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The Benefit-Cost Model: An Alternative Approach to Project Life Cycle Analysis

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ABSTRACT
The benefit-cost model (BCM) is a method for assessing a project or investment. Generally, we denote our measure of costs with the sign C and our measure of benefits with the symbol B. Benefit-cost analysis aims to achieve many goals. First, a project's economic viability can be assessed using BCM. Second, competing projects can be compared using the outcomes of a number of benefit-cost evaluations. Business decisions, the value of public investments, the wisdom of managing natural resources, and the effects of changing environmental circumstances can all be evaluated using BCM. In the end, BCM seeks to investigate possible courses of action with the goal of enhancing social welfare. All benefit-cost studies share a number of characteristics, regardless of their purpose. A BCM starts with an issue that needs to be resolved. For instance, reducing poverty in a region can be a community's objective. Next, a number of projects that could potentially address the specific issue are identified. Alternative initiatives to reduce poverty in a region could, for instance, provide farmers with inputs, agricultural financing, or a successful marketing system. These projects' costs and benefits would be determined, computed, and contrasted. The model emphasizes the spectrum of benefits and cost from the project conceptualization to its „death". It involve five identifiable phases, namely; conception, investment. growth, maturity and decline. Its main advantages over the **convectional approach** is that it consider the behaviour and magnitude of the project"s gross benefit and cost streams over time, thus provides a basis for cash flow analysis, fund phasing and making realistic projections.

Keywords:
Traditional method,
Cost-Benefit,
Analysis of Project Life Cycle

INTRODUCTION

The international lending agencies, especially the World Bank **(IBRD)** and international food agency for development **(IFAD)** base their agricultural project formulation, lending and investment decisions on project life cycle analysis using the convectional approach. In this approach, there are six identifiable phases, namely; identification, preparation, appraisal, negotiation, implementation/supervision, and evaluation. This concept of the project cycle encompasses the period of conceiving of the project idea, through investing of resources in the project, to evaluating the project activities up the end of investment. It provides an additional ingredient for project planning and management, since good project formulation enhances the chance of successful project implementations. The objective of this paper is to introduce a new approach the benefit cost model **(BCM)** to project life cycle analysis concept. The **BCM** concentrates on the spectrum of the project activities and consequences, from the investment point to its “death.” It aligns the different phases of a project’s life cycle to the scheduling of project activities, cost and benefits. The proposal of new dimension in project life cycle is meant to stimulate further thinking and discussion on the concept theorists and to provide practitioners with an alternative tool for project analysis. However, in discussing the new model, it is imperative to review the convectional model, especially for the purpose of comparison.

MATERIALS AND METHODS

Conventional Approach

The identification phase: The process identification is seen to begin with the search for an idea with a development potential and to end with pin-pointing a specific project (FAO, 2019). It involves a pre-feasibility study or mission during which several

worthwhile investment opportunities are screened through a process of successive approximations and call for a number of preparatory and analytical phases involving the participation of many expert in various disciplines, as well as close cooperation between various governments and agencies. It is at the identification stage that tentative decisions on what to produce, how to produce and the location of production are made (Okorie,981).In the identification and selection of Agricultural production projects, the major steps to be considered are:

i. the economic setting of the country and the role of Agriculture,
ii. the constraint facing overall and agricultural development,
iii. the selection of agricultural priority sectors,
iv. the identification of the project,
v. the choice of alternative and selection, and
vi. finally a summary of the project itself (FAO,op cit).

The preparation phase: Project preparation starts with the borrowing country or agency examining the technical, institutional, economic and financial aspect of the proposed project. This typically takes a longer time than the identification process, and with World Bank assisted project it takes one to two years. However, this time lag could be reduced considerably by involving local experts as recent experience with the federal agricultural coordinating unit (FACU) in Nigeria has demonstrated. Like the identification process, preparation phase is best achieved through a multidisciplinary approach, involving several experts in different disciplines working as a team. The project preparation usually involved the use of consultants local or otherwise. The end result of this process is a project preparation report which forms a basis for the appraisal phase (Cleland, 2007).

The Appraisal Phase: Appraisal phase involves a comprehensive and systematic review of all aspects of the proposed project. This should be a combined effort of both the lending agency and the borrower (when funding is by an external agency). The appraisal may take three to five weeks in the field and covers four major aspects: technical, Institutional, economic, and financial. During this process, the justification of the level of services proposed, the estimated costs and benefit are made. A report is prepared by appraisal team return from the field. This report undergoes several reviews by technical experts to ensure the validity and practicability of the proposals; and for the investors, to confirm that the report reflect their desires and aspirations.

The project negotiation phase: The Negotiation phase is only relevant when and if the project is to be funded by lending agency such as World Bank; and it involves discussion between the lending agency and the borrower on the measures needed to ensure the success of the project. By so doing the lending agencies want to minimize risk of project failure by getting the borrower's firm commitment. The agreement reached during such negotiations are embodied in the project and loan agreement document. After a close study of the agreements by both bodies, by their accredited representative.

Implementation and supervision phase: Implementation is very crucial phase of a project. Its success depends on several factors:

a. how effectively the earlier phases of a project life cycle were handled;
b. availability and appropriate programming of other resources;
c. provision of adequate supervision;
d. Flexibility of the project management to contain the eventualities of a dynamic socioeconomic and political environment of the project.
e. And provision of a workable internal monitoring system.

Evaluation phase: The evaluation phase of the project is the last phase of the project life cycle. This involves an ex-post evaluation at the end of the investment period. This is done by collecting and reviewing project reports, available data at the headquarters, as well as collecting primary data from field trips. Where good monitoring primary network exist, monitored information provides a good base for subsequent evaluation process. The ex-post evaluation process provides lessons of experience which are built into subsequent identification, preparation and appraisal works (Cleland, 2007).

The Benefit - Cost Model (BCM)

The Benefit Cost Model (BCM) A cost- benefit model likens a project of cycles of living things such as trees, and animals and even human beings. Human life cycle refers to a series of processes by which 'an embryo grows, becomes an adult, reproduces, ages and dies... a phenomenon of growth, maturation, reproduction and death' (Maylor, 2010). The project life cycle is also similar to the business life cycle or product life cycle. Wysocki *at. el.,* (2014), defines the product life cycle as an attempt to recognize distinct stages in its sales history; and further identifies four such stages as introduction, growth maturity and decline. In similar vein, a project's life cycle can be partitioned into phases with respect to its net benefit stream. Thus,a projects life cycle can be defined as the different phases of a projects economic life starting from its birth to its death" in relation to costs and benefit over time. Here, birth refers to the project take -

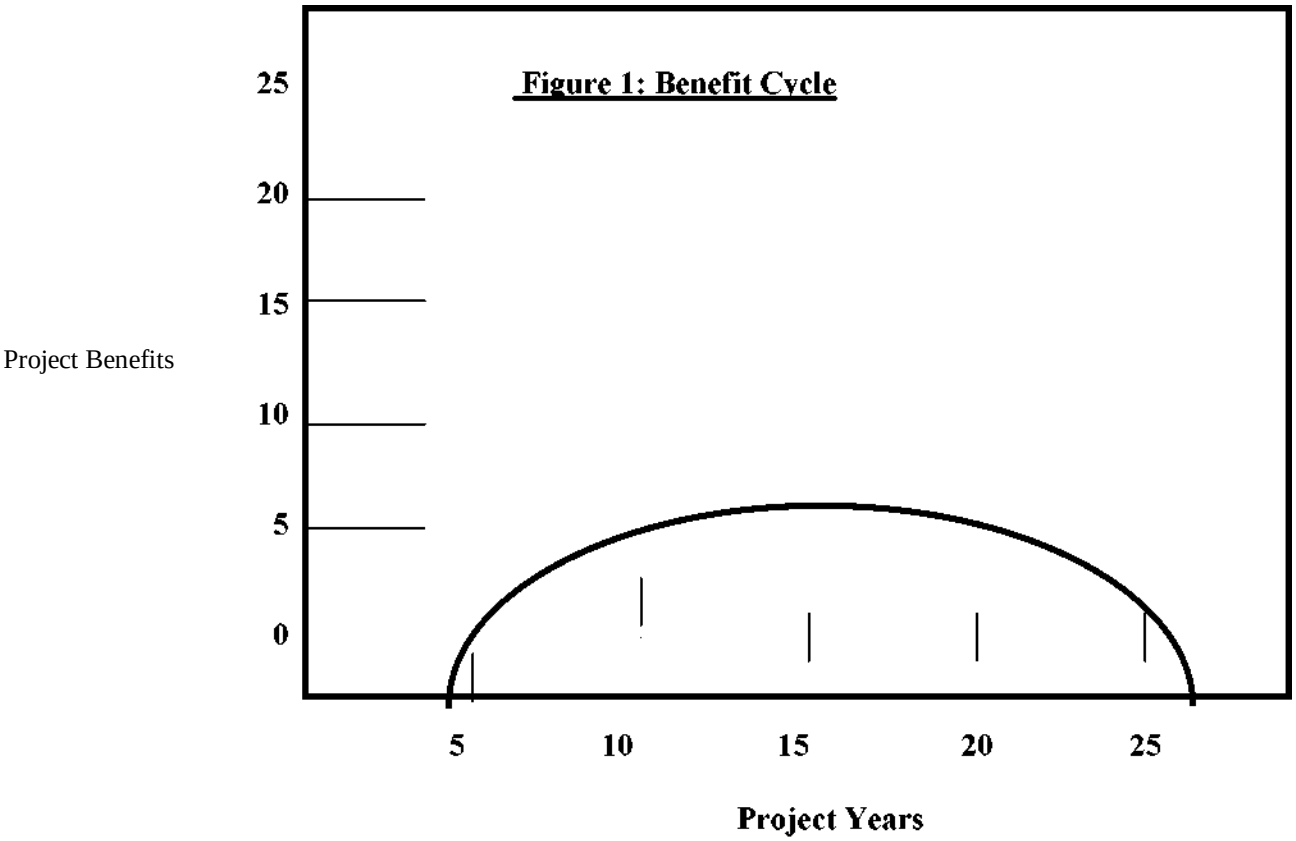
off time when investment starts; on the other hand, death is used to mean when the project becomes uneconomical to operate. Like the business cycle whose troughs and plateau are measured by sales volume, (PMI. (2020), the project life cycle's up and downs depend on net benefit generated at different time periods. The net benefit variable has two components: gross cost (fixed and operating costs), and gross benefits (total value of project outputs). Consequently, the analytical approach is basically benefit and cost oriented. This approach considers the behavior and magnitude of the projects gross benefit and streams over time. With this frame work, project life can be subdivided into five phases, representing an amalgam of the cycles of living things and those of the business products, namely (1) Conception (ii) Investment, (iii) Growth (iv) Maturity and (v) Decline. The behavior of project benefit and costs during these phases is shown in figures 1 and 2, as benefit and cost cycles respectively (*Kerzner, 2017).*

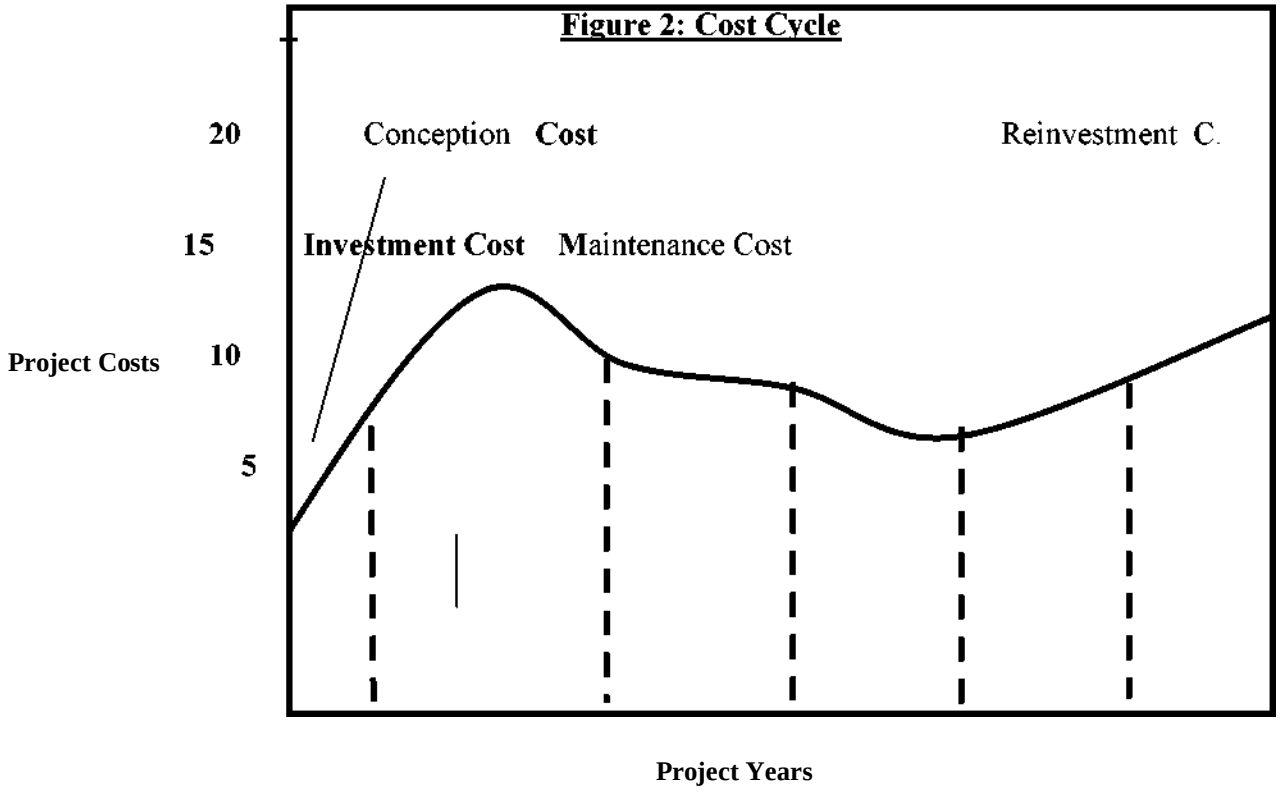
Conception phase: - The conception or birth phase start with the conceptualization of an implementable project idea and ends at the project take off -time. Hence, it covers the identification, preparation, appraisal, and negotiation phases of the conventional approach. The length of time taken by this phase may vary from a few months to several years, depending on the investor and availability of resources. While a private entrepreneur may take a few months to translate a project idea into reality, the Nigerian experience with the World Bank assisted projects shows that this could extend to two to four tears. Also, the magnitude of the costs during this phase depends on the nature of the project, sources of funding, and the type of investor, or corporate, private or public. Expectedly, monetary or other quantifiable benefits are usually generated during this phase.

Investment phase: - The investment phase describes the period of project development. It involves development of physical infrastructure such as roads, offices and residential buildings, dams and storage facilities; it is a period of development of institutional and social infrastructures such as farmer's associations, cooperative societies, and the opening up of communication channels with the local leadership. Purchases of farm/office equipment and machineries, recruitment of all categories of staff as well as staff training and development constitute major investment activities at this stage. It is therefore not surprising that most of the project's capital costs are incurred in this phase; but the project benefits are minimal and in some cases non - existent throughout the investment phase.

Maturity phase: As the project is about to reach its pre-determined size, it is expected to acquire a 'reproductive ability a - benefit - yielding ability and the projects then regarded as having attained a maturity stage. The maturity phase is generally characterized by high benefit stream on one hand, but low and relatively steady cost stream on the other. The major component here is the maintenance/operating cost. The graph of the project costs then flattens out, while the graph of the benefit reaches its peak, stays there for a while, thereby giving rise to a plateau configuration shown in figure 1. This is a period when farmers (for an agricultural project) have started to reap the benefits of say new technology, new inputs, improved varieties and more intensive extension services. At this time of the project, it is also expected that farmers have market outlets for their products or that the project provides some.

PROJECT LIFE CYCLE





Decline/Death Phase: The decline phase starts when the project activities slow down. Perhaps the machinery and equipments have worn-out due to use and misuse; the input may not be available or are delayed due to management inefficiencies; the workers became demoralized because of lack of incentives or new government policies; Additionally, extension staff have learnt new tricks of engaging in petty trading when they should be educating farmers. During the decline phase, the projects operating costs starts to rise for various reasons, while the benefit starts to decline for some of the reasons outline above. This trend continues until costs outstrip benefits, making the project uneconomical to operate. As a result, the project may be discontinued, leading to its termination.

Inter-relatedness and length of phases: It is pertinent however to stress that even though this phase are been analyzed as if they were separate entity, they tend to overlap. For agricultural projects, the investment phase may vary from two to seven years, the growth phase from three to five years, the maturity phase from five to fifteen years. While the last phase (decline) may range from one to three years. Furthermore, the analysis so far centers on consumption hat a project always has one cycle, but in practice, a project may have several cycles or sub-cycle within its life time, depending on the operator/management s well as the nature of the project itself. For instance, a project at the decline phase could be revamped to start what may be regarded as a new life cycle. The decision to do this rest on the operator/management and availability of resources. Rehabilitation project of cocoa, rubber and palm oil plantations undertaken by the Federal Government of Nigeria and financed by the World Bank could be considered an example of this second life cycle.

RESULTS AND DISCUSSION

Application of the Benefit-Cost Model

The benefit cost model has important managerial and policy applications. First, it will enable both the government and the financial organization to determine the phasing of funds, and for private entrepreneurs, it could provide a basis for cash flow analysis necessary to obtain Credit from financial institutions, also it will encourage wise use of funds. Second, if used by planners, it will make for the avoidance of unwarranted expectation about project benefits by investors, funding agencies and most importantly the target group. The third in the benefit cost model, each phase of project life call for special managerial strategy. At the investment phase, agricultural projects require skill personnel in administration, technical and engineering divisions, to put the project on the right footing. These people should remain through the growth stage during which they train the less - skilled personnel to takeover. During the maturity and decline phase project requirement for skilled manpower might be less since most of the infrastructures and installation must have been completed; the project management then becomes a rather routine affair that could be handled by those trained on the job. Thus project evaluators ought to recognize the tremendous impact a particular project phase could gave on the costs and benefit streams; and this awareness is very crucial in narrowing the chances of errors in the evaluator's conclusions and recommendations. In addition, the target group (for public - orientated agricultural projects) should be made familiar with the cycles of a proposed project so as to avoid raising false hopes about the time and magnitude of expected benefits. In government projects, this is necessary particularly when the government desires to maintain some credibility among its subject especially among agricultural communities (Meredith & Mantel, (2012).

CONCLUSION

The Benefit cost-model provides an alternatives approach to project life cycle analysis by emphasizing the benefit-cost stream dimension of a project's life.The approach has useful planning and managerial applications, not only for project formulation but for the target group. Nevertheless, it is important to emphasize that the BCM does not compete with the conventional model; rather, it complements it. It will therefore be rewarding for project planners and evaluators to be conversant with both approaches.

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