock and fisheries. The strategies for achieving this objective were streamlined as follows:

(i) Making insurance a pre-requisite for obtaining agricultural loans

(ii) Farmers were to insure their farms to the tune of $2^1/_2$ percent of their loan volume only.

(iii) Establishing and funding agricultural insurance company by the governments.

(iv) Encouraging private sector participation in mobilizing funds for investment in agriculture, that is, the involvement of private insurance companies.

(3). Establishment and strengthening of rural banking institution to provide loans to the agricultural sector. Initially government introduced specialized banks such as Nigeria
Agricultural and Cooperative Bank (NACB), the People's Bank and the Community Banks to ensure availability of credits to all categories of farmers at concessionary interest rate to facilitate growth and development of the agricultural and agro-allied sectors of the national economy. It was evident that the overall effectiveness and financial viability of NACB was constrained by over-dependence on government subvention, its inability to attract deposits and access loans, poor loan recovery performance, high administrative costs and eventual financial distress. The Peoples bank also suffered similar problems that lead to the bank's inability to perform its statutory functions. These problem resulted in the birth of the Nigeria Agricultural, Cooperative and Rural Development Bank (NACRDB) limited as the single largest development finance institution in Nigeria following the successful merger of the former NACB, peoples bank and the Family Economic Advancement Programme (FEAP) in October 2000. The banks broad mandate encompasses saving mobilization and the timely delivery of affordable credit to meet the funding requirements of the teaming Nigeria population in the agricultural and non-agricultural sector of the national economy. Specifically, the mandate of NACRDB includes:

(a) Providing all classes of agricultural loans for crops, livestock, poultry and fisheries production, etc.

(b) Developing the economic base of the low income groups through provision of loans to small scale enterprise.

(c) Encouraging the formation of cooperatives.

(d) Accepting savings from individuals and cooperative societies and to make repayment of such savings together with appropriate interest.

(e) Engendering good banking habits among Nigerian, especially the target group,

(f) Encouraging capacity building through the training of beneficiaries on proper loan utilization, repayment, savings and the formulation of strategies for the profitable marketing of products.

(4). Granting of grace period (moratorium) on agricultural loans. Initially the grace period was 2 years for seasonal crops, poultry and pig enterprises, and 5 years for the crops, cattle breeding and ranching. These grace periods were however reviewed from time to time. For instance, between 1992 and 1993, the grace periods for agricultural loans were as follows:

(a) One year for seasonal crops (grains, food crops or vegetable).

(b) Four years for tree crops e.g. Oil palm, cocoa, rubber etc.

(c) Five years for tree medium and large scale mechanized farm with large capital outlays, seven years for ranching.

(5). Establishment of Micro-finance Banks. In a bid to repositioning the remaining community banks after the increase in their capital base from initial modest sum of ₦250, 000 to ₦5, 000,000 and the reduction in the banks number to 753 nationwide as well as poor management coupled with the rural people's preference for traditional informal thrift and saving organizations (Osusu), the Central Bank of Nigeria (CBN) directed that the licensed community banks be converted to micro-finance banks. This was to make them more effective vehicles for credit and savings mobilization in the rural informal sector. The Micro-finance banks as provided for, in the National Micro-finance Policy Regulatory and Supervisory Framework was launched on 15th December, 2005 with the goal of providing financial services to over 65 percent of the Nigerian economically active population who are not served by the formal financial system. The goals for the establishment of micro-finance banks therefore are to, among others.

(a) Provide diversified, affordable and dependable financial services to the poor in a timely and competitive manner, that would enable them to undertake and develop long-term, sustainable entrepreneurial activities;

(b) Mobilize savings for intermediation;

(c) Create employment opportunities and increase the productivity of the active poor in the country; thereby increasing their individual household income and uplifting their standard of living;

(d) Enhance organized, systematic and focused participation of the poor in the socio-economic development and resource allocation process;

(e) Provide veritable avenues for the administration of microcredit programmes of government and high net worth individuals on a non-recourse basis. In particular, this policy ensures that state governments shall dedicate an amount of not less than 1% of their annual budgets for the on-lending activities of microfinance banks in favour of their residents; and

(f) Render payment services such as salaries, gratuities and pensions for various tiers of government.

Micro-finance banks that are licensed to operate as unit banks are to be community based and have a minimum paid-up capital of ₦20 million for each branch. Those licensed to operate in a state or Federal Capital Territory (FCT) are to have a minimum paid-up capital of N1 billion.

Government intervention in credit starts with policy. Where a government accords agriculture priority rating over other sectors of the economy, this emphasis is reflected in its estimates or budget. Though credit policy, government can direct attention to different agricultural sub-sectors e.g livestock, fisheries, forestry, processing, small-scale, large-scale farming, ranches, root and tree crop agriculture. Any economic policy must have understanding objectives which defines the purpose for adopting such a policy. Five (5) major objectives which guided the formulation of various agricultural credit policies include:

(1) Increased agricultural production

(2) Improved techniques of agricultural production

(3) Adequate provision of credit for production in various subsectors of agriculture.

(4) Increased volume of credit to all categories of producers.

(5) Adequate support to facilities for production

Agricultural credit policy instruments are the means of achieving the objectives of agricultural credit policies. The following credit policy instruments can be identified:-

(1) Increased institutionalization of agricultural credit

(2)Concessionary interest rate policy

(3) Less rigid conditions of borrowing

(4) Improved credit delivery system

(5) Greater reliability in support of agricultural credit

(6) Punitive action against defaulting credit institutions.

9.4 Problems of Institutional (Formal) Credit Sources

(1) Provision of Security for Loans

Providing security for loans has been a major problem for smallholder farmers in Nigeria. The main type of security a farmer can provide for agricultural loan is land. Farmers may not own the land on which they farm or do not have clear title to them. The 1978 land use act which vested ownership of land on the Federal, State or Local Government has further incapacitated the farmer.

(2) Illiteracy among Farmers

The majority of farmers are illiterate who cannot read or write. The illiteracy of farmers tends to have some negative multiplier effects on banks funding of agricultural. Most farmers find it extremely difficult to complete necessary forms for agricultural loans.

(3) Poor Management of Funds

Poor management of funds and other resources by farmers derived partly from illiteracy and partly from diversion of loans funds to non-productive uses. The banks too share the blame for many of the loans are not usually supervised.

(4) Small and Fragmented Holdings

These holdings are not economically viable and cannot be managed efficiently and this present difficulties with respect to funding.

(5) Risk and Uncertainty

Crop failure as a result of poor weather, epidemics, increase in productive costs, sudden price fluctuations, changes of technology. Farmers are reluctant to borrow and invest funds under risky and uncertain conditions.

(6) Loan Delinquency or Default

Factors affecting loan default include: nature and timeliness of loan disbursement, effectiveness of supervision by credit officers, profitability of enterprise on which loan funds were invested, level of education, doption of technology, and time spent on farming business.

(7) Rural Bank Branches.

There is an insufficient number of banks branches in the rural areas, the current level of rural banks branches cannot cope adequately with farmers demands in terms of processing of applications, supervision of loans and recovery of loans when due. The problem is further compounded by inadequacy of relevantly trained manpower.

(8) Inadequate Manpower

The banking staff available for agricultural lending is grossly inadequate in both number and quality. Adequate trained personnel are essential in agricultural credit administration to process application forms, evaluate the farms and feasibility studies, monitor and supervise the use of loans given to farmers. Agricultural credit personnel in the commercial banks must have a

sound knowledge of farming, farm problems, credit principles and how to apply them.

(9) Interest Rate Structure

Other problems of the commercial banks are associated with non-competitive interest rate prescribed for the agricultural sector by the monetary authorities.

(10) High Administrative Costs

High administrative costs of loan to numerous farmers in Nigeria have been a major concern to the commercial banks.

(11) Problems Arising from Government Policies

These policies give rise to ineffective commercial bank lending to the agricultural sector. In 1979, restricting the importation of maize and liberalize the importation of frozen chicken had adverse effects on poultry production and pricing of locally produced chicken respectively. This caused a lot of losses to the local farmers who therefore could not meet their commitments to the banks.

Exercises for Chapter Nine

1. What are the differences between formal and informal credit?
2. Critically assess Nigeria agricultural credit policies.
3. Enumerate the goals of microfinance banks in Nigeria.
4. Identify and proffer possible solutions to problems of Nigeria agricultural credit delivery.
5. In your view, what should be the role of government in rural finance?

CHAPTER TEN

RISK MANAGEMENT IN AGRICULTURAL LENDING AND OTHER AGRICULTURAL POLICIES AND PROGRAMMES

10.1 Risk and Types of Risks

Risk is the situation which exists when the future can be predicted with a specified degree of probability. Therefore with a perfect knowledge of a situation it is possible to say definitely and positively that an event will occur. On the other hand risk can also be defined as the variability or outcomes which are measureable in an empirical or quantitative manner. There are two types of risks- apriori and statistical risks. Apriori probability prevails when sufficient information is known in advance about the probability of an event occurring and can be specified. A good example of this is the tossing of a coin; it is a known fact that both sides (head or tail) have exactly the same chance of turning up. Statistical risk occurs when the probability of future event can be stated on the basis of results of many previous observations. Example is the mortality tables of life insurance companies. Therefore probabilities of occurrence are assigned to a future events based on previous recorded experiences as to what has happened previously under similar circumstances. Consequently, Risk management is an approach that anticipates accidental losses and designs and implements methods for minimizing the occurrence of loss or the financial impact of the losses that do occur.

10.2 Risk Management in Agricultural Lending

Risk management is an approach that anticipates accidental losses and designs and implements methods for minimizing the occurrence of loss or the financial impact of the losses that do occur. Risks in agricultural lending are concerned about those associated with defaults.

Types of Risks in Agricultural Lending

Risks in agricultural lending can be categorized into two namely those related directly to agricultural production and those of default and non-repayment by beneficiaries. Risks closely linked with agricultural production include:

a) Risks associated with crop or livestock failure, which could be physiological (such as poor yield, etc; pathological (i.e. due to diseases and pests) or physical (mechanical and physical damage;
b) Risks associated with natural disasters such as drought, wind, flood, fire etc;
c) Risks associated with the marketing system such as price fluctuations, spoilage in transportation, handling and storage.

Risks of Default and Non-Payment

Loan default simply means the inability of a borrower to repay the borrowed funds in accordance with the loan terms. Loan default could be due to risks inherent in agricultural production or may be due to deliberate intent to defraud or wrong perception of the loan. Other authors have noted that the risk of loan default in Nigeria agriculture can be linked to the following:

(a) Government inconsistent policies towards the agricultural sector;
(b) Natural disasters such as flood, drought, fire, outbreak of diseases and pests;
(c) Poor management of projects;
(d) Poor project evaluation by financial institutions;
(e) Untimely loan disbursement;
(f) Lack of or poor supervision and monitoring of projects;
(g) Diversion of funds to other uses (in many cases, non-productive); and
(h) Dishonesty and fraud by loan beneficiaries.

10.3 Managing risks in Agricultural Lending

The major strategies for dealing with agricultural lending risks are through:

(1) Group Lending

In group lending, a lender may provide funds to a group or a collective entity such as a cooperative or a village bank which then disburses the loan to individual members according to agreed criteria. In such a case, the group is jointly liable for the entire amount of the loan. On the other hand funds may be lent to members individually who are organized in groups in which case the group jointly guarantees all loans or simply furnishes information about individual participants.

Group lending allows risk pooling through joint liability. Joint liability improves loan repayment in two ways; first group members can put pressure on potential defaulters when their own interests are not at stake. Secondly, the risk that the whole group will default diminishes with increased membership, unless all of the members' activities are highly correlated.

(2) Agricultural Insurance

The occurrence of physiological crop failures, plants and animal diseases and pests, natural hazards such as drought and flood could be minimized by agricultural insurance. Agricultural insurance improves the position of the farmers in relation to agricultural credit. It guarantees protection against crop and livestock failure, thus, the insured farmers have greater confidence when applying for loans.

(3) Demanding Appropriate Security

Common securities (collaterals usually demanded of farmers by financial institutions include:

(a) Landed property, such as building;
(b) Insurance policies, especially life

(c) Company stocks and shares; cash deposits especially in savings or fixed (time) accounts;
(d) Debentures on floating assets; and
(e) Personal guarantee by reputable persons.

Appropriate security or collateral is needed before a loan is given to farmers; however most farmers and poor Nigerians are unable to provide easily realizable securities, due to the high rate of poverty among these groups. On the other hand, financial institutions are profit oriented organizations. Therefore, there is the need to de-emphasis the conventional loan securities, rather security arrangement should be in such a manner that does not discourage genuine farmers seeking credit. For prevention of default, farmers should be encouraged to form co-operative associations, in order to enjoy the benefits of group lending. Also using a solidarity group approach with joint liability for borrowing assumed by a group of borrowers can be viable alternative to the more traditional collaterals required by financial institutions.

(4) Effective Loan Supervision and Project Monitoring

Project/loan supervision and monitoring refers to the process of control, usually applied by a lender on a borrower by visiting, overseeing and inspecting the project for which the loan was obtained. Supervision/monitoring involve physical presence at the project sites it includes a pre-loan visits, monitoring and supervision of a project. This reduces or prevents wrong production decisions which could increase risks of loan default. The visits should be done frequently and by well trained professionals. It is also suggested that such visits should be extended to the homes of borrowers in order to know the socio-economic problems of the borrowers. If the borrower is in need of money to take care of some pressing family needs, it might be an indication that if he is given a loan at that particular time, such will be diverted to meet his immediate needs.

10.1.2 Nigeria Incentive Based Risk Sharing for Agricultural Lending (NIRSAL)

NIRSAL is a dynamic, comprehensive strategy introduced under the Agricultural Transformation Agenda (ATA) to redress issues relating to both the agricultural value chains and the agricultural financing value chain. The agriculture value chains and the agricultural financing value chain are inter-dependent (Figure 1) and thus, in moving agricultural financing forward in Nigeria, fixing the financing value chain without addressing the agricultural value chains would be a futile exercise (FMARD, 2012). The strategy entails leveraging of USD 500 billion in agricultural lending from commercial banks into agricultural value chains. NIRSAL is based on five pillars that aim to "de-risk" agricultural lending and lower the cost of lending for banks. The total package as apportioned within its five pillars as follows (Figure 2):

i) Risk-Sharing Facility (USD 300 million). This facility is aimed at correcting banks' perception that agriculture is a high-risk sector. NIRSAL will share banks losses on agricultural loans.

ii) Insurance Facility (USD 30 million). This facility primarily aims at expanding insurance products for agricultural lending from the current coverage to assist in alleviating credit risks and increasing lending across the entire value chain. These will be by expanding the coverage of existing products provided by the Nigerian Agricultural Insurance Corporation (NAIC), piloting and scaling new products, such as weather index insurance, new variants of pest and disease insurance, etc.

iii) Technical Assistance Facility (USD 60 million). NIRSAL will equip banks to lend sustainably to agriculture, as well as equipping producers to borrow and use loans more effectively, with the view to producing more and better quality goods for the market.

iv) Holistic Bank Rating Mechanism (USD 10 million). This mechanism rates banks based on two factors: the effectiveness of their agricultural lending and its social impact.

v) Bank Incentives Mechanism (USD 100 million). This mechanism complements NIRSAL's first three pillars and offers banks additional incentives to build their long-term capabilities to lend to agriculture**.**

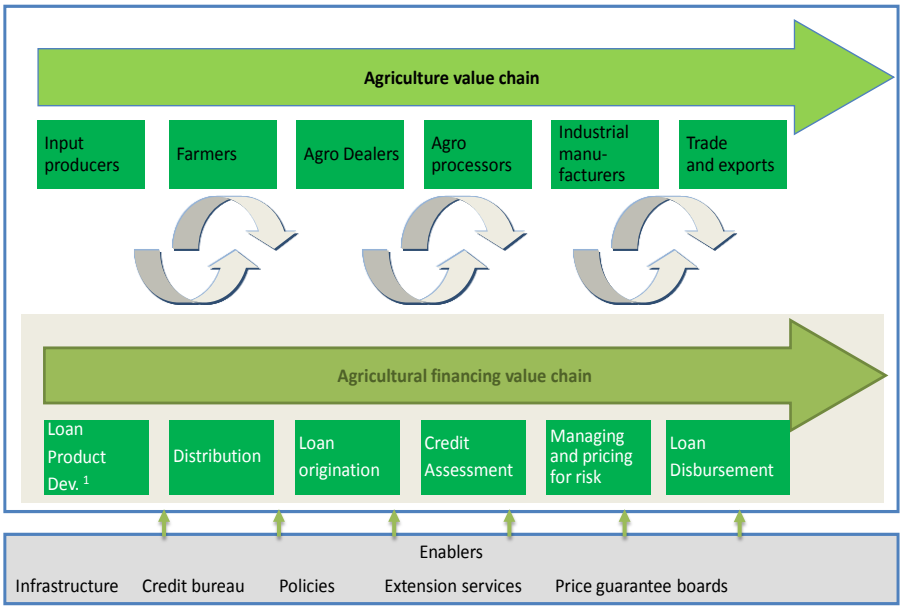


Figure 1: NIRSAL integrates an end-to-end agriculture value chains with agricultural financing value chains

5

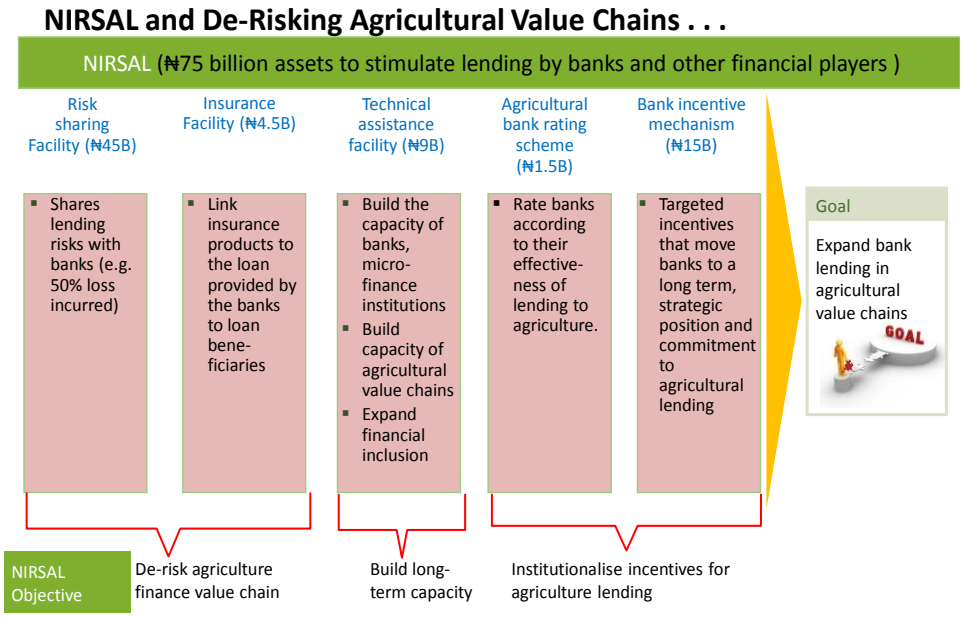


Figure 2: NIRSAL and De-risking Agricultural Value Chains
Source: Federal Ministry of Agriculture and Rural Development (2012)

10.4 Interest Rate Policy

Prior to Structural Adjustment Programme (SAP), interest rate was directly administered by the central bank on commercial banks. But from 1987, Nigeria took the path of deregulation of interest rate which led to an immediate rise in all interest rates up to 1991. In 1991, the government prescribed a maximum margin between each bank average cost of funds and its maximum lending rate at 14.50% and 20.01%. The maximum discount rate for all banks in the country was raised from 11% to 15%, while the liquidity ratio was raised from 15% to 30% for commercial banks. The lending rate has hovered from 10.5% to 20% between 1986 and 2004.

10.5 Lenders Policy

Lenders are businessmen selling the use of funds, the lender in estimating a potential borrower credit worthiness usually assess the risk involve in the three (3c's) of credit:- Competence, Collateral, Character. (i) Competence shows how profitable is the business, the repayment capacity of the borrower, how stable is the business, how flexible or liquid are the practices of the business, what does balance-sheet says?, Can we look at farm-records, and audited financial statement. How good is the proposal or how feasible is the proposal? (ii) Collateral: - The less the collateral, the lower the credit rating and the higher the cost of rating. This means giving mortgage of your property, or having stock of goods on your property or retaining ownership on your

livestock and machines. (iii) Character: - If character is good, risk is low, if character is only fair or it's doubtful, risk is high even if competence is good. If both character and competence are good, risk is low. Competence and collateral whether considered together or a part are not sufficient element which to estimate risk.

10.6 Borrowers Policy

There are some principles (a) you must have a plan and a budget which must be quite adequate, accurate and conservative (b) you must look at all possible sources of funds, every agreement on the funds must be in written document. (c) Automatic repayment net worth should be considered. (d) Short term funds should be used to buy liquid and current assets for easy repayment, while long term funds can be used to buy fixed and semi-fixed assets which are not easily transferable. There are factors that borrowers should consider in borrowing (3R's) :- (a) Returns:- Managers should ensure that returns exceed cost of investment, so that the loan can show a profit. Future returns should show future cost, which can be discounted to present terms. The quickest returns is usually gained from short term production credit for seasonal inputs like seeds, fertilizer, chemicals, feeds etc. (b) Repayment Capacity: The issue is whether the cash flow on investment will be such that agreed loan or repayment terms can be met. An investment may yield a profitable long term returns, but the borrower may not be able to pay when due, because at that point in time he does not have cash. (c) Risk Bearing Ability:- A borrower must have a good plan, the borrower consider its risk bearing ability, its level of reserve, its position in business, equity ratio.

Exercises for Chapter Ten

1. Write short note on Risk.
2. Enumerate types of risks in agricultural lending
3. Loan default is major risk in lending especially to farmers and small scale entrepreneurs, how do you think this could be reduced to the barest minimum.
4. As a credit officer in a microfinance bank covering twenty cooperatives, what criteria will you consider before recommending or otherwise granting/reject their loan applications?
5. What is meant by the term loan security? Why do lenders consider it desirable to require security for loans?

CHAPTER ELEVEN

FINANCIAL MANAGEMENT

11.1 Definitions and Goals of Financial Management

Definition 1

Financial Management means planning, organizing, directing and controlling the financial activities such as procurement and utilization of funds of the enterprise. It means applying general management principles to financial resources of the enterprise.

Definition 2

Financial Management is the scientific manipulation and exploitation of our business and financial environment, using a range of statistical, mathematical, and economic tools, with the aim of making the best economic decision, under prevailing circumstances and availability of information and scarce resources.

Definition 3

Financial Management simply put is an intelligent quest for optimal use of financial and economic resources at our disposal. Tax matters are also considered.

Definition 4

Financial Management entails planning for the future for a person or a business enterprise to ensure a positive cash flow. It includes the administration and maintenance of financial assets. Financial management covers the process of identifying and managing risk.

Goals and Objectives of Financial Management

(a) The goal of financial management is to maximize the current value per share of existing stock.

(b) The primary financial goal is shareholder wealth maximization, which translates to maximizing stock price.

The financial management is generally concerned with procurement, allocation and control of financial resources of a concern. The objectives can be to:-

(a) Ensure Regular and Adequate Supply of Funds to the Concern.

(b) Ensure Adequate Returns to the Shareholder which will depend upon the earning capacity, market price of the share, expectations of the shareholders.

(c) Ensure Optimum Funds Utilization. Once the funds are procured, they should be utilized in maximum possible way at least cost.

(d) **Ensure Safety on Investment** i.e. funds should be invested in safe ventures so that adequate rate of return can be achieved.
(e) **Plan a Sound Capital Structure**. There should be sound and fair composition of capital so that a balance is maintained between debt and equity capital.

Scope of Financial Management

(1) Investment Decisions:- Which focuses on the decisions made by both individual and institutional investors as they choose securities for their investment portfolios. Investment decisions includes investment in fixed assets called as Capital budgeting. Investment in current assets is also a part of investment decisions called as working capital decisions.

(2) Financial Decisions: They relate to the raising of finance from various resources which will depend upon decision on type of source, period of financing, cost of financing and the returns thereby.

(3) Money and Capital Markets : which deals with securities markets and financial institutions. Dividend decision – The finance manager has to take decision with regard to the net profit distribution. Net profits are generally divided into two:-

(a) Dividend for Shareholders – Dividend and the rate of it has to be decided.

(b) Retained Profits:- Amount of retained profits has to be finalized which will depend upon expansion and diversification plans of the enterprise.

Financial management cut across wide range of sectors today in fact, all sectors. Government agencies for instance make use of cost-benefit analysis to determine the economic wisdom in certain projects. Financial management has so advanced that many behavioural factors now play significant role in certain aspect of financial management, the legal practitioners rely on time value of money to same claims that involve financial compensation. The significance and particular position of investment appraisal may be still better appreciated by an examination of the broad functions of financial management. Five (5) principal areas of financial management responsibility include:-

(a) Converting a business plan into a financial plan.
(b) Appraising the viability and suitability of the financial plan in the light of firm's objectives
(c) The choice of financing with respect to the plan.
(d) Controlling the plan's implementation
(e) Presenting the result and outcome of the plan to interested parties such as the Board of Governors and Shareholders.

Investment appraisal intercedes between the stage where a business plan is translated into its equivalent financial plan and the decision to finance its implementation.

11.2 Financial Management Decisions

(a) Capital Budgeting or Investment Appraisal

The process of planning and managing of firm's long term investment is capital budgeting. It is the planning process used to determine whether a firm's long term investments such as new machinery, replacement machinery, new plants, new products, and research development projects are worth pursuing. It is budget for major capital, or investment, expenditures.

Capital Budgeting Techniques

(1) **Net Present Value (NPV)** – Each potential project's value is estimated using a discounted cash flow (DCF) valuation, to find its net present value (NPV).

(2) **Profitability Index (PI)** – identifies the relationship of investment to payoff of proposed projects.

(3) **Internal Rate of Return (IRR)** – define as the discount rate that gives a net present value of zero. It is a commonly used measure of investment efficiency.

(4) **Equivalent Annuity** – expresses the NPV (net present value) as an annualized cash flow by dividing it by the present value of the annuity factor. It is often used when assessing only the cost of specific projects that have the same cash inflows.

Project Ranking

The real value of capital budgeting is to rank projects. Most organizations have many projects that could potentially be financially rewarding. Once it has been determined that a particular project has exceeded its hurdle, then it should be ranked against peer projects. The highest ranking projects should be implemented until the budgeted capital has been expended.

(b) Capital Structure

The mixture of debt and equity maintained by the firm. Capital structure refers to the way a company finances its asset through some combination of equity, debt, or hybrid securities. A firm's capital structure is then the composition or structure of its liabilities. Assume a perfect capital market, no transaction or bankruptcy costs, perfect information, firms and individuals can borrow at the same interest rate; no taxes and investment decisions are not affected by financing decisions. If capital structure is irrelevant in a perfect market, then imperfections which exist in the real world must be the cause of its relevance.

(c) Working Capital Management

A firms short terms asset and liabilities. Working Capital Decisions is decision involving managing the relationship between a firm's short term asset and its short-term liabilities. The goal of working capital management is to ensure that the firm is able to continue its operations and that it has sufficient cash flow to satisfy both maturing short-term debt and upcoming operational expenses.

(a) Cash Management: Identify the cash balance which allows for the business to meet day to day expenses, but reduces cash holding costs.

(b) Inventory Management: Identify the level of inventory which allows for uninterrupted production but reduces the investment in raw materials and minimizes re-ordering costs and hence increase cash flow.

(c) Debtors Management: - Identify the appropriate credit-policy i.e. credit terms which will attract customers, such that any impact on cash flows and the cash conversion cycle will be offset by increased revenue and hence return on capital or vice-versa.

(d) Short Term Financing: - Identify the appropriate source of financing, given the cash conversion cycle, the inventory is ideally financed by credit granted by the supplier, however, it may be necessary to utilize a bank loan or overdraft, or to convert debtors to cash through factoring.

11.3 Functions of Financial Management

(1) Estimation of Capital Requirements

A finance manager has to make estimation with regards to capital requirement of the company. This will depend upon expected cost and profits and future programmes and polices of a concern. Estimations have to be made in an adequate manner which increases earning capacity of enterprise.

(2) Determination of Capital Composition

Once the estimation have been made, the capital structure have to be decided. This involves short-term and long-term debt equity analysis. This will depend upon the proportion of equity capital a company is possessing and additional funds which have to be raised from outside parties.

(3) Choice of Sources of Funds

For additional funds to be procured, a company has many choices like; (a) issue of shares and debentures, (b) loans to be taken from banks and financial institutions, (c) public deposits to be drawn like in form of bonds. Choice of factor will depend on relative merits and demerits of each source and period of financing.

(4) Investment of Funds: The finance manager has to decide to allocate funds into profitable ventures so that there is safety on investment and regular returns is possible.

(5) Disposal of Surplus

The net profits decision has to be made by the finance manager. This can be done in two ways: - (a) Dividend declaration it includes identifying the rate of dividend and other benefits like bonus, (b) Retained profits – the volume has to be decided which will depend upon expansion, innovational, diversification plans of the company.

(6) Management of Cash

Finance manager has to make decisions with regard to cash management. Cash is required for many purposes like payment of wages and salaries, payment of electricity and water bills, payment to creditors, meeting current liabilities, maintenance of enough stock, purchase of raw materials.

11.4 Importance/Significance of Financial Management

(a) Economic Growth and Development: Through investing decision, financing decision, dividend decision, and risk management decision, better and more economically viable projects are undertaken by companies. The resultant effect on the economy is economic growth and development. Financial managements serve as a good guide to online investing.

(b) Improved Standard of Living: Growth and development in the economy that is brought about by financial management will ultimately translate into improved standard of living for all.

(c) Improved Health: Again, good economic condition and improved standard of living, culminates into improved health as a lot of financial stress related sicknesses will be completely eliminated or reasonably reduced.

(d) Allows for Better Financial Decision and Creates Job:- Those that teach financial management and the jobs that are created as a result of flourishing economy. Better financial decisions will lead to profitability, and profitability will eventually lead to expansion which in turn will mean more jobs.

(e) Alleviation of Poverty, Preserve our Environment and Promotes Efficiency:- Good financial management does not give room for wastes and inefficiencies that characterizes poor financial management and decision making.

11.5 Business Risk and Financial Risk

Risk is the threat that an event or action will adversely affect an entity's ability to achieve its objectives and or execute its strategies successfully. Types

of risk include: strategic risks, operating risks, financial risks, informational risks, physical risks, business risks.

Definition of Business Risk
Definition 1

The probability of loss inherent in an organization's operations and environment (such as competition and adverse economic conditions) that may impair its ability to provide returns on investment. Business risk plus the financial risk arising from use of debt (borrowed capital and/or trade credit) equal total corporate risk.

Definition 2

The possibility that a company will have lower than anticipated profits, or that it will experience a loss rather than a profit. Business risk is influenced by numerous factors, including sales volume, per-unit price, input cost, competition, overall economic climate and government regulations. A company with higher business risk should choose a capital structure that has a lower debt ratio to ensure that it can meet its financial obligations at all times. Investors in a company are exposed not only to business risk, but also to financial risk, liquidity risk, systematic risk, and exchange – rate risk.

Definition 3

Business risk usually involves all of the risks attributed to the business's strategic decisions, with the exception of the company's financial decisions. Such risk could include the decision to introduce a new product or service into the market or a potential partnership with another company. In estimations of business risk, internal efficiency and production quotas are commonly measured to determine whether or not a key business decision is worth the risk. There are several factors that can affect the business risk level of a company. The fluctuations in demand for a certain product or service can certainly affect business risk as this will have a direct impact on a company's profits. In addition, every time a competing company introduces a similar product to the market, it has the potential to drive down costs and sales, both of which can affect a company's earnings. Changes in business risk can also be attributed to external factors like government actions and changes in consumer preferences as well as internal factors like the company's ratio of fixed to variable expenditure.

Definition 4

A business risk is a circumstance or factor that may have a negative impact on the operation or profitability of a given company. It can be the result of internal conditions or some external factors that may be evident in the wider business community. When it comes to outside factors that can create an

element of risk, one of the most predominant is that of a change in demand for the goods and services produced by the company. If the change is a positive one, and the demand for the offerings of the company increase, the amount of risk is decreased a great deal. When consumer demand for the offerings decrease, however, either due to loss of business to competitors or a change in general economic conditions, the amount of risk involved to investors will increase significantly. When a company's risk factor is considered to be increased due to outside factors that are beyond the control of the company to correct, chances of attracting new investor are severely limited.

Internal factors may also result in the development of significant risk for the investor. Often, these are factors that can be identified and corrected. If flagging sales can be attributed to an ineffectual marketing effort or a sales force that is not performing up to expectations, making changes in the marketing approach or restructuring the sales effort will often result in minimizing the perception of risk on the part of potential investors. The same is true if a company's manufacturing facilities are to operating at optimum efficiency. Revamping the operational structure of the plants and facilities will decrease the element of business risk and result in higher profits at the same level of production and sales, which will in turn make the company more attractive to potential investors.

In general, any investors will consider the relationship of a company's securities and the business risk associated with the company before choosing to invest in the future of the corporation. While there is an element of risk associated with any corporate operation, proper management will result in creating a balance between assets and securities that will be attractive to individuals and entities that consider investing funds into the operation.

Business risk is the variation in net earnings arising out of the major or kind of enterprises which the firms is engaged in. These are variations brought about by diseases, weather, policy, unforeseen circumstances, and government. Every business organization contains various risk elements while doing the business. Business risks implies uncertainty in profits or danger of loss and the events that could pose a risk due to some unforeseen events in future, which causes business to fail. For example, an owner of a business may face different risks like in production, risks due to irregular supply of raw materials, machinery breakdown, labour unrest, etc. In marketing, risks may arise due to different market price fluctuations, changing trends and fashions, error in sales forecasting, etc. In addition, there may be loss of assets of the firm due to fire, flood, earthquakes, riots or war and political unrest which may cause unwanted interruptions in the business operations. Thus, business risks may take place in different forms depending upon the nature and size of the business.

Business risks can be classified by the influence by two (2) major risks: internal risks (risks arising from the events taking place within the organization) and external risks (risks arising from the events taking place outside the

organization). Internal risks such as factors (endogenous variables which can be controlled) such as human factors, technological factors (emerging technologies), physical factors (failure of machines), fire or theft, operational factors (access to credit, cost cutting, advertisement). External risks arise from factors (exogenous variables, which cannot be controlled) such as economic factors (market risks, pricing pressure), natural factors (floods, earthquakes). Political factors (compliance and regulations of government).

Definition of Financial Risk

Definition 1

Financial risks are the risks associated with the financial structure and transactions of the industry.

Definition 2

Financial risk is an umbrella term for multiple types of risk associated with financing including financial transactions that include loans in risk of default.

A company's financial risk is predominantly targeted at its shareholders and those who own or buy the company's stock as this type of risk is based on how a company's finances are structured, and traditionally focuses on corporate debt. Companies that rely heavily on business financing are often considered risky. One of the most common things that can affect a company's financial risk is the quality of the financial system within its country of operation. If a company is based in a country that has a poorly financial system or devalued currency. Its financial risk will usually be relative high as the company's holding could easily be eliminated. Financial leverage is a company's debt to equity ratio. The more a company relies on debt to finance the business, the higher the financial leverage is and therefore, the company is a higher financial risk.

Types of Financial Risks

(1) Credit Risk

Credit risk, also called default risk, is the risk associated with a borrower going into default, not making payment as promised.

Investor looses include lost principal and interest, decreased cash flow and increased collection costs. An investor can also assume credit risk through direct or indirect use of leverage.

(2) Foreign Investment Risk

Risk of rapid and extreme changes in value due to smaller markets, differing accounting, reporting or auditing standards, nationalization, expropriation or confiscatory taxation, economic conflict, political or diplomatic changes.

Valuation, liquidity and regulatory issues may also add to foreign investment risk.

(3) Liquidity Risk

This is the risk that a given security or asset cannot be traded quickly enough in the market to prevent a loss or make the required profit. There are two (2) types of liquidity risk:-

(a) Asset Liquidity: An asset cannot be sold due to lack of liquidity in the market, essentially a sub-set of market risk.

(b) Funding Liquidity: Risk that liabilities cannot be met when they fall due, can only be met at an uneconomic price.

(4) Market Risk

This is the risk that the value of an investment portfolio or a trading portfolio, will decrease due to the change in market risk factors. The four (4) standard market risk factors are stock prices, interest rates, foreign exchange rates, and commodity prices (Equity Risk, Interest Rate Risk, Currency Risk, Commodity Risk).

(5) Operational Risk

These are the risks associated with the operational and administrative procedures of the particular industry.

11.6 The Income Statement and Its Analysis

The income statement is a summary of revenue and expenses for a given accounting period. It is sometimes called an operating statement or a profit-and-loss statement. Its purpose is to measure the difference between revenue and expenses. A positive difference indicates a profit, or a positive net farm income and a negative value indicates a loss, or a negative net farm income, for the accounting period. Therefore, an income statement answer the question:- Did the farm or business have a profit or loss during the last accounting period, and how large was it?

An income statement should include all business revenue earned during the accounting period but no other revenue. The problem is one of determining when revenue should be recognized, that is, in what accounting period it was earned. This problem is further compounded because revenue can either be cash or non-cash.

When revenue is received in the form of cash for a commodity produced and sold within the same accounting period, recognition is easy and straightforward. However, revenue should also be recognized grain and market livestock fit this classification and changes in these inventories (ending value minus beginning value) are included on an accrual income statement. Accounts receivable represent earned revenue, which should be recognized, but it is revenue for which a cash payment has not yet been received. Any change in their value from the beginning to the end of the year must be included as

revenue. These two items represent sources of revenue that may be recognized in one accounting period even though cash will not be received until a later accounting period. When an inventory or account receivable is recognized as revenue, it is non cash revenue at that time, but something for which a cash payment typically will be received at a later date. However, payment may sometimes be received in the form of goods or services instead of cash. The non-cash payment should be treated in the same manner as a cash payment. The value of feed or livestock received in payment for custom work should be included in revenue, because a commodity was received in lieu of cash.

Table 2:- Condensed Income Statement Format

	₦
Total Revenue	
Less Total Expenses	
Equals Net Farm Income from Operations	
Plus or Minus Gain/Loss on Sale of Capital Assets	
Equals Net Farm Income	

The gain or loss on the sale of a capital asset is an entry that often shows up in the revenue section of an income statement. It is the difference between the sale price and cost of a capital asset such as land. For depreciable assets such as machinery orchards, and purchased breeding livestock, it is the difference between the selling price and the asset's book value. Gain or loss is recognized only when an asset is actually sold. Before then, the market value or selling price is subject to considerable uncertainty.

Expenses incurred in producing that revenue may be either cash or non-cash expenses. Cash expenses include purchases of a payment for feed, fertilizer, seed, market livestock and fuel. Non cash expenses would include depreciation, accounts payable, accrued interest, and other accrued expenses. There is also an adjustment for prepaid expenses. Depreciation is a non-cash expense that reflects decreases in the value of assets used to produce the revenue. Account payable, accrued interest and other accrued expenses such as property taxes are expenses incurred during the past accounting period but not yet paid. To properly match expenses with the revenue they helped produce, these expenses must be included on this year's income statement. They must also be subtracted from next year's income statement, when the cash will be expended for their payment. The difference in timing between the year in which the expenses was incurred and the one in which it will be paid creates the need for these entries.

Accounts payable and accrued expenses are paid for in an accounting period later than the one in which the products or services were used. This is

opposite form prepaid expenses, goods and services paid for in one year but not used to produce revenue until pesticides and feed purchased and paid for in December to take advantage of price discounts, income tax deductions or to assure availability. However, because they will not be used until the next calendar year, the expense should be deferred until then to properly match expenses with the revenue produced by this expense. The timing of paying the expense and using the product is just opposite of an account payable, so the accounting procedure is opposite. Prepaid expenses should be subtracted from this year's expenses as they did not produce any revenue this year. They should then be included with next year's expenses, ensuring that the business records properly match expenses with their associated revenue in the same period.

Profitability is a measure of the efficiency of the business in using its resources to produce profit or net farm income. Six (6) measures of profitability include:-

(1) Net Farm Income

Net farm income is the amount by which revenue exceeds expenses, plus any gain or loss on the sale of capital assets.

(2) Rate of Return on Assets (ROA)

$$\text{Rate of Return on Assets (\%)} = \frac{Return\ to\ Assets\ (₦)}{Average\ Assets\ (₦)} \times 100$$

Expressing return on assets as a percentage allow an easy comparison with the same values from other farms, over time for the same farm and with return from other investments. Return on assets is an average return and not a marginal return. It should not be used when making decisions about investing in additional assets where the marginal return is the important value.

(3) Rate of Return on Equity (ROE)

$$\text{Rate of Return on Equity (\%)} = \frac{Return\ to\ Equity\ (₦)}{Average\ Equity\ (₦)} \times 100$$

The ROE can be either greater or less than the return on assets, depending on the ROA's relation to the average interest rate on borrowed capital.

If ROA > i, then ROE > ROA

If ROA < i, then ROE < ROA

Where,

i = interest rate on debt

(4) Operating Profit Margin Ratio

$$\text{Operating Profit Margin Ratio} = \frac{Operating\ Profit}{Total\ Revenue} \times 100$$

Farms with a low operating profit margin ratio should concentrate on improving this ratio before expanding production. It does little good to increase total revenue if there is little or no profit per dollar of revenue.

(5) Return to Labour and Management

Net farm income was described as the amount available to provide a return to unpaid labour, management and equity capital. Return to labour and management is a dollar amount that represents the part of net farm income from operations that remains to pay for operator labour and management after all capital (total asset value) is paid a return equal to its opportunity cost.

Adjusted Net Farm Income from Operations
Less opportunity cost of all capital
Equals Return to Labour and Management

(6) Return to Labour

Return to Labour and Management
Less Opportunity Cost of Management
Equals Return to Labour

Return to labour and management, with the opportunity cost of capital already deducted, the only step remaining to find return to labour is to subtract the opportunity cost of management.

(7) Return to Management

It measures how well the manager organized the other resources to generate a profit.

Return t o Labour and Management
Less Opportunity Cost of Labour
Equals Return to Management

A negative return means only that net farm income was not sufficient to provide a return to capital, labour and management equal to or higher than their opportunity costs. The net farm income may have been a substantial amount, particularly on a large farm or ranch. It just should have been better to provide labour, management, and capital a return equal to their individual opportunity costs.

Note:- *Accrual concept of net profit is said to be the difference between revenue and expenses rather than cash receipt and expenses known as accrual concept.*

11.7 The Balance Sheet and its Analysis

A Balance sheet is a systematic organization of everything owned and owed by a business or individual at a given time. Anything of value owned by a business or individual is called an asset, and any debt or other financial obligation owed to someone else is referred to as a liability. Therefore, a

balance sheet is a list of assets and liabilities that concludes with an estimate of net worth or owner equity.

A balance sheet summarizes the financial condition of the business at a point in time, while an income statement summarizes those financial transactions that affected revenue and expenses over a period of time. A balance sheet can be completed any time during an accounting period.

Table 3: General Format of a Balance Sheet

Assets	**₦**	**Liabilities**	**₦**
Current Assets		Current Liabilities	
Non Current Assets		Non Current Liabilities	
		Total Liabilities	
		Owner Equity	
Total Assets		Total Liabilities and Owner Equity	

Assets

Assets can be sold to generate cash, or it can be used to produce other goods that in turn can be sold for cash at some future time. Goods that have already been produced, such as grain and feeder livestock, can be sold quickly and easily without disrupting future production activities. They are called liquid assets.

Marketable securities, stocks, bond etc and the cash value of life insurance are also easy to convert to cash and are considered liquid assets. Assets such as machinery, breeding livestock, and land are owned primarily to produce agricultural commodities that can then be sold to produce cash income. Selling income producing assets to generate cash would affect the firm's ability to produce future income, so they are less liquid or illiquid. These assets are also more difficult to sell quickly and easily at their full market value.

Current Assets

Current assets are the more liquid assets, which will either be used up or sold within the next year as part of normal business activities. Cash on hand and checking and savings account balances are current assets and are the most liquid of all assets. Other current assets include readily marketable stocks and bonds, accounts and notes receivable, which represent money owed to the business because of loans granted, products sold, or services rendered, and inventories of feed, grain, supplies and feeder livestock. The latter are livestock held primarily for sale and not for breeding purposes.

Non Current Assets

Any asset not classified as a current asset is, by default, a non current asset. On a farm or ranch, these assets would include primarily machinery and equipment, breeding livestock, buildings, and land.

Liabilities

A liability is an obligation or debt owed to someone else. It represents an outsider's claim against one or more of the business assets.

Current Liabilities

Current liabilities are financial obligations that will become due and payable within one year from the date of the balance sheet and will therefore require that cash be available in these amounts within the next year. Examples include accounts payable at farm supply stores for goods and services received but not yet paid for and full amount of principal and accumulated interest on any short-term loans or notes payable. Short term loans are those requiring complete payment of the principal in one year or less. These would typically be loans used to purchase crop production inputs, feeder livestock and feed for the feeder livestock. All principal payments due within the next year, whether they are for short-term loans or for non-current loans are included as current liabilities.

Non-Current Liabilities

Are those obligations that are deferred for the time being but which will be paid within a few years, five years or less or within a short period of time e.g. real estate's mortgages, long term land leases.

Analyzing Liquidity

Liquidity measures the ability of the business to meet financial obligations as they come due without disrupting the normal operations of the business. Liquidity measure the ability to generate cash in the amounts needed at the time needed. Liquidity is a relative rather than an absolute concept.

(1) Current Ratio

$$\text{Current Ratio} = \frac{Current\ Asset\ Value}{Curent\ Liability\ Value}$$

The larger the current-ratio value, the more liquid the business, and vice versa. A value of 1.0 means current liabilities is equal to current assets, and while there are sufficient current assets to cover current liabilities, there is no safety margin. Assets values can and do change with changes in market prices, so values larger than 1.0 are preferred to provide a safety margin for price changes and other factors.

(2) Working Capital

Working capital is the difference between current assets and current liabilities:

$$\text{Working Capital} = \text{Current Assets} - \text{Current Liabilities}$$

Working capital measures the dollars that could, in theory, be available to purchase new inputs or other items after the sale of current assets and the payment of the current liabilities. Working capital is also available to pay family living expenses if the business and family are not treated separately. Working capital is a dollar or Naira value, not a ratio. A larger business would be expected to have larger current assets and liabilities and would need more working capital to have the same relative liquidity as a smaller business.

Analyzing Solvency

Solvency measures the liabilities of the business relative to the amount of owner equity invested in the business. It also provides an indication of the ability to pay off all financial obligations or liabilities if all assets were sold, that is, it measures the degree to which assets are greater than liabilities. Solvency is generally discussed in relative terms by measuring the degree to which assets exceed liabilities.

(1) DebT/Asset Ratio

$$\text{Debt/Asset Ratio} = \frac{Total\ Liabilities}{Total\ Assets}$$

Debt/Asset Ratio measures what part of total assets is owed to lenders. This ratio should have a value less than 1.0, and even smaller values are preferred. A debt/asset ratio of 1.0 means debt or liabilities equal assets, and therefore, equity is zero. Ratios greater than 1.0 would be obtained for an insolvent business.

(2) Equity/Asset Ratio

$$\text{Equity/Asset Ratio} = \frac{Total\ Equity}{Total\ Assets}$$

Equity/Asset Ratio measures what part of total asset is financed by the owner's equity capital. Higher values are preferred, but the equity asset ratio cannot exceed 1.0 a value of 1.0 is obtained when equity assets, which mean liabilities, are zero. An insolvent business would have a negative equity/asset ratio, because equity would be negative.

(3) Debt/Equity Ratio

The debt/equity ratio is also called the leverage ratio.

$$\text{Debt/Equity Ratio} = \frac{Total\ Liabilities}{Total\ Equity}$$

This ratio compares the proportion of financing provided by lender with that provided by the business owner. When the debt/equity ratio is equal to 1.0, lenders and the owner are providing an equal portion of the financing. Smaller values are preferred and the debt/equity ratio will approach zero as liabilities approach zero. Large values result from small equity, which means an increasing of insolvency.

(4) Net Capital Ratio

$$\text{Net Capital Ratio} = \frac{Total\ Assets}{Total\ Liabilities}$$

A net capital ratio of 1.0 result from zero equity, and higher values indicate a greater degree of solvency. For example, a value of 2.0 mans liabilities are one-half of assets and equal to equity. This is often considered the minimum safe value.

(5) Debt Structure Ratio

$$\text{Debt Structure Ratio} = \frac{Current\ Liabilities}{Total\ Liabilities}$$

This ratio shows what proportion current liabilities are to total liabilities and can be converted to a percentage by multiplying by 100. All current liabilities must be paid within the next year, so smaller numbers are preferred.

11.8 Financial Ratios Analysis

Ratio analysis refers to methods of calculating and interpreting financial ratios to assess a firm's performance. Financial ratios are one of the most common tools of managerial decision making. A ratio is a comparison of one number to another, mathematically, a simple division problem. Financial ratios involve the comparison of various figures from the financial statements in order to gain information about a company's performance. It is the interpretation, rather than the calculation, that makes financial ratios a useful tool for business managers. Ratios may serve as indicators, clues or red flags regarding noteworthy relationships between variables used to measure the firm's performance in terms of profitability, asset utilization, liquidity, and leverage or market valuation. There are basically two (2) uses of financial ratio analysis:-

(a) To track individual firm performance over time and to make comparative judgments regarding firm trend analysis, calculating individual ratios on a per-period basis and tracking their values overtime. This analysis can used to spot trends that may be cause for concern, such as an increasing average collection period for outstanding receivables or a decline in the firm's liquidity status. In this role, ratios serve as red flags for troublesome issues, or as benchmarks for performance measurement.

(b) Another common usage of ratios is to make relative performance comparisons. For example, comparing a firm's profitability to that of a major competitor or observing how the firm stacks up versus industry averages enables the user to form judgments concerning key areas such as profitability or management effectiveness. Users of financial ratios include both internal and external to the firm. External users include security analysts, current and potential investors, creditors, competitors and other industry observers. Internally, managers use ratio analysis to monitor performance and pinpoint strengths and weakness from which specific goals, objectives and policy initiatives may be formed.

Types of Financial Ratios

(i) Liquidity Ratios
(ii) Activity Ratios
(iii) Leverage Ratios
(iv) Profitability Ratios

(1) Liquidity Ratios

Liquidity measures a firm's ability to satisfy its short-term obligations as they come due. Managers and creditors must closely monitor the firm's ability to meet short-term obligations. The liquidity ratios in other words are measures that indicate a firm ability to repay short-term debt. Current liabilities represent obligations that are typically due in one year or less. Type of ratios used for analyzing liquidity is:-

(a) Current Ratio

$$\text{Current Ratio} = \frac{Current\ Asset}{Current\ Liabilities}$$

A current ratio of 1.5 indicates that for every Naira or dollar in current liabilities, the firm has N1.50 or $ 1.50 current asset. Such assts could be sold and proceeds used to satisfy the liabilities if the firm ran short of cash. However, some current assets are more liquid than others. Obviously, the most liquid current asset is cash. Account receivable is usually collected within one to three months, but this varies by firm and industry. The least liquid of current assets is often inventory. Depending on the type of industry or product, some inventory has no ready market. Since the economic definition of liquidity is the ability to turn an asset into cash at or near fair market value, inventory that is not easily sold will not be helpful in meeting short-term obligations.

(b) Quick-Ratio (Acid-Test)

$$\text{Quick Ratio} = \frac{Quick\ Assets}{Current\ Liabilities}$$

$$\text{Quick Ratio} = \frac{(Cash + Marketable\ Securities + Accounts\ Receivable)}{Current\ Liabilities}$$

Note:- Inventories excluded (a) Inventories generally take longer to sell, often at discounted prices (b) Inventories may be accounts receivable before they can be turned into cash.

The quick ratio also is known as the acid test. Quick assets are defined as cash, accounts receivable and notes receivable, essentially current assets minus inventory.

(c) Net Working Capital (not a Ratio)

Networking Capital = Current Assets – Current Liabilities

Dollar or Naira amount of current assets exceed/fall short of current liabilities.

(2) Activity Ratios

Activity ratios measure the firm's effectiveness at managing accounts receivable, inventory, accounts payable, fixed assets, and total assets.

(a) Total Asset Turnover

Total asset turnover is a measure of how efficiently and effectively a company uses its asset to generate sales. The higher the total asset turnover ratio, the more efficiently firms' assets have been used.

$$\text{Total Asset Turnover} = \frac{Sales}{Total\ Assets}$$

(b) Fixed Asset Turnover

The fixed assets turnover is a measure of how efficiently a company uses its fixed assets to generate sales. The higher the fixed asset ratio the better

$$\text{Fixed Asset Turnover} = \frac{Sales}{Net\ Fixed\ Assets}$$

(3) Leverage Ratios

Leverage ratios provide measures of the firm's use of debt financing. Amount of debt used in an attempt to maximize shareholders' wealth. These are extremely important for potential creditors, who are concerned with the firm's ability to generate the cash flow necessary to make interest payments on outstanding debt. Thus, these ratios are used extensively by analysts outside the firm to make decisions concerning the provision of new credit or the extension of existing credit arrangements. It is also important for management to monitor the firm's use of debt cost to a firm, resulting in decreased flexibility and higher break-even production rates. Therefore, the use of debt financing increases the risk associated with the firm. Managers and creditors must constantly monitor the trade-off between the additional risk that comes with borrowing money and increased opportunities that the new capital provides. Leverage ratios provide a means of such monitoring. Capitalization ratios are:-

(a) Debt Ratio

Debt ratios measure the total amount and proportion of debt within the liabilities section of a firm's balance sheet. It measures the proportion of total assets provided by a company's creditors. The debt ratio is calculated by dividing the total liabilities by total assets. The higher this ratio, the greater the degree of outside financing by creditors. It indicates that the firm is more highly leveraged (debt) and highly risky for creditors. The basic formula is as follows:-

$$Debt\ Ratio = \frac{Total\ Liabilities}{Total\ Assets}$$

(b) Debt to Equity Ratio

This ratio indicates the ratio of debt on a firms balance sheet to the amount of funds provided by owners. It measures performance by using only long term debt divided by total equity. The more capital intensive the firm, the higher the debt to equity ratio. It measures the percentage of debt tied up in the owners equity.

$$Debt\ to\ Equity = \frac{Long\ Term\ Debt}{Total\ Equity}$$

Coverage ratios include:-

(a) Times Interest Earned

Times interest earned measures the ability of the firm to service all debts. The figure will indicate how many times a company can cover its fixed contractual obligations to its creditors. The higher the times interest earned, the more likely the firm can meet its obligations.

$$Times\ Interest\ Earned = \frac{Earnings\ Before\ Interest\ and\ Taxes}{Interest}$$

(4) Profitability Ratios

Perhaps the types of ratios most often used and considered by those outside a firm are the profitability ratios. Profitability ratios provide measures of profit performance that serve to evaluate the periodic financial success of a firm.

(a) Gross Profit Margin

The gross profit margin indicates the percentage of each sales dollar or Naira remaining after a firm has paid for its goods. The basic formula is calculated as follows:-

$$Gross\ Profit\ Margin = \frac{(Sales - Cost\ of\ Goods\ Sold)}{Sales}$$

The higher the gross profit margin the better pricing flexibility and cost management controls a firm has in its operations.

(b) Operating Profit Margin

The operating profit margin indicates the profits of the company before interest and taxes are deducted from firms operations. The higher the operating profit margin, the greater pricing flexibility a firm has in its operations. However, it could also indicate the degree of cost control management a firm possesses.

$$Operating\ Profit\ Margin = \frac{Operating\ Profits}{Sales}$$

(c) Net Profit Margin

The Net Profit Margin measures the amount of profits available to shareholders after interest and taxes have been deducted on the income statement. The higher the profit margin, the more pricing flexibility a firm may have in its operations or the greater cost control initiated by management.

$$Net\ Profit\ Margin = \frac{Net\ Profit}{Sales}$$

(d) Return on Equity (ROE)

The return on equity measures the return earned on the owners' equity in the firm. The higher the rate the better the firm has increased wealth to shareholders.

$$Return\ on\ Equity\ (ROE) = \frac{Net\ Profits}{Stockholders\ Equity}$$

(e) Earnings Per Share

The earnings per share measures per share dollar or Naira return to owners of a company.

$$Earnings\ Per\ Share\ = \frac{Total\ Earnings}{Number\ of\ Shares\ Outstanding}$$

It sums the prior year earnings and divides the amount by the weighted average of shares outstanding. This assumes the most accurate information if a company distributes new shares outstanding during the period which could substantially impact or dilute shares to current shareholders with lower per share earnings.

(f) Return of Total Assets (ROA)

Effectiveness in generating profits with its available assets, the higher the ratio the better.

$$Return\ on\ Total\ Assets = \frac{Net\ Income\ after\ Taxes}{Total\ Assets}$$

(g) Price/Earning (P/E) Ratio

Amount investors are willing to pay for each dollar or Naira of earnings. The ratio indicates investors' confidence.

$$Price/Earning\ Ratio = \frac{Market\ Price\ Per\ Share}{Earnings\ Per\ Share}$$

11.9 Budgeting and Budgetary Control

Budgeting is often used to estimate whether a proposed plan or a change in farm business is worthwhile. Budgeting is a forward planning tool or a way to estimate the profitability or feasibility of a plan, a proposed change in a plan before making the decision and implementing it. The combination of budgeting and economic principles provides some powerful, practical and useful techniques for the manager to use when analyzing alternatives. Budgeting is very useful for all kinds of business, it is more or less the monetary implications

of a business plan particularly in term of costs and returns, for most part of the budget it is expected costs and expected returns. Budgeting is forecasting stating what will happen in the future in terms of costs and returns to the business-man. Budgeting aids or helps planning. There are three (3) types of budgeting.

(a) Partial Budgeting
(b) Complete Budgeting
(c) Cash flow Budgeting

(a) Partial Budgeting

Partial budgeting is used to assess the financial effect of small changes in the farm, changes arise as a result of policy change or there is a price change or another production-method. If is called a marginal analysis techniques because it looks only at a changes in costs and returns or receipts and therefore net farm income. Then which changes pay more. There are four (4) key questions when doing the partial analysis of partial-budgeting and this translate to the standard format to the partial budget analysis:-

(1) What new cost will arise?
(2) What former cost will be saved?
(3) What former income will be lost?
(4) What new income will arise?

Table 4: Standard Format of Partial Budgeting

Losses	Gains
Income Lost	New Income
New Cost	Cost Saved
Net Gain	Net Loss

Partial budget in other words is designed to analyze relatively small changes in the farm business, partial budgeting is really a form of marginal analysis. The changes in costs and revenues needed for a partial budget can be identified by considering the following four (4) questions stated in another forms. They should be answered on the basis of what would happen if the proposed alternative was implemented.

(1) What new or additional costs will be incurred?
(2) What current costs will be reduced or eliminated?
(3) What new or additional revenue will be received?
(4) What current revenue will be lost or reduced?

The answers to the preceding questions are organized within one of the four (4) categories shown on the partial budget form in Table 5. There are different partial budgeting forms, but all have these four (4) categories arranged in some manner. For each category, only the changes are included, not all costs or revenues.

Table 4: Partial Budget Form

Alternative ₦	₦
Additional costs:-	Additional Revenue:-
Reduced Revenue:-	Reduced Costs:-
A. Total Additional Costs and Reduced Revenue _____	B. Total Additional Revenue and Reduced Costs. _____
	Net change in Profit (B minus A)

Additional Costs

These are costs that do not exist at the current time with the current plan. A proposed change may cause additional costs because of a new or expanded enterprise that requires the purchase of additional inputs. Other causes would be increasing the current level of input use or substituting more of one input for another for an existing enterprise Additional costs may be either variable or fixed, because there will be additional fixed costs whenever the proposed alternative requires additional capital investment. These additional fixed costs would include depreciation, interest (opportunity cost), taxes, and insurance for a new depreciable asset.

Additional Revenue

Tax is revenue to be received only if the alternative is adopted. It is not being received under the current plan. Additional revenue can be received if a new enterprise is added, if there is an increase in the size of a current enterprise, or if the change will cause yields, production levels or selling price to increase. Estimates of yields and prices are important.

Reduced Revenue

Tax is revenue currently being received but that will lose or reduced should the alternative be adopted. Revenue may be reduced if an enterprise is eliminated or reduced in size. If the change causes a reduction in yields or production levels or if the selling price will decrease. Estimating reduced revenue requires careful attention to information about yields, livestock birth and growth rates and output selling prices.

Reduced Costs

Reduced costs are those now being incurred that would no longer exist under the alternative being considered. Cost reduction can result from eliminating an enterprise, reducing the size of an enterprise, reducing input use, substituting more of one input for another or being able to purchase inputs at a lower price. Reduced costs may be either fixed or variable. A reduction in fixed costs will occur if the proposed alternative will reduce or eliminate the current investment in machinery, equipment, breeding livestock, land or buildings.

(b) Complete Budgeting

In complete budgeting, the farmer will undertake a general reorganization or an overhaul of the whole farm systems. By this we mean that if the farmer has been

producing cassava, cocoa, yam, this enterprise and include some other enterprises. He may then have a new farm-plan such as cassava, maize, rice, poultry, and piggery as new forms of enterprises for his new farm-plan. By so doing a large amount of farm resources will need to be diverted from those enterprises already out and to be spread on the new types of enterprises the farmer now has. The resources that will be so concerned will not only be variable in nature but will also be fixed. Both variable and fixed resources will be concerned in such farm restructuring. There is going to be a complete re-organization of the farming system. For example if poultry is to be added, then either cases or any area will be reserved for the deep litter system to be used in raising the birds. Similarly, these items of cost, production originally used for cocoa either in terms of processing will need to be disposed off.

A new balance sheet will therefore evolve in terms of changes in the cost item. For example we can have the generalized table shown below for the old enterprises and the new ones added.

Table 5:- Complete Budgeting

Enterprises		**Cost**	**Returns**
Cassava	_____	_____	_____
Cocoa	_____	_____	_____
Yam	_____	_____	_____
Maize	_____	_____	_____
Poultry	_____	_____	_____
Piggery	_____	_____	_____

We can then have a second table showing the net returns for the old farm-plan and the new farm plan. This is as shown below:-

Table 6:- Complete Budgeting: Net Returns of Old and New Farm Plans Net Returns

Old Plan	**₦**	**New Plan**	**₦**
Enterprises Cassava Cocoa Yam Maize		Enterprises Cassava Maize Rice Poultry Piggery	

(c) Cash-Flow Budgeting

A cash flow budget is a summary of the projected cash inflows and cash outflows for a business over a given period. This period is typically a future accounting period and is divided into quarters or months. A cash flow budget is

a financial analysis tool with applications in both forward planning and the ongoing analysis of a farm or ranch business. As a forward planning tool, its primary purpose is to estimate the amount and timing of future borrowing needs and the ability of the business to repay these and other loans on time. Given the large amount of capital today's commercial farms and ranches require and financial management tool.

Cash flow budgeting is a forecast of the cash flow of the farm for the immediate period ahead, it is a forecast of expected flow of money into and out of the business, it is different from forecast profit and loss account as it does not take depreciation and valuation changes into consideration.

The cash flow budget is made by adding to the expected cash balance at the start of each period all the receipts expected during the period, from this total, all cash payments are to be deducted. Cash flow planning is one of the most important techniques available to farmers, it helps to show the pattern of income and expenditure, it helps to show whether resources could be available to meet commitment. Cash shortages often cause critical conditions for farms and make it impossible to meet current liabilities. The cash flow budget will provide answers to following questions:-

(a) Is the plan financially feasible?
(b) Will there be sufficient capital available at the specific times it will b needed?
(c) Will the plan generate the cash needed to repay any new loans?

Table 7 shows the structure and format of a cash flow budget in condensed form. There are five (5) potential sources of cash

(1) The beginning cash balance, or cash on hand at the beginning of the period.
(2) Farm product sales or cash revenue from the operation of the farm business
(3) Capital sales, the cash received from the sale of capital assets such as land, machinery, breeding livestock and dairy cattle.
(4) Non business cash receipts, which would include nonfarm cash income, cash gifts, and other sources of cash
(5) New borrowed capital or loans received.

Table 7:- Simplified Cash Flow Budget

	Period 1	Period 2
(1) Beginning Cash Balance	_____	_____
(2) Cash Inflow		
(a) Farm Product Sales	_____	_____
(b) Capital sales	_____	_____
(c) Miscellaneous Cash Income	_____	_____
(d) Total Cash Inflow	_____	_____
(3) Cash Outflow		
(a) Farm Operating Expenses	_____	_____
(b) Capital Purchases	_____	_____
(c) Miscellaneous Expenses	_____	_____
(d) Total Cash Outflow	_____	_____
(4) Cash Balance (2(d) – 3(d)	_____	_____
(5) Borrowed Funds Needed	_____	_____
(6) Loan repayments (Principal and Interest)	_____	_____
(7) Ending Cash Balance (4+5-12)	_____	_____
(8) Debt Outstanding	_____	_____

Cash Balance	+	Expected Receipts	-	Expected Cash Payment

Cash Flow Budgets have the Following Uses:

(1) Cash flow budget allows managers to plan their credit needs and repayment programmes.
(2) It raises the probability of a bank manager agreeing to a loan or overdrafts.
(3) It aids financial control.

Note the following about cash flow budgeting

(a) The expected movement of cash in and out of business is allocated to the month in which payment or receipt is expected to be made and not when transaction took place. It is a flow of cash and not an account because you record the actual day the payment is made or will be made.
(b) All possible cash payments and receipts must be included (New capital expenditure, loan repayment, gifts, taxes, interest, all personal drawings, dividends etc must be included.

Advantages and Uses of Budgeting

(1) Budgeting approach allows great flexibility adjustment, supposing proposed new farm plan gives us net returns not large enough then make adjustment.
(2) The techniques can be widely used in extension works since it does not involved tedious and lies within the comprehension of most educated farmers and advisers
(3) Budgets can be used to decide whether a proposed plan will effectively increase the farm profits or not.
(4) Budgeting provides an indication of the likely financial prospects of different alternative farm plans.
(5) It can be used to guide production process on the farm and estimated sales; cost of inputs can be checked as the farm plan being implemented.
(6) Budgeting gives a clear picture of a prospect of a proposed to financial institutions and the benefits acre able for such institution to decide on funding of the farm-plan or otherwise.

Budgetary Control

Budgetary control is one of basic tool in financial control, it is a planning tool, but it is a control is the setting of goals, targets and performances and the comparison of actual results with this goal on timely basis for remedial action. Budgetary control is a control technique whereby actual results are compared with budgets, any differences are made the responsibility of key individuals who can either exercise control action or revise the original budgets. Budgetary control is an estimate of cost and return. Budgetary control must be constantly review for it to serve as a good check. No system of planning can be successful without having an effective and efficient system of control. Budgeting is closely connected with control. The exercise of control in the organization with the help of budgets is known as budgetary control. The process of budgetary control includes: preparation of various budgets, continuous comparison of actual performance with budgetary performance, revision of budgets in the light of changed circumstances. A system of budgetary control should not become rigid. There should be enough scope of flexibility to provide for individual initiative and drive.

Budgetary Control can be Divided into:-

(a) Ideal targets:- Targets does not allow for waste, inefficiencies and unforeseen circumstances.
(b) Practicable Targets: What is achievable, what is realistic, you don't know what is realistic until you implement the project or execute the project, because circumstances might have changed.

Basic Principles of Budgetary Control include:

(a) Make plans as to act as both short and long term performance goal
(b) Recall actual result

(c) Compare the result achieved with those planned
(d) Calculate variance and analyse the reason for the variance
(e) Act immediately if necessary, to either correct the variance or change the plan.

One good base of budgetary control is the cash flow budget, it set out the periodic costs and returns, with that it is possible to recall actual against estimated. The difference of actual and estimated is the variation. If there is a bigger variances between actual and forecasted item (cost and return) there are two possible causes of action or three possible reasons:-

(a) Your budget estimate may be wrong
(b) There may be inefficiency in your execution
(c) There may be changes in external conditions not for seen during budget drafting.

There are two major possible causes of action:-

(1) You can have remedial action to bring performance up to plan level
(2) You could change plan to make it more realistic
(3) No action.

A times non-variance, close correlation between budget and actual result may hide unsatisfactory result.

(a) External circumstances could have change in such a way that result could have being better than expected.
(b) Bad budgeting could have being balance with poor result

11.10 Programme Planning

Farm plan means preparation of operational programme for a farm which will ensure adequate conservations of land and other natural resources and the judicious use of this and other factors of production. The aim of planning of course is to increase the net-income of farmers as well as satisfaction of farmers.

There are as many as four (4) types or methods of farm-planning;-

(a) Budgeting
(b) Programme – Planning
(c) Regression – Analysis
(d) Linear Programming

Programme planning is an arithmetic procedure based on returns acrewable from each enterprise arising from the use of limited farm resources. The basic principle is such that farm enterprises are selected based on the most limiting factors of production which often influences the scale of production of each farm-enterprise, that is, an increase in the scale of production can only occur provided the limitation arising from the scarcity of a particular factor of production is solved.

Enterprise			Increaments →		
Cassava	1ha	2ha	3ha	4ha	
Cocoa	1ha	2ha	3ha	3h	Constant effect of land
Yam	1ha	2ha	3ha	4ha	
Maize	1ha	2ha	3ha	4ha	

We can maximize production unless constraint effect of land is removed because the land can no longer withstand cocoa production. It can also be for capital, it could mean that capital cold limit production of yam or maize and unless available we cannot maximize production. It is important to make available the factor of production that limit a particular scale of production of an enterprise or limit the maximization of returns to the farm.

Steps Required in Programme Planning

(1) Identify all your farm resources, resource appraisal on the farm.
(2) List out the various enterprises producible on your farm.
(3) Enumerate and evaluate the costs and returns for the production of all the identified enterprises.
(4) Carryout the gross margin analysis for each factor of production according to the enterprises i.e. G.M/ha for maize, rice etc. compute gross margin per man days for each enterprises, calculate gross margin per farm for the different farm-plan.
(5) Identify the most limiting factor of production for each enterprise
(6) Compute the effects of each limiting factor of production to observe that of highest adverse effect on the farm return.
(7) Involve an appropriate strategy to eliminate the constraining effect of that most limiting factor of production on that farm plot.

11.11 Variance and Variance Analysis

The variance is the difference between the actual performance and the plan. A variance is the difference between an actual result and an expected result.

Favourable Variance

When actual results are better than the expected results, we have a favourable variance. A variance can be put into the favourable category when the results are better than expected. This means that revenue was more than the expected amount or costs were below the budgeted amount. In accounting practice, a favourable variance is shown by noting a letter ‘F’ in parenthesis on

the reports. A favourable variance might earn a bonus for a manager, or perhaps a move up the corporate ladder.

Unfavourable or Adverse Variance

Adverse variance is where actual is more than plan or worse than plan. In other words, actual results are worse than expected result, we have an adverse (A). The variance can be judged as unfavourable if the results are worse than expected. If the revenues were below expectations or the costs were higher than standards, the variance would be termed unfavourable or adverse. This would be denoted on the reports with the letter A or U, usually in parenthesis.

Variance Analysis is a tool of budgetary control by evaluation of performance by means of variances between budgeted amount, planned amount or standard amount incurred/sold. Variance analysis can be carried out for both costs and revenues. Variance analysis can be used to observe how well a business is performing and also how close actual costs and revenues are to expected costs and revenues. Variance analysis uses this standard or expected amount versus the actual amount to judge performance. The analysis includes an explanation of the difference between actual and expected figures as well as an evaluation as to why the variance may have occurred. The purpose of this detailed information is to assist managers in determining what may have gone right or wrong and to help in future decision-making.

A variance is the difference between an actual result and an expected result. The process by which the total difference between standard and actual results is analysed is known as variance analysis. Basic variance measure differences without explaining causes, it does not show which aspect of management are faulty and therefore needs correction, and the variances are measured but not explained. Variance analysis is the process of explaining the causes or the cause of variance. It is necessary for managers to find out what aspects of management were most responsible for each important variance.

Importance of Variance Analysis

(1) Variance analysis is used as a controlling tool. Managers can take suitable remedial actions to achieve the desired objectives if there is a variation of the actual performance.
(2) It acts like a barometer for measuring efficiency.
(3) Through regular variance analysis, weak spots can be ascertained and remedial actions can be taken.
(4) Variance analysis aids framing of more accurate budgets in the future
(5) Variance analysis can be used for comparing the departmental performance of the organization.

There could be a combination of favourable and adverse variance which seldom balance cut and possibly end up as adverse or favourable variance.

There could also be combinations of adverse variance called double adverse variance or could be double favourable variance. Business sometimes will experience a positive variance offset by a negative variance. For example sales may improve due to an increase in staffing, resulting in a favourable sales variance combined with an unfavourable labour cost variance. Thus in the end, the total variance would balance out.

Labour Variance

The difference between actual labour costs and budgeted or standard labour costs is known as direct wages variance. This variances may arise due to a difference in the amount of labour used or the price per unit of labour i.e. the wage rate. The direct wages variance can be split into:-

(a) Wage Rate Variance:- The wage rate was higher or lower than budgeted e.g. using more unskilled labour, or working overtime at a higher rate.

(b) Labour Efficiency Variance:- Arises when the actual time spend on a particular job is higher or lower than the standard labour hours specified e.g. breakdown of a machine.

Material Variance

The variance for material cost could also be split into price and usage elements.

(a) Material Price Variance: Arises when the actual unit price is greater or lower than budgeted. Could be due to inflation, discounts, alternative suppliers etc.

(b) Material Quantity Variance: Arises when the actual amount of material used is greater or lower than the amount specified in the budget e.g. a budgeted fertilizer at 350 Kg per hectare may be increased or decreased when the actual fertilizer is applied, giving rise to a usage variance.

Overheads Variance

Again, overhead variance can be split into:-

(a) **Overhead Volume Variance:-** Where overheads are taken into the cost centers, a production higher or lower than budgeted will cause an over-or under-absorption of overheads.

(b) **Overhead Expenditure Variance: -** Where the actual overhead expenditure is higher or lower than that budgeted for the level of output actually produced.

Calculation of Price and Usage Variances

(a) Price Variance = (Budgeted Price – Actual Price) × Actual Quantity

(b) Usage Variance = (Budgeted Quantity – Actual Quantity) × Budgeted Price.

11.12 Cost Control

One of the big aims of financial managers in financial control is the cost control. The cost control is comparing actual expenses with standard or budged

so that adverse variance is minimized and can be remedied. Managers try to keep down cost, cost reduction. Cost reduction is a tool in cost control. Cost reduction is to reduce target cost by any suitable means e.g. cheaper alternatives or better methods of doing it. In farming, the major cost control areas are

(a) Labour Cost
(b) Material Cost

In farming, it is labour intensive, in labour cost control managers pay attention to when to use hired labour, wages to pay, seasonality, the productivity of labour and labour supervision. Labour budget is very important in financial planning and control. Labour cost can be reduced by adequate planning, good work relation and supervision, better training and reduced labour turnover. Material cost can be reduced through preventive maintenance, stock control (you don't stock more than you need), good buying policy like regular orders, capital purchase not credit purchase. There are five (5) parts of an effective cost control system. These are:-

(a) Preparation of budgets
(b) Communicating and agreeing budgets with all concerned.
(c) Having an accounting system that will record all actual costs.
(d) Preparing statements that will compare actual costs with budgets showing any variances and disclosing the reasons for them, and
(e) Taking any appropriate action based on the analysis of the variances in (d) above.

Action(s) that can be taken when a significant variance has been revealed will depend on the nature of the variance itself. Some variances can be identified to a specific department and is within that department's control to take corrective action. Variances revealed are historic. They show what happened last month or last quarter. However, they can be used to influence managerial action in future periods.

Exercises for Chapter Eleven

(1) True or False? If the debt/equity ratio increases, the debt/asset ratio will also increase why?
(2) Use your knowledge of balance sheets and ratio analysis to complete the following abbreviated balance sheet. The current ratio = 2.0 and the debt/equity ratio = 1.0.

Assets		**Liabilities**	
Current Assets	₦80,000	Current Liabilities	_____
Noncurrent Assets	_____	Noncurrent Liabilities	_____
		Total Liabilities	_____
		Owner Equity	₦ 100,000
Total Assets	_____	Total liabilities and Owner Equity	_____

(3) Assume you are an agricultural loan officer for a bank and a customer requests a loan based on the following balance sheet. Conduct a ratio analysis and give your reasons for granting or denying an additional loan. What is the weakest part of this customer's financial condition?

Assets		**Liabilities**	
Current Assets	40,000	Current Liabilities	60,000
Noncurrent Assets	240,000	Noncurrent Liabilities	50,000
		Total Liabilities	110,000
		Owner Equity	₦170,000
Total Assets	280,000	Total liabilities plus Equity	280,000

(4) Would the following entries to a farm balance sheet be classified as assets or liabilities? As current or noncurrent?
   (a) Machine Shed
   (b) Feed Bill at Local feed Store
   (c) A 20 year Farm Mortgage Contract
   (d) A 36-Month Certificate of Deposit
   (e) Newborn Calves

(5) Use the following information to compute values for each of the following items

	₦		₦
Net Farm Income	36,000	Opportunity Cost of Labour	16,000
Average Equity	220,000	Opportunity Cost of Management	8,000
Average Asset Value	360,000	Family Living Expenses	20,000
Interest Expense	11,000	Income and Social Security Taxes	4,000
Total Revenue	109,500	Opportunity Cost of Capital	10%

   (a) Rate of Return on Assets
   (b) Rate of Return on Equity
   (c) Operating Profit Margin Ratio
   (d) Change in Equity
   (e) Return to Management

(6) Use the following information to compute the values:

	₦		₦
Cash Expenses	110,000	Beginning Inventory Value	42,000
Cash Revenue	167,000	Ending Inventory Value	28,000
Depreciation	8,500	Cost of New Tractor	48,000
Beginning Accounts Receivable	2,200	Ending Accounts Receivable	0
Beginning Accounts Payable	7,700	Ending Accounts Payable	1,500

(a) Cash basis net farm income
(b) Total revenue an accrual basis
(c) Accrual basis net farm income.

(7) It was budgeted that it would take 200 Man days at ₦10.00 per day to complete the task casting ₦2, 000.00 when the actual cost was ₦1875.00 being 150 man days at ₦12.50 per day. Calculate the following labour variances:-
(a) Price Variance
(b) Usage Variance

(8) Mr. 'X' is thinking of installing a grain-dryer in his 170 Ha maize crop. Normally he produces 91kg/ha with the direr he would harvest the whole crop earlier than usual so might gain an extra 12kg/ha due to quick harvest and drying. And the new drier would cost ₦290, 400. The building in which he is to put the drier would cost ₦100, 000. The expected life of the drier is 5 years. Annual operating cost is ₦55, 800. Annual interest on cost of new capital investment is 10%. Do a partial budgeting for Mr. 'X'.

The cost return in price/kg is ₦120.00. The cost of shelling and transportation of the extra quantity is ₦20/kg. Subsequent ploughing of a moist land as a result of early harvest and drying of his crops also ensures better yield in his subsequent production. The increase yield anticipated is 2.5 kg/ha.

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APPENDIX

Statistical and Financial Tables
Table I

Compound interest.

Table shows value of £1 at compound interest $(1+r)^n$

	Interest rates (r) %										
Years (n)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.10
2	1.020	1.040	1.061	1.082	1.102	1.124	1.145	1.166	1.188	1.210	1.232
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.368
4	1.041	1.082	1.126	1.167	1.216	1.262	1.311	1.360	1.412	1.464	1.518
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.610	1.685
6	1.061	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.870
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.076
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.304
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.583	2.558
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	2.839
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853	3.152
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.519	2.813	3.138	3.498
13	1.138	1.294	1.468	1.665	1.886	2.133	2.410	2.720	3.006	3.452	3.883
14	1.149	1.319	1.513	1.732	1.980	2.261	2.578	2.937	3.342	3.797	4.310
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	4.785
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727	8.062
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.835	13.585

	Interest rates (r) %										
Years (n)	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**25**	**30**
1	1.120	1.130	1.140	1.150	1.160	1.170	1.180	1.190	1.200	1.250	1.300
2	1.254	1.277	1.297	1.322	1.346	1.367	1.392	1.416	1.440	1.562	1.490
3	1.405	1.443	1.481	1.521	1.561	1.602	1.643	1.685	1.728	1.953	2.197
4	1.573	1.630	1.689	1.749	1.811	1.874	1.939	2.005	2.074	2.441	2.856
5	1.762	1.842	1.925	2.011	2.100	2.192	2.288	2.386	2.488	3.052	3.713
6	1.974	2.082	2.195	2.011	2.100	2.192	2.288	2.386	2.488	3.052	3.713
7	2.211	2.353	2.502	2.660	2.826	3.001	3.186	3.379	3.583	4.768	6.275
8	2.476	2.658	2.853	3.059	3.278	3.511	3.759	4.021	4.300	5.960	8.157
9	2.773	3.004	3.452	3.518	3.803	4.108	4.435	4.785	5.159	7.451	10.604
10	3.106	3.395	3.707	4.046	4.411	4.807	5.234	5.695	6.192	9.313	13.786
11	3.478	3.836	4.226	4.662	5.117	5.624	6.176	6.777	7.430	11.641	17.922
12	3.896	4.334	4.818	5.350	5.936	6.580	7.288	8.064	8.916	14.552	23.298
13	4.363	4.898	5.492	6.153	6.886	7.699	8.599	9.596	10.699	18.190	30.287
14	4.887	5.535	5.492	6.153	6.886	7.699	8.599	9.596	10.699	18.190	30.287
15	5.474	6.254	7.138	8.137	9.265	10.539	11.974	13.589	15.407	28.422	51.186
20	9.646	11.523	13.743	15.366	19.461	23.106	27.393	32.429	38.338	86.736	190.050
25	17.000	21.230	32.920	40.874	50.874	50.658	62.669	77.388	95.396	264.698	705.641

Statistical and Financial Tables

Table II

Present Value Factors. Present Value of £1 $(1 + r)^{-n}$

Periods (n)	1%	2%	4%	6%	8%	10%	12%	14%	15%
1	0.990	0.980	0.962	0.943	0.926	0.909	0.893	0.877	0.870
2	0.980	0.961	0.925	0.890	0.857	0.826	0.797	0.769	0.756
3	0.971	0.942	0.889	0.840	0.794	0.751	0.712	0.675	0.658
4	0.961	0.924	0.855	0.792	0.735	0.683	0.636	0.592	0.572
5	0.951	0.906	0.822	0.747	0.681	0.621	0.567	0.456	0.497
6	0.942	0.888	0.790	0.705	0.630	0.564	0.507	0.400	0.432
7	0.933	0.871	0.760	0.665	0.583	0.513	0.452	0.351	0.376
8	0.923	0.853	0.731	0.627	0.540	0.467	0.404	0.308	0.327
9	0.914	0.837	0.703	0.592	0.500	0.424	0.361	0.270	0.284
10	0.905	0.820	0.676	0.558	0.463	0.386	0.322	0.237	0.247
11	0.0896	0.804	0.650	0.527	0.429	0.350	0.287	0.208	0.215
12	0.887	0.788	0.625	0.497	0.397	0.319	0.257	0.182	0.187
13	0.879	0.773	0.601	0.469	0.368	0.290	0.229	0.160	0.163
14	0.870	0.758	0.577	0.442	0.340	0.263	0.205	0.140	0.141
15	0.861	0.743	0.555	0.417	0.315	0.239	0.183	0.123	0.123
16	0.853	0.728	0.534	0.394	2.292	0.218	0.163	0.108	0.107
17	0.855	0.714	0.513	0.371	0.270	0.198	0.146	0.095	0.093
18	0.836	0.700	0.494	0.50	0.250	0.180	0.130	0.083	0.081
19	0.828	0.686	0.475	0.331	0.232	0.164	0.116	0.073	0.070
20	0.820	0.675	0.456	0.312	0.215	0.149	0.104	0.064	0.061
21	0.811	0.660	0.439	0.294	0.199	0.135	0.093	0.056	0.053
22	0.803	0.647	0.422	0.278	0.184	0.133	0.083	0.050	0.046
23	0.795	0.634	0.406	0.262	0.170	0.112	0.074	0.049	0.040
24	0.788	0.622	0.390	0.247	0.158	0.102	0.055	0.048	0.035
25	0.780	0.610	0.375	0.233	0.146	0.092	0.059	0.038	0.030

Periods (n)	16%	18%	20%	22%	24%	25%	26%	28%	30%
1	0.862	0.847	0.833	0.820	0.806	0.800	0.794	0.781	0.769
2	0.743	0.718	0.694	0.672	0.650	0.640	0.630	0.610	0.592
3	0.641	0.609	0.579	0.551	0.524	0.512	0.500	0.477	0.455
4	0.552	0.516	0.482	0.451	0.423	0.410	0.397	0.373	0.350
5	0.476	0.437	0.402	0.370	0.341	0.328	0.315	0.291	0.269
6	0.410	0.370	0.335	0.303	0.275	0.262	0.250	0.227	0.207
7	0.354	0.314	0.279	0.249	0.222	0.210	0.198	0.178	0.159
8	0.305	0.266	0.233	0.204	0.179	0.168	0.157	0.139	0.123
9	0.236	0.225	0.194	0.167	0.144	0.134	0.125	0.108	0.094
10	0.227	0.191	0.162	0.137	0.116	0.107	0.099	0.085	0.075
11	0.195	0.162	0.135	0.112	0.094	0.086	0.079	0.066	0.056
12	0.168	0.137	0.112	0.192	0.076	0.069	0.062	0.052	0.043
13	0.145	0.116	0.093	0.075	0.061	0.055	0.050	0.040	0.033
14	0.125	0.099	0.178	0.062	0.049	0.044	0.039	0.032	0.025
15	0.108	0.084	0.065	0.051	0.040	0.035	0.031	0.025	0.020
16	0.093	0.071	0.054	0.042	0.032	0.028	0.025	0.019	0.015
17	0.080	0.060	0.045	0.034	0.026	0.023	0.020	0.015	0.012
18	0.069	0.051	0.038	0.028	0.021	0.018	0.016	0.012	0.009
19	0.060	0.043	0.031	0.023	0.017	0.014	0.012	0.009	0.007
20	0.051	0.037	0.026	0.019	0.014	0.012	0.010	0.007	0.005
21	0.044	0.031	0.022	0.015	0.011	0.009	0.008	0.006	0.004
22	0.038	0.026	0.018	0.013	0.009	0.007	0.006	0.004	0.003
23	0.033	0.022	0.015	0.010	0.007	0.006	0.005	0.003	0.002

24	0.028	0.019	0.011	0.008	0.006	0.005	0.004	0.003	0.002
25	0.024	0.016	0.010	0.007	0.005	0.004	0.003	0.002	0.001

Statistical and Financial Tables

Table III

Present Value Annuity Factors

Present Value of £1 received annually for n years $\left(\frac{1-(1+r)^{-n}}{r}\right)$

Periods (n)	**1%**	**2%**	**4%**	**6%**	**8%**	**10%**	**12%**	**14%**	**15%**
1	0.990	0.980	0.962	0.943	0.926	0.909	0.893	0.877	0.870
2	1.970	1.942	1.886	1.833	1.783	1.736	1.690	1.647	1.626
3	2.941	2.884	2.775	2.675	2.577	2.487	2.402	2.322	2.283
4	3.902	3.808	3.610	3.465	3.312	3.170	3.037	2.914	2.855
5	4.853	4.713	4.452	4.212	3.996	3.791	3.605	3.433	3.352
6	5.795	5.601	5.242	4.917	4.623	4.355	4.111	3.889	3.784
7	5.728	6.472	6.002	5.582	5.206	4.868	4.564	4.288	4.160
8	7.652	7.325	6.733	6.210	5.747	5.335	4.968	4.639	4.487
9	8.566	8.162	7.435	6.802	6.247	5.759	5.328	4.946	4.772
10	9.471	8.983	8.111	7.360	6.710	6.145	5..650	5.216	5.019
11	10.368	9.787	8.760	7.887	7.139	6.495	5.988	5.453	5.234
12	10.255	10.575	9.385	8.384	7.536	6.814	6.194	5.660	5.421
13	11.255	11.343	9.986	8.853	7.904	7.103	6.424	5.842	5.583
14	12.114	12.106	10.563	9.295	8.244	7.367	6.628	6.002	5.724
15	13.004	12.849	11.118	9.712	8.559	7.606	6.811	6.142	5.847
16	13.865	13.578	11.652	10.106	8.851	7.824	6.974	6.265	5.954
17	14.718	14.292	12.166	10.477	9.122	8.022	7.120	6.373	6.047
18	15.562	14.992	12.659	10.828	9.372	8.201	7.250	6.467	6.128
19	16.328	15.678	13.134	11.158	9.604	8.365	7.366	6.550	6.198
20	17.226	16.351	13.590	11.470	9.818	8.514	7.469	6.623	6.259
21	18.046	17.011	14.029	11.764	10.017	8.649	7.562	6.687	6.312
22	19.660	17.658	14.451	12.042	10.201	8.772	7.654	6.743	6.369
23	20.456	18.292	14.857	12.303	10.371	8.883	7.718	6.792	6.399
24	21.243	18.914	15.247	12.550	10.529	8.985	7.784	6.815	6.434
25	22.023	19.523	15.622	12.783	10.675	9.077	7.843	6.873	6.464

Periods (n)	**16%**	**18%**	**20%**	**22%**	**24%**	**25%**	**26%**	**28%**	**30%**
1	0.862	0.847	0.833	0.820	0.806	0.800	0.794	0.781	0.769
2	1.605	1.566	1.528	1.492	1.457	1.440	1.424	1.392	1.361
3	2.246	2.174	2.106	2.042	1.981	1.952	1.923	1.868	1.816
4	2.798	2.690	2.589	2.494	2.404	2.362	2.320	2.241	2.166
5	3.274	3.127	2.991	2.864	2.745	2.689	2.635	2.532	2.436
6	3.685	3.498	3.326	3.167	3.020	3.161	3.083	2.937	2.802
7	4.039	3.812	3.605	3.416	3.242	3.161	3.083	2.937	2.802
8	4.344	4.078	3.837	3.619	3.421	3.329	3.421	3.076	2.925
9	4.607	4.303	4.031	3.786	3.566	3.463	3.366	3.184	3.019
10	4.833	4.949	4.192	3.923	3.682	3.571	3.465	3.269	3.092
11	5.029	4.636	4.327	4.035	3.766	3.656	3.544	3.335	3.147
12	5.197	4.793	4.439	4.127	3.851	3.725	3.606	3.387	3.190

13	5.342	4.910	4.533	4.203	3.912	3.780	3.656	3.427	3.223
14	5.468	5.008	4.611	4.265	3.961	3.824	3.965	3.459	3.249
15	5.575	5.092	4.675	4.315	4.001	3.859	3.726	3.483	3.268
16	5.669	5.162	4.730	4.357	4.033	3.887	3.751	3.503	3.283
17	5.749	5.222	4.775	4.391	4.059	3.910	3.771	3.518	3.295
18	5.818	5.273	4.812	4.419	4.080	3.928	3.786	3.529	3.304
19	5.877	5.316	4.844	4.442	4.097	3.942	3.799	3.539	3.311
20	5.929	5.353	4.870	4.460	4.110	3.954	3.808	3.546	3.316
21	5.973	5.384	4.891	4.476	4.121	3.963	3.816	3.551	3.320
22	6.011	5.410	4.909	4.488	4.130	3.970	3.822	3.556	3.323
23	6.044	5.432	4.925	4.499	4.137	3.976	3.827	3.559	3.325
24	6.073	5.451	4.937	4.507	4.143	3.981	3.831	3.562	3.327
25	6.097	5.467	4.948	4.514	4.147	3.985	3.834	3.564	3.329

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