

Relevance of Project Evaluation and Review Technique (PERT) for Procurement of Equipments in a Government Medical College and Hospital in North-East India

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Abstract:


Introduction: Continuous procurement of various equipments in the hospitals is essential to keep up with global progress of healthcare services. In public sectors, procurement process largely depends on budget sanctions and also by a number of formal procedures and rules which leads to delayed procurement. With this prevalent scenario, the present study was carried out to evaluate the procurement of two major equipments in an apex tertiary care institute using Project Evaluation and Review Technique (PERT). **Objective:** This study was done to evaluate the procurement of two major equipments using PERT in a tertiary care institute. **Method:** This study was conducted using Operational Research technique in an apex tertiary care institute i.e., medical college and hospital, in one of the North Eastern states of India. All the procurements related to equipments in that teaching hospital initiated in the financial year 2021 were listed. Out of them, two procurement files were selected by simple random sampling; procurement of Operating Table and Bio Safety cabinet Level – III. Project Evaluation and Review Technique (PERT) was applied to calculate the possible reduction in time in the whole procurement process. **Results:** The present study showed that procurement of Operating table took 185 days where minimum 8 days could have been saved and procurement of Bio-Safety cabinet Level-III was completed by 702 days where minimum 196 days could have been saved. **Conclusion:** Application of PERT in this procurement evaluation process can play significant role by calculating critical path and predicting the possible delay.

Keywords: Medical equipment, Operational research, Operating table, Project Evaluation and Review Technique (PERT)

Introduction:

Healthcare across the globe has evolved tremendously. Along with advancement in knowledge, medical equipment technology has also evolved at an exponential pace to introduce fineness and accuracy in diagnosis and treatment. Changing healthcare policies have created a space for the medical equipment industry to showcase their products and promote them in the sector. To keep

pace with this advancement, there is a continuous demand for up gradation of medical equipments in hospital settings. Procurement cycle in the public sector settings is governed by a number of formal procedures guided by a set of procurement rules which are often time consuming. Most hospitals have their unique system of collecting the demands and materializing them. In most public sector hospitals, it is the guided by an annual procurement plan which is

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prepared by the central store of the hospital, which in turn is prepared based on the user area demand. High end medical equipments however, may have some special procedures to follow depending on the hospital policy. In general, most hospitals have a separate procurement cell or section which deals with these procurements. High end machines or cost intensive equipments are not routinely purchased and hence when demanded by the user department, needs some scrutiny as well as sufficient justification. These demands when placed before the administrative heads undergo the routine formal procedures which include processes like selection of specification, estimation of budget, sanction of budget, etc. followed by tender formalities and award of contract.^[1] All these steps in procurement are unique and require their own time due to multiple stake holders in public procurement. Although, all these steps are essential, alternative paths can still reduce the required time. Hence, evaluation is quintessential for ensuring smooth procurement process. Application of Project Evaluation and Review Technique (PERT) in this process can play significant role.^[2,3]

Method:

The present study is a descriptive study carried out in the hospital setting of a tertiary care institute in one of the North-Eastern states of India. All the official data were retrieved with permission from the administrative authority. The study was carried out during the year 2022. For purpose of the present study, all procurements related to machinery and equipments initiated during the financial year 2020-2021 in the study setting were listed. A total of 18 files were in the process of procurement related to machinery and equipments of financial value worth Rs. 5,00,000/- and above. Some of the listed files were also not physically available in the concerned section on account of movement on the days of data collection. Out of the available files, two were selected by simple random sampling for the present study on account of short study period and convenience. The selected files were related to procurement of Operating Table and Bio Safety cabinet Level-III.

For this purpose, the steps of procurement process in general, were specified initially to compare with the standard.^[1] These steps are:

1. Initiation of the requisition.
2. Decision of the administration to procure.
3. Selection of specification of the item.
4. Obtaining administrative approval and expenditure from competent authority depending on the financial involvement.
5. Preparation of the NIT/ e tender/creation of GeM bid.
6. Floating of tender / GeM bid.
7. Ending of bid submission.
8. Placing in technical committee.
9. Placing in finance committee and selection of L1 bidder.
10. Placing before the appropriate purchase committee for finalization of rate and firm.
11. Approval from the next higher committee.
12. Placing of supply order.
13. Supply.
14. Installation and commissioning.

Application of PERT: The program (or project) evaluation and review technique, commonly abbreviated PERT, is a statistical as well as optimisation tool used in project management, is designed to analyze and represent the tasks involved in completing a given project.

The various steps employed in application of PERT to a project are:-

- Identification of specific activities and milestones.
- Determination of the proper sequence of activities.
- Construction of a network diagram.
- Estimation of time required for each activity.
- Determination of the critical path.
- Updating PERT chart as the project progresses.

Table 1 : List of Activities and Their Duration for Procurement of Operating Table (OT table) and Bio Safety cabinet Level (BSL) III

Sr No	List of activities	OT table	Days	BSL III	Days
A	Date of Requisition	05-08-2021	—	26-05-2020	—
B	Decision to Purchase	07-08-2021	02	26-05-2020	0
C	Specification committee	23-08-2021	16	27-05-2020	01
D	Administrative approval expenditure sanction	31-08-2021	08	09-12-2020	196
E	Tender notification	27-10-2021	57	03-07-2021	206
F	Tender closing	17-11-2021	21	26-07-2021	23
G	Technical evaluation	26-11-2021	09	24-08-2021	29
H	Financial bid evaluation	18-12-2021	22	07-01-2022	136
I	Purchase committee	17-01-2022	30	12-01-2022	05
J	Approval	20-01-2022	03	24-01-2022	12
K	Purchase order	25-01-2022	05	31-01-2022	07
L	Supply	05-02-2022	11	10-4-2022	69
M	Installation & commissioning	06-02-2022	01	28-4-2022	18

Results:

Present study evaluated the Application of Project Evaluation and Review Technique (PERT) in procurement of equipments in tertiary care institute. List of activities and their duration for procurement of Operating Table (OT table) and Bio Safety cabinet Level (BSL) III is shown in Table1.

Network chart related to procurement of OT table and BSL III is given in Figure 1 and Figure 2. For OT table procurement maximum time lag was found in the process of tender notification (57 days) followed by purchase committee (30 days) and for financial bid evaluation 22 days (Figure 1)

For procurement of BSL III, maximum time taken in for tender notification (206 days) and in administrative approval and fund sanctioning (196 days). (Figure 2)

Discussion:

The present study showed that completion of procurement of Operating Table has taken 185 days. But there was scope for reduction in time in few of the activities. If the requisition was put up along with the specification of item, 8 days time could have been saved. Administrative approval and fund sanction has taken 57 days and financial bid evaluation took 30 days which could have been reduced by proper planning. Procurement of Bio Safety cabinet Level III was completed by total 702 days. Again by placing the requisition along with specification of the item, 196 days could have been saved. Administrative approval and fund sanctioning took 206 days which is very long. The reason being, health infrastructure was suddenly hit by the COVID 19 pandemic. At that time, resources were diverted towards the pandemic management which led to this significant delay. Another two most time consuming steps were technical evaluation and purchasing the order where time reduction was possible.

Figure 1 : Network chart related to procurement of OT table*

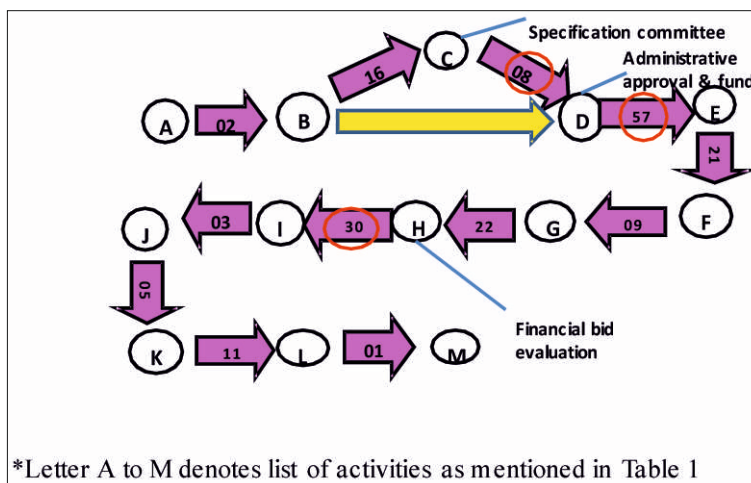
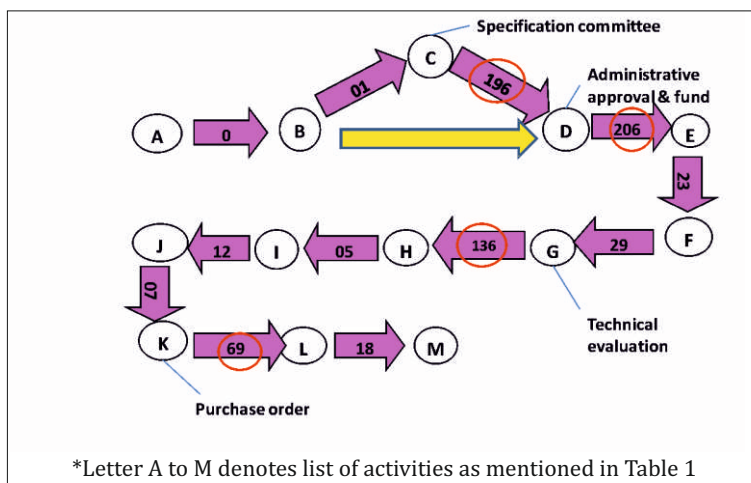


Figure 2 : Network chart for procurement of Bio-Safety cabinet Level III*



Utilizing PERT, all the activities required for the purchase of equipment can be planned before hand there by reducing the time of completion of overall project. In a study conducted at Nizams Institute of Medical Sciences, considerable reduction in procurement time of an MRI machine was observed. A period of 23 weeks could be reduced.^[4] Woolf et al, applied PERT to a medical research project at the Hospital situated in Toronto. In order to use PERT, the project was broken down into the individual tasks and time estimates were given to each of these activities. Whenever each activity was completed, an International Business Machine (IBM) card was sent to the project director who compared the actual completion date with respect to the date on the schedule report. Application of PERT made it

possible to determine whether the project was on time, behind or ahead of schedule and significantly helped to organize the project and maintain progress toward its conclusion.^[5]

In another study conducted in the emergency department of a tertiary care hospital to analyse the different types of process flow with respect to PERT technique, the critical path, completion time and any variation in path in the emergency care unit was estimated. The study contained an exploratory research with random sample of 100 patients within the sample of 460 in duration of 2 months. On application of PERT the expected time of project completion was 84.89 minutes whereas the variance time was found to be 253.1 minutes.^[6]

Limitation of the study:

Although, current study tried to identify the events where time could have been saved, a number of other facets of delay in these steps remained unexplored and this could be addressed by qualitative methods.

Conclusion:

Application of PERT in the planning stage of any procurement can reduce the overall time taken for the project. After completing the network diagram, progress of all the activities can be monitored easily and this will help in completing the project within the specified timeframe. The project also can be expedited by reducing the time taken for each activity in the critical path.

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