

AN OVERVIEW OF IMPLEMENTATION OF TECHNICAL AND ENGINEERING PROJECT MANAGEMENT WITH TOOLS OF INFORMATION AND COMMUNICATION TECHNOLOGY

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ABSTRACT

This paper highlights information and communication technology as a tool in implementing Technological Engineering Project Management. It also raises emphasis on some of the common management techniques and presents instances of their implementation using computer packages and software. Recommendations were made for proper implementation of technical and engineering projects using Information and Communication Technologies.

INTRODUCTION

Technology is defined as the practical application of knowledge and sciences for the production of goods and services while Engineering projects could be defined as a scheme or an undertaking designed to achieve a specific objective or objectives of the promoter. Engineering projects management systems therefore could be described as the planning, organizing, directing and control of engineering resources towards achieving a specified physical structure for the use of the citizenry. While engineering also could be defined as the design, execution and implementation of artificial resources and facilities for the use of man

According to Osara, (1994), a project starts with an idea or need to achieve an objective. In Technical engineering project management, realization of the objectives are based on the following:

- Technical feasibility
- Socio-economic acceptability,
- Effects on the acceleration of Environmental and Ecological degradation.
- Institutional practicability and organism strengths and weakness.

The comprehensive feasibility report encompasses all the above issues. These are made possible by the use of information and communication technology tools. With ICT tools the above could be tested or simulated.

Osara (1994) stated further that for the realization of a full blown project, it must pass through a necessary cycle. The components of this cycle in the broadest sense are as follows:

- Initiation of project ideas
- Identification of the formulation of project objectives
- Feasibility studies
- Design and compilation of tender documents
- Tender contract award
- Construction
- Operation and maintenance
- Evaluation.

Information and communication Technology on the other hand could be defined as the application of computer for the process of collating data, manipulating the data according to specified rules or programs, storing the results and communicating the results to other users for solving immediate needs (Osaigbovo, 2008). Programs are themselves defined as finite analysis of problems solving techniques using mathematical models and logic abstractions to obtain solution.

Osaigbovo (2008) further defined computer as an electronic machine, operating under the control of instructions stored in its own memory that can accept data, manipulate the data according to specified rules, produce results and store the results for future use. French (1996) opined that computer is a device

that accepts data in one form and processes it to produce data in another form. Anyasi, Yesufu and Oriafu (2006) also stressed that data analysis seeks to analyze systematically, the data input, data flow and information output within the context of a particular organization. They went further to define system analysis and design as a series of processes systematically undertaken to improve business through the use of computerized information system.

The exponential expansion of knowledge and the growing demand for urgent solutions to problems of everyday technical and engineering activities accounts for the use of computer to solve these problems. The growing demands for models and proto-types of engineering technical activities are actualized through the use of special programs like computer Aided Design and Manufacture (CADAM), and Formular Translation (FOTRAN).

The requirements and needs for knowledge in special academic areas has made the use of internet facilities an every day tool in problem solving techniques in engineering systems. The processes of harnessing the use of information and communication technology in planning, organizing, coordinating and directing of human and material resources for the achievement of expected goal or structures as spelt out in contract documents or government tenders is the main focus of this paper. UNESCO (1979), defined information simply as “a set of data recorded in a methodical manner” which includes;

- (a) any item of knowledge capable of facilitating the operations of a system.
- (b) any numerical or alpha-numerical quantity processes by the machine. The aggregate of information constitutes the data and results of a problem. (as cited in Nwankwo 1985).

PLANNING AND CONCEPTION OF PROJECTS USING ICT

Planning has been defined in different ways by different authors both in management and technology. The most replete of the various definitions is summarized as conceiving a future outcome and analyzing step by step methods of achieving it.

Planning according to Toby (1997) is a process and process in this context is a step by step way of getting things done. This implies that planning processes could be subjected to algorithm tests to explain whether it is realizable or not. Flow chart programs could be designed using variables to identify specific steps in the planning documents. The most accessible engineering management tool in this regard is the Programme Evaluation and Review Technique (PERT)

Toby (1997) opined that PERT shows the planned sequence of accomplishments and the inter-relationships of the tasks. In this case, flows are always unidirectional from left to right. In this type of flow charts, activities are time and resources and these are represented with arrow. Most networks are time-scaled, which means that the horizontal range of an activity indicates the time span required. In the flow chart, events are represented by a number within a circle. These represent points of accomplishments. Events represent a start or completion of activities. An event cannot occur until all activities preceding it are accomplished.

ORGANIZING USING ICT

Organizing could be defined as the bringing together of all the materials and human resources needed to actualize a program or a specific objective structure. Nnamdi, Offiong and Tonwe (1997) defined organization as structure through which activities are operationalised to achieve set objectives. Mathematical programming and heuristic techniques are used for solving resource allocation problems. In mathematics approach, constraints equations involving variables and time constants are formulated. These mathematical constraints could be computerized using truth table to determine the time constraints, limited resources, price fluctuations and consequent availability of funds and finally activity performance requirement taking alternative steps.

Software packages could be installed and utilized for the purpose of organizing manpower and material resources for the engineering projects. The problem of resource allocation is concerned with determining the better option between available resources which include time, throughout the project.

In programme evaluation and review techniques (PERT), the most common objectives the application packages are used to calculate are:

- Minimum projected time for all projects
- Minimum total completion or time for all projects

- Minimum total lateness time for all projects.

The above three criteria were identified in Toby (1997) as:

- Pessimistic time
- The most likely time
- The optimistic time

Using computer information technology, these constraints are formulated in packages. These packages ensure that every schedule meets all the following constraints. These also give a set of feasible solutions.

Some of these constraints are:

- Limited resources
- Precedence relations possibilities
- Project activity due dates
- Activity splitting possibilities
- Substitution of resources to assign specified activities
- Concurrent and non-linear activity performance.

According to Toby (2000), the above constraints are charted in PERT using step by step process. There are

- (a) Project definition and work breakdown
- (b) Flow chart network design
- (c) Adding time to the flow chart
- (d) Designation of resources for each event
- (e) Critical path method (CPM)

These are salient steps to follow to ensure projects completion on specified dates. Udosen (2002) asserts that if the duration of each activity in PERT # chain equations is given, the Project Duration (PD), the Earliest Start Time (EST) and Latest Finish Time (LFT) of each activity in the network represented by # chain equation can be computed.

In Technical engineering projects, material, manpower, equipment are subjected to some sort of controls. Control focuses on the major demands of a project. These elements are classified as inputs and they are:

- (a) time
- (b) Finance
- (c) Resources

In cybernetic control, inputs are subjected to a process that transforms them into outputs. These outputs are monitored. Output measurement taken by sensors is transmitted to a comparator, which compares them with a set of pre-determined standards. The difference between actual and standard is sent to the decision maker, which determines whether or not the difference is of sufficient size to deserve correction.

GO/NO-GO CONTROL

These take the form of testing to see if some specific pre-condition has been met. This type of control can be used for every aspect of technical and engineering projects. While cybernetic controls are automatic and would check the operating systems continuously, go/no-go controls function periodically, at regular intervals. Information Technology would make it possible to collect the information continuously instead of at regular intervals in computerized engineering systems. This will eliminate errors in the control system and action would be taken at the appropriate time.

POST PERFORMANCE CONTROLS

Post performance controls or post project controls are applied towards improving chances of future projects. Post performance controls are implemented following the formats of four distinct section documents.

These may be summarily described as:

- (a) Project objectives
- (b) Milestone, checkpoints, and budgets.
- (c) Final report on project results
- (d) Recommendation for performance and process improvement.

A data base management system and spreadsheet may be used for the post control phase. A data base can be defined as the collection of data or information help in a logical manner and in a format that allows the computer to store, recall, manipulate and move around individual parts with ease.

Data base management is the aid of processing data and storing information in which single files are put together into a common database of records for processing and reporting. (Osaigbovo 2008). Post performance controls are determined by available data base. Database is used to generate the report while spreadsheets or lotus 1-2-3 is used to carry out the calculations necessary for final decisions.

REQUIREMENT OF ICT IN ENGINEERING AND TECHNICAL PROJECT MANAGEMENT

Information and communication technology tools needed for execution of Technical Engineering projects should enable diagram scheduling, and tracing and other multi media devices. In view of this the following criteria are suggested for choosing a suitable ICT tool.

- > Friendliness: Programme must be user friendly
- > Calendars: It must be calendar compliant
- > Cost/finance: It should not be very costly to purchase
- > Interface with spreadsheets programme
- > Interface with word processing for compilation of reports
- > Graphics and chart capabilities. (Osaigbovo 2008).
- > **Migration:** Software should enable migration to any application.
- > Support for appropriate output devices
- > **Multi-media capability**
- > **Internet connection** capability
- > **Non-determinacy:** Must be able to handle and respond to events that happen unpredictably
- > **Sharing:** ICT tool or operating system must be able to allocate resources and handle the simultaneous execution of programs
- > **Concurrency:** The ICT tool or operating system must be able to run several activities simultaneously.
- > **Long-storage:** The operating system must have long term storage when installed
- > **Maintainability:** The ICT tool or operating system must be maintainable. Thus it is easy to make changes, diagnose infected files and clears any virus from the system or files.

SUMMARY AND CONCLUSION

The role of information and communication Technology as a tool in Technical project management cannot be over-emphasized. All aspects of technical engineering projects require ICT tool in proper execution. When projects are planned, ICT tool are needed for pilot and trail testing of the projects. Three dimensional views of the particular projects are generated to give a holistic view of the projects' experiments. The software packages also help to carry out those critical and highly sensitive aspects of technical and engineering project management. When ICT is fully integrated into technical engineering project management, it would save cost; a lot of time efforts and energy are saved and utilized for other ventures.

RECOMMENDATIONS

The development of our contemporary environment depends largely on the proper implementation of industrial and developmental projects. Our almost intractable power system failure had been traced to improper systems management of the sector to be able to forecast progressive power demands and maintenance schedule of our already ailing transmission systems.

It is also recommended that further researches on ICT tools for maintenance management should be carried out to rejuvenate our poor maintenance culture that had bedeviled our roads and urban and rural facilities over the years.

This being the case, a functional engineering and technical management processes aided with information and communication technology tools had become imperative if we are to develop into a modern society.

REFERENCES

- Anne-marie B. (2002). *Internet Technologies making the Internet work for you*: Oxford; Heinemial Educational Publishers.
- Anyasi F. I. Yesufu A. K. and Oriafo J. (2006). Software Design for a Firewall Security System. *Journal of Engineering Science and Applications (JESA)* 4,2.
- French C. S. (1996). *Computer Science Fifth Edition* London; Book Power/Cengage Learning
- Nnamdi H. s. Offing O. J. and Tonwe D. A. (1997). *Eminent Administrative and Management Thinkers* 1, 2, Ibadan; Amfitop Books.
- Nwankwo J. I. (1985). *Fundamental of Management Information Systems*, Ibadan; Spectrum Books Limited.
- Osara S. I. (1994). *Anatomy of Engineering project management*, Benin City; Ilupeju Press Limited.
- Osaigbovo (2008). *Introduction to computer software for engineering Fields*, Benin City; St. Louis Publishers,
- Toby T. (2000). *Essentials of Management and Leadership in Vocational and Technical Education*. (2ed). Jos; (Nig). Association of Technology Teachers (NATT).
- Udosen U. J. (2002). *Analytic Project Planning Model Using # Chain Equation Technical Transactions of The Nigerian Institution of Production Engineers*, Special Edition 7, 3.
- UNESCO (1979). *Computerized Management of Educational System* 1. Paris; operational Programmes Division p. 112.