An X-Ray of Programme Evaluation and Review Technique (Pert) as a Powerful Managerial Tool in Educational Planning

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Abstract

The paper examines the development and rationale behind the use of Programme Evaluation and Review Technique (PERT) as a tool in educational planning. PERT is a system with interrelated components or entities and a notable management technique for evaluating, reviewing progress and performance towards the accomplishment of stated and well defined organizational goals. Two major elements that are important in the operation of the technique are events and activities. The paper discusses the nature, concepts and terminologies in PERT and its applicability to planning. The discussion of the planning is limited to short-run educational projects. The paper unfolds several benefits that can be accrued when PERT principles are applied to educational planning. Such benefits include; clearer statement of project objectives and goals, enable project manager to identify at an early stage the potential trouble spots in the project plan, to know where to re-plan in the event that the original plan is inappropriate for some reasons. This facilitates the communication process since plans are portrayed in a graphic manner. The paper equally discusses PERT limitation and issues of uncertainty in form of PERT's weakness as a tool in educational planning.

Introduction

The importance of effective management in educational organizations can not be over emphasized. Studies (Tony and Mariane, 2000; Oredehin, 2004) revealed that the quality of management is one of the most important variables in distinguishing between successful and unsuccessful schools. Effective management of any industry requires effective planning of programmes and implementation to meet its goals. Controlling large projects requires careful coordination and planning of the many activities involved. Examples of such projects include; personnel training, construction of projects, research and development (R&D) and planned maintenance of machines and buildings. Generally, successful project management involves the following three phases; planning, scheduling, and control.

Education project like any of the industrial projects involve at times complex problems. For instance through stages of the educational process; programme planning,

revision and implementation constantly take place. Thus, implementing educational plan has grown to be the most difficult phase of the planning process in Africa. Among the reasons adduced for the incessant implementation failures are poor programme management and particularly the inexperience of our educational planners on the quantitative methodological aspects of educational planning. Successful planning demands that implementation be closely monitored to ensure efficiency in the use of resources and effectiveness in the achievement of institutional goals.

There are a number of techniques and tools that make project monitoring more scientific such technique include; Delphi techniques, Network tools, PERT and CPM, etc. (Owolabi, 2006; Ovwigho, 2004). The two most popular forms of network models that focus the attention of the planner on the use of time, labour and other scarce resources including money are the Critical-Path Method (CPM) and the Programme Evaluation and Review Technique (PERT). The major managerial problems related to the issue of time, resource and performance required appropriate management technique. Management techniques are socially designed tools, instruments, models, methods or procedure to optimize efficiency in the practice of management, regardless of the increasing complexities in organizations. PERT becomes essential because is an integrated project management system and a notable quantitative technique that can be used in implementing some educational programmes in Nigeria. PERT, is the most powerful planning control and decision-making aid for educational administrators.

There are several project activities or events the university authority would want to put on network, such events could include academic programme in which the senate decides upon. Correspondingly, the critical events involved could be network thus; date of arrival of students, teaching, revision, examinations, processing of examination results, and consideration of exams results by the senate. Similarly, non-academics programme may be networked thus; inter-house sports, school founder's day and communities, etc.

The focus of this paper is to discuss the importance of PERT in educational planning, with a view to unfolding the potential value that PERT has for educational planning. Therefore, the next section of the paper will discuss briefly the concepts of educational planning and PERT which forms the major elements of the subject of this paper.

The Concepts of Educational Planning

Planning is a process of deciding in advance, the specific future course of action to be adopted with a view to optimizing the use of limited organizational resources for desirable and specific goal attainment. Planning could be on short or long term basis. A

plan can achieve little success without efforts being made to control or monitor its effective and efficient implementation. Within the general concept of planning one can talk not only about economic planning and military planning, but also about educational planning. Educational Planning therefore, is the application of rational and systematic analysis to the process of educational development with the aim of making education more effective and efficient in responding to the need and the goals of the students and the society (Adedeji, 2004; Ovwigho, 2004).

For the purpose of this discussion, therefore long-range planning could be considered as the process of systematically projecting the activities of the organization for at least ten years in order to achieve intended goals. The implication is that to base the activities of education on such long-term plans may not produce the desired results since our society is dynamic and the educational programmes are expected to reflect societal changes. The second type of educational planning relates to short-range planning which are generally limited in scope and brief in duration such as the construction of a new building or the development of a new curriculum. The succeeding remarks in this paper will be focused upon planning as related to educational projects and as opposed to planning related to long-range and comprehensive activities.

The Nature and Concept of Pert

The program (or Project) Evaluation and Review Technique, commonly abbreviated PERT, is a model for project management designed to analyze and represent the tasks involved in completing a given project. It is commonly used in conjunction with the Critical Path Method or (CPM). As noted by Owolabi (2006). PERT is essentially a technique for planning, scheduling and controlling projects. This method is to divide a project into separate operations and then chart the order in which the operations should be carried out. When they should be started and ended, and when the entire project should complete. These are done to eliminate idle equipment time and optimize the use of human and material resources.

PERT was developed primarily to simplify the planning and scheduling of large and complex projects. It is more of an event-oriented technique rather than start–and completion–oriented, and is used more in projects where time, rather than cost, is the major factor. In general, information is needed about the status of

the project in terms of time (or schedule), costs (or resources) and performance. There is need to know whether or not the project is ahead or behind schedule, whether or not the budget will be over-or under—run, and whether or not work is being performed on satisfactory basis, both quantitatively or qualitatively. PERT is a technique for evaluating and reviewing progress towards a stated goal. It is more than a post-mortem in analysis.

It is an aspect of a set of management technique generally referred to as Network Analysis. It is applied to very large-scale, complex, non-routine infrastructure and Research and Development projects. An example of this was for the 1968 Winter Olympic in Grenoble which applied PERT from 1965 until the opening of the 1968 games. The project was the first of its kind a revival for scientific management, founded by Fredrick Taylor (Taylorism) and later refined by Henry Ford. Du Pont Corporation's Critical Path Method was invented at roughly the same time as PERT.

Program Evaluation and Review Technique is a more powerful tool, unlike other management tools and techniques that has serious limitations for the scheduling of projects that require numerous tasks. Thus, PERT is recognized today not only as an effective tool or technique for the manager to control a project once underway but also as an effective technique for the planning of the same project.

PERT Conventions and Terminologies

A typical PERT network consists of activities and events. An event is the completion of one program component at a particular time. An activity is defined as the time and resources required to move from one event to another. PERT mandates that each preceding event be completed before succeeding events, and thus the final project can be considered complete. (Ovwigho, 2004; Rank, 2011).

One key element to PERT's application is that three estimates are required because of the element of uncertainty and to provide time frames for the PERT network: the optimistic time (if everything goes extremely well), the pessimistic time (if everything goes badly), and the most likely time (if progress occurs at a normal rate). The following notation for these three estimates is commonly used; O = the optimistic time, P = the pessimistic time, m = the most likely time. A vital aspect of PERT is the formular used for the calculation of expected project time (TE). $TE = (O + 4m + P) \div 6$. Once the expected time is computed the network diagram is established (as shown in figure one below), the critical path is then established. The PERT chart may have multiple pages with many sub-tasks.

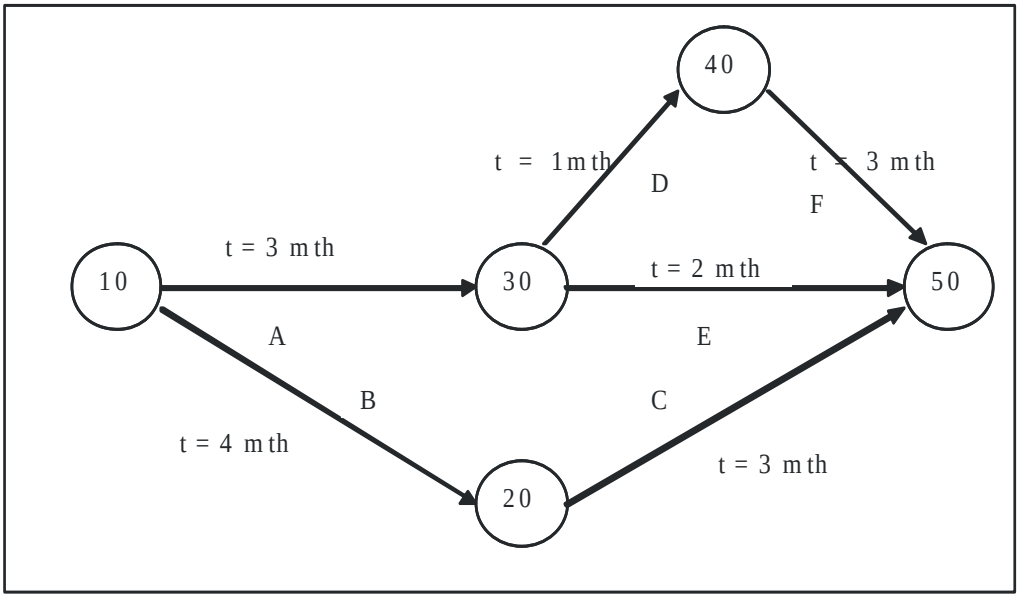

Fig 1: PERT network chart for a seven month project with five events (10 through 50) and six activities (A through F). Adapted from: Wikipedia (2011): the free encyclopedia: http://en.wikipedia.org/wiki/program. Evaluation Review Tech.

Benefits accruable from using PERT as a tool in Educational Planning

Several benefits can be found to accrue when the general concept of network planning and the particulars of PERT technique are applied to development projects. These potential benefits are discussed as follows:

The use of PERT in planning often results in a clearer statement of project objectives and goals. The interdependency and sequence of task to be accomplished are more clearly outlined. On the positive side, PERT requires management to conduct activity analysis (Net MBA, 2011). This implies that well defined activities must be identified, and consideration must be given to the duration times and precedence relationships. This process in itself can be a valuable and informative aspect of the planning phase. This supports that of Oyesola (2004). Planning reconciles objectives, opportunities, and capabilities and lends itself as a factor for selecting targets and means of achieving those targets. Infact PERT system offers an organized method for project planning, scheduling and control.

As noted by Olagboye (2004), one of the most important ways by which school administrators can improve on their overall efficiency is the process of time management. In the use of PERT, several tasks established as separate activities and then time estimates secured. As a consequence, the total time estimates for the larger task was perhaps more realistically established than it would have been for the more global activity description as originally established.

Further on benefits accrued, the use of PERT enables the project manager to identify early potential trouble spots in the project plan (Rank 2011). Planning a major network reveals potential problem areas and interdependent events that are not so obvious in conventional project development methods. As the network proceed in the preparation phase, the project status could indicate that the established deadline date for actually completing the project would not be reached. In fact a condition of being some months late could be noted. With this information in mind the investigator can look at the project plan as represented by the network and make necessary revisions on the critical path (longest network path in time) and then revise other network paths, so as to reduce the total project time. The availability of network makes the necessary re-planning to be efficiently carried out. When utilizing the latest computer application to PERT networks, managers have additional benefits with which to plan. According to Ogunsaju (2006), critical path analysis (CPA) technique along with PERT, is a very simple technique that encourages project managers to work towards deadline because it is concerned with timing operations. It is logical in construction, easy for modification when necessary and can be applied to all schools' system.

The use of network technique facilitates the communication process since plans are portrayed in graphic manner. One does not have to read a verbose description of procedure in order to ascertain the investigators plan attack. The large amount of project data can be organized and presented in diagram for use in decision making. The drawing of the network before preparing the formal written procedure actually helps to provide a clearer statement of the latter. The view of Ijaiya (2002) was corroborative. The complexity of communication can be represented in network and the network serves many other purposes such as; to promote innovation and to integrate activities.

Scholars have submitted that in economic terms, resources are always in short supply. For this reason, the proportion of the resources voted for each school at a particular session has to be efficiently allocated and used. Hence, to balance the mission of educational institutions and their financial goals requires good planning (Durosaro, 2002; Owolabi, 2006). When managers have used PERT in integrated project management, experience gained is re-applied to future projects, especially in developing bids for project estimates. When appropriate costing techniques are implemented with PERT networking, the project sponsors realize significant financial benefits. The PERT/cost system was developed to gain tighter control over actual cost of any project. Job cost estimates are established on a group of activities on the basis of a time network. All aimed at more effective and efficient project management.

PERT Limitations and the Issues of Uncertainty in Project Scheduling

During project execution, however, a real-life project can never be executed as planned due to uncertainty. It can be ambiguity resulting from subjective estimates that are prone to human errors or it can be variability arising from unexpected events or risks.

In cases where there is little experience in performing an activity, the estimate numbers may be only a guess and therefore, the time there may be bias in the estimate. Even if the activity times are well-estimated, PERT assumes a beta distribution for these time estimates and the actual distribution may be different. PERT assumes that the probability distribution of the project completion time is the same as that of the critical path. Because other paths can become the critical path if their associated activities are delayed, PERT consistently underestimates the expected project completion time due to alternate paths. (Net MBA, 2011; Moder, 2000).

Factors influencing project management take many forms, including personnel, materials, equipment and facilities, utilities and environmental conditions. For example, absenteeism, sickness, vacations and even strikes can affect personnel supply, or sudden changes in climatic conditions (snow, flooding from rains, etc) may have an environmental impact. Studies (Moder, 2000; Spinner, 2002) have established various methods to adjust the PERT network in order to allow for unpredictable situations. One possibility is to include safety in the baseline schedule in order to absorb the anticipated disruptions. This is called proactive scheduling. A pure proactive scheduling is a Utopia incorporating safety in baseline schedule that allows coping with every possible disruption. A second approach, reactive scheduling, consists of defining a procedure to a react to disruptions that cannot be absorbed by the baseline schedule.

Conclusion

Successful planning demands that implementation be closely monitored to ensure efficiency in the use of resources and effectiveness in the achievement of institutional goals. PERT is a powerful controlling tool based on dividing a project into separate operations and then charting the order in which the operations should be carried out in a way to save time and optimize the use of resources. Knowledge of PERT concepts and principles can contribute to more efficient educational planning. PERT provides the project mangers with information that is necessary for him to carry out his role of decision making effectively.

The technique is useful to solve complex problems and is task/activities oriented. It addresses every task and requires the designer to identify the goals and activities involved in achieving those defined goals, build up a framework or a network and determine the estimates for every activity. The major overall benefit to be gained from

using PERT in educational planning is that project planning is made more explicit. This is visible proof that a plan does exist to reach the established goal.

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