Integrated Cost Management System for Delivering Construction Project

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Abstract - Cost management forms a major discipline in delivering construction projects of different sizes and complexity. Traditional cost management systems are mostly based on principles enacted several decades ago. A notable feature of these traditional cost management systems is that key information required for critical decisions is usually produced too late, and is often too aggregated and configured in a form that is not amenable to the requirements for current project management practice. Other problems associated with traditional cost systems relate to inadequacies in estimating and cost control processes and particularly the lack of integration of cost management across the whole project. The lack of integration means measurements provided by traditional cost systems do not sufficiently align with the goals and objectives set for the project. To address these inherent weaknesses in the current practice of cost management, a number of studies have argued for an integrated alternative that better responds to the information demand and decision making need to be developed. The thesis presents the development of a solution to such an integrated cost management system. The investigation conducted to support the development of the integrated cost management system and the applied model addresses user requirements and determination of the system boundary conditions for efficacious use by key decision makers.

II. OBJECTIVE

1. To investigate and establish the essential features of a cost management system
2. To provide a prototype development and trialing of a cost management system which integrates the planning and control stages for the delivery of projects in the construction sector.
3. To identification and find solution for the problems of poor connectivity that predominates in the use of traditional cost management methods.

Index Terms - Construction project, Integrated cost management system, Primavera, Resources
2.1 To achieve the aim of this project, the following objectives were pursued:
1. Establishment of current knowledge base that supports the study to include cost management, integrated systems development, and project information planning.
2. System requirements analysis and data collection work to obtain the data configuration for the integrated system development.
4. Coding and developing the application for the Integrated Cost Management System.
5. Providing a set of recommendations for the use of the new system.

III. LITERATURE REVIEWS

The main aim of the journals is to determine the production cost in companies and in construction and their managing the costs. To reduce the cost of production majority of the companies tend to follow their own cost management system. Results from the system development and verification with construction project cases find that cost management system can help to reduce time effort and input errors compared to the manual methods. By using the cost management system complete information regarding the cost status of the project can be accessed at any time. So, it can reduce the total project cost and increase the efficiency and profitability of the construction.

IV. METHODOLOGY

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Above mentioned are the 5 topmost significant limitations that are identified. Developing an integrated system can be useful to overcome the problems. Primavera P6 software was used. Here I considered a bridge construction project and analysed using Primavera and given the solution.

VI. PRIMAVERA

Primavera is enterprise project portfolio management system. It includes project management, product management, collaboration and control capabilities and integrates with other enterprise software such as Oracle and SAP’s ERP systems. Primavera was launched in 1983 by Primavera system Inc. and was acquired by Oracle cooperation in 2008. Oracle Cooperation’s Primavera Global Business Unit (PGBU) focuses as of 2016 on providing web-based enterprise project-portfolio management software that encompasses resource allocation, cost reduction, supply-chain efficiency, and decision-making – using real-time data – for the enterprise market.

6.1 Analysis of Bridge Construction Project Using Primavera
The study area selected for this project is “Construction of bridge at Pattambi in Pattambi constituency – Palakkad district”. Its length is 23m and width is 3.6m and its height is 22.86m.

6.1.1 CREATING EPS
The Enterprise Project Structure (EPS) is also a hierarchical based structure that represents how your projects are organized. The OBS and EPS are combined together through the responsible manager field on the EPS structure, project folder and Work Break Structure (WBS) level.

![Fig.1 EPS OF THE PROJECT](image1)

6.1.2 WORK BREAKDOWN STRUCTURE (WBS)
The various activities that make up the project have to be clearly identified. The process of breaking the project into easily identifiable major systems, their sub-systems and discrete activities is known as WBS.

![Fig.2 WBS OF THE PROJECT](image2)

6.1.3 CREATING ACTIVITIES
A project can be broken down into various jobs in the form of operations and processes necessary for its completion.

![Fig.3 ACTIVITIES OF THE PROJECT](image3)

6.1.4 GANTT CHART
A Gantt chart, commonly used in project management, is one of the most popular and useful ways of showing activities (tasks or events) displayed against time. Each activity is represented by a bar; the position and length of the bar reflects the start date, duration, and end date of the activity.

![Fig.4 GANTT CHART OF THE PROJECT ACTIVITIES](image4)

6.1.5 ACTIVITY USAGE PROFILE
Use the Activity Usage Profile to view cost or unit values for activities in the open project over time according to a timescale you specify. The Activity Usage Profile displays resource allocations for all activities.

![Fig.5 ACTIVITY USAGE PROFILE](image5)
6.1.6 RESOURCE USAGE PROFILE
Use the Resource Usage Profile to analyze quantity or cost usage for resources or roles. We can view a resource's or role's cost and quantity data for a specific project.

Fig.6 RESOURCE USAGE PROFILE

6.1.7 ACTIVITY USAGE SPREADSHEET
The Activity Usage Spreadsheet displays activity data in a spreadsheet format. View baseline budgeted or planned, actual, remaining, and at completion values or review information such as earned value cost, actual labor and non-labor units, and remaining total cost for the activities in your project.

Fig.7 ACTIVITY USAGE SPREADSHEET

6.1.8 RESOURCE USAGE SPREADSHEET
Use the Resource Usage Spreadsheet to analyze quantity or cost usage for resources or roles. For every role and resource in the project, you can review cost or quantity information for a specific project or for all projects across the enterprise (total allocation).

Fig.8 RESOURCE USAGE SPREADSHEET

VII. DEVELOPMENT OF INTEGRATED SYSTEM (PRONTO)
Resources are required to carry out the project tasks. Resources can be labour, non-labour, and materials required for the completion of a project activity. In the primavera software, before assigning the resources, we have to define the resources and assign to each activity. While defining the resources, we have to add resource name, resource type and resource units. Then assign the activities. In the primavera software, if we want to manage the cost of the project by replace or adding resources, we have to define the resources and assign the activities. And have to repeat the procedure from stage one and it will consume more time. In my project a solution for it has been found by developing an integrated system (PRONTO). If it is added to the primavera software, replacing and adding resources to the activities will become easier and can be done at any stage of the project.

Fig.9 PRONTO home page
Fig.9 shows the PRONTO home page. This page consists of two options such as Resources and
Activities. Using these two options, we can add or replace the resources at any stage of project process.

Fig. 10 Resources
Fig. 10 shows the list comes under Resource options. Resources like Labour, non-labour and materials can be changed at this stage.

Fig. 11 Subtopics under each resource
Fig. 11 shows the subtopics under each resource.

Fig. 12 Activity table
Fig. 12 shows the Activity table of non-labour resource. Select any activity to add or replace. Here, an activity — Earthwork in Excavation — is selected from the table.

Fig. 13 Add or Replace
Below activity table, we have two options such as ‘ADD’ and ‘REPLACE’. Click on the desired option to meet our requirement.

Fig. 14 List of Replaceable items
Fig. 14 shows the list of replaceable items comes under Replace option. Select the item that has to be replaced with.

By using integrated system PRONTO, we can skilfully manage the cost of the project at any stage of construction process.

A. BENEFITS
- To eliminate differences between the cost estimation and cost control processes.
- To reduce the cost uncertainties in construction projects.
- To integrate cost estimation and cost control processes.
- To provide a new way of managing cost in a project delivery.
- To solve poor communication of information linkages that traditional cost management methodology produces.
- To satisfy better client’s needs.
- Seeks to make cost a driver for design, thereby reducing waste and increasing value.
- To improve manager’s and project team’s performance.
VIII. CONCLUSION

This work examined and developed an integrated cost management system for project delivery. Essential feature has been concluded and an integrated cost management system has been developed through the methodology adopted to meet the research objectives. The integrated cost management system enables the identification and solution of the problems of poor linkages that predominate in the use of traditional cost management methods. The main conclusions are strongly connected with the objectives of the research, providing valuable information for future researchers and professionals. It is a valid guide for all the project managers and upper management within companies, as it supports the decision making in any stages of the project. The contribution of the cost management system is immense in the completion of delivering construction projects. Integrated cost management system is a decision-making tool for all project managers and upper management offering continuous support in all the stages of a project’s life cycle.

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