

Management Information Systems for Cost Effectiveness in Construction

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Abstract:- This paper explores future requirements of Management information systems (MIS) for professional Project Management Consultancy. The Main Focus area would be to establish an effective MIS to control the cost. The overall objective of this paper is to investigate the contribution of MIS towards the controlling the cost of the project. At present all the existing literature in Information System focuses on Information System for the construction. There is comprehensive study, evaluation and assessment on Information System for Professionals . But there is lack of study and knowledge in understanding MIS to establish cost effective construction model. This paper will establish ways and mechanism to utilize the MIS for cost effectiveness. This will also help in understanding effective utilization of MIS by effective scheduling, process improvements etc. The expected outcome from this paper would be a comparative analysis based on case study to prove cost effectiveness by using MIS

Keywords: Management Information System, Cost Effectiveness.

I. Introduction

The current time of globalization and information has reduced the information illiteracy and divided the digital. This in has also increased the local and international competitiveness. Increased competition has forced organizations to change their ways to ensure they could sustain in the market.

The projects need to be planned, monitored, controlled, evaluated and optimally resources. The cost consideration and its effectiveness is one of the important parameter which should be considered in the management of projects.

For any organization to be successful the projects must be managed well in terms of quality, cost , scope and time.

As per Raymond et al., it is important for the Project to optimally managed keeping cost ,scope and time in mind and to effectively achieve the performance and productivity objectives. The Project Management in general although looks to be simple still highly remains as challenging task due to ineffective control and cost, scope, quality and time.

Although the use of MIS in the management of projects will not give any guarantee for the success of the project but it will certainly ensure better control on various keys parameters of the project.

So application of MIS has become the need of any projecte to ef and efficiently manage the projects and provide a supportive framework to Construction Managers to meet the target and objective of the project within underlying constraint.

Thus the purpose of this paper is to study the role of MIS towards the success of projects a case of construction projects.

Aim

- An aim of this project is “Introduction of a project management information system for cost effectiveness in construction”
- The purpose of this paper is to study the role of MIS towards the success of projects by establish a cost effective project management model.
- Main Focus area would be to establish an effective MIS to control the cost.

Objectives

- The overall objective of this paper is to investigate the contribution of MIS towards the success of construction projects.
- The research intended to find out the contribution of MIS towards controlling the cost by establishing an effective mechanism to keep close control on schedule.
- Control on schedule will ultimately result in controlling the cost and its demonstration by case studies.
- The plan is to establish some software information system to keep close watch and control on scheduling by adopting various technique viz Scheduling Crashing, better sequencing of activities, parallel processing etc.

II. Literature Review

Management Information System has developed to assist the professional for their day to day work mainly for Project Managers.

Information systems have been continuously going through the evolution process and have not just limited to planning, scheduling and resource management. These have evolved to extent where it can play vital role in decision making, Productivity and efficiency improving, complex problem solving to controlling the cost.

MIS is different and class apart from other IS in the sense that it very flexible and customizable to cater the need of professionals and organizations.

MIS need to continuously go the evolution to meet the changing project requirements originated from project governance, complexity, approach and strategy etc.

As per Project Management Knowledge, MIS can be defined as the tools to facilitate managers in managing projects whether simple or complex.

MIS can also be described as a means to help in planning, scheduling and controlling cost, scope and time for the project.

Most commonly used MIS systems in market are MS Project, Primavera etc

As per Kaiser, MIS are important tool to manage the projects efficiently and effectively and no more limited to just scheduling, monitoring the applications rather an effective tool to deal with complex systems and covers the wide range of project processes.

As per Ahleman (cited in Caniels et al., 2011) MIS is comprehensive and elaborative system that support the most of the phases of project life cycle starting from inception to implementation.

According to Elonen et al. PMIS is advantageous to project managers due to its contribution towards timely decision making, controlling and effective monitoring ensuring its ways toward success.

MIS is an effective system to assist project managers in decision making, effective and timely communication to various stakeholders resulted in to customer satisfaction. It also paves the path of project success by ensuring proper and effective control on cost, schedule, quality and timely completion.

MIS like any other system has gone evolution process in terms of its integration with computer software and evolved tremendously to meet varied project management requirement. Initially started with just scheduling and monitoring tool now has evolved as full package where contributing for all the aspect of project management like requirement gathering, feasibility analysis, design, development and deployment.

MIS is proving to be an effective tool for project managers effecting assisting for all the managerial tasks.

As per Parks, MIS supports three major functionalities like Communication, Collaboration and Community.

- Communication (MIS delivers information quickly to team by external and internal network)
- Collaboration (MIS supports an active cooperative management system among the members)
- Community (MIS supports accumulation of related information and data through information sharing).

High Quality Information System is must to assist project manager to make appropriate and timely decision which ultimately improves the productivity and performance and ensures the project success.

According to Kaiser et, The use of MIS is based on the fact that cost benefit the offset of other associated benefits of MIS like enabling organizations to manage projects and portfolios effectively ensuing better control on the projects.

MIS support most of the project life cycle phases from the inception, idea generation, risk management, stakeholder management to the effectively manage the knowledge repository created after the project completion. MIS also ensure better quality control and adherence to the defined quality standards.

According to Kim, Project qualities of a MIS control the project from cost, scope time point of views, it also ensures its adherence to quality standards.

According to Swanson, The quality of information generated by the MIS determines the quality of the system.

As per Zmud, accuracy and timeliness of the information are critical determinants of information quality.

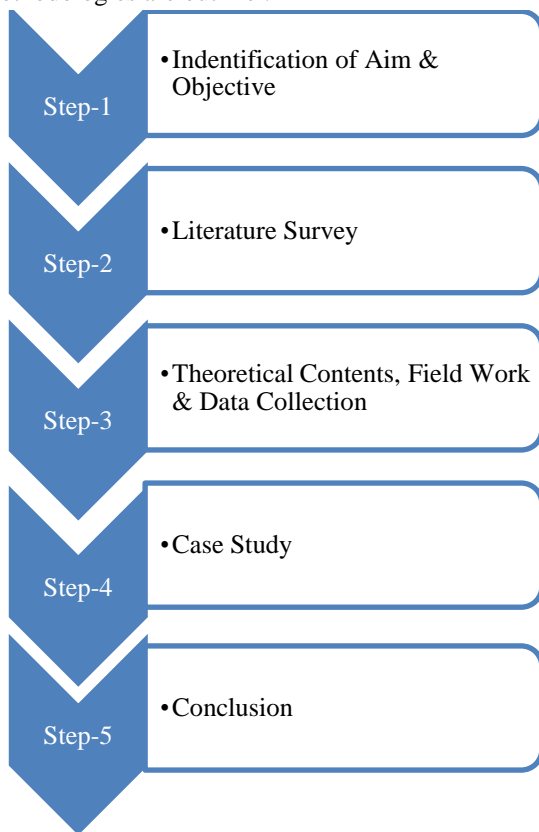
As per Kim, important factors that determine the quality of management information system are accuracy, availability, precise, conciseness, consistency, interpretation etc

The use of MIS is beneficial as it provides relevant and correct information for day to day running of a project.

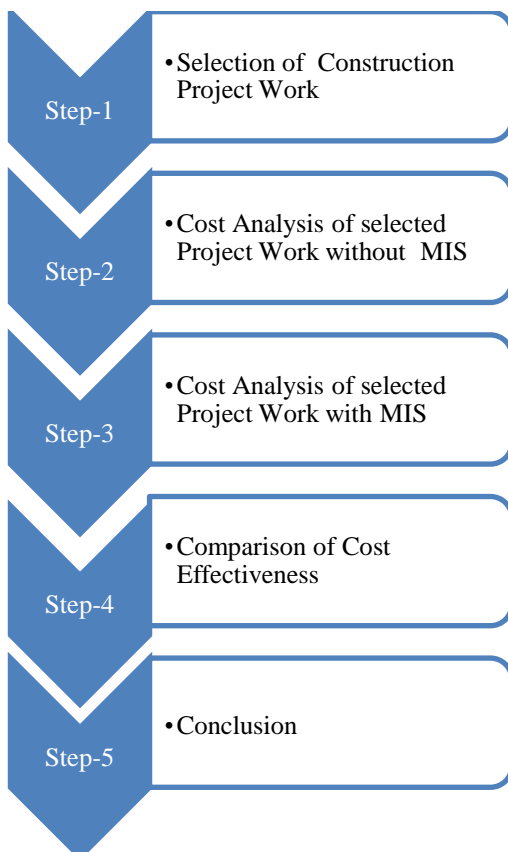
III. Methodology

The purpose of this study is to analyze the 'current status and future direction' of CM's management information Systems (CM-MIS) to establish a cost effectiveness in construction projects

In order to achieve the above stated purpose, following methodologies are outlined:



IV. Case Study Approach



V. Theoretical Contents

Information systems assessment (ISA) issues number of literature in the construction industry. As a starting point, Betts [1] proposed a five-level framework for IS to present industry level

Jung et al. [6] and Stewart and Mohamed [9] have developed two independent frameworks one for industry level perspective and another for IT utilization in the industry. [2].

Jung and Joo [3] have set up a comprehensive framework on building information Modeling (BIM).

Jung and Gibson [5] developed a quantitative framework to evaluate the benefits from IS on a 'company-level' perspective.

Industry-level perspective emphasizes on the generally applicable variables of ISA, company-level perspective articulates more organization-specific issues. Out of these variables, construction business function (e.g. design, estimating, cost control) is commonly used both for industry- and company-level perspectives.

Construction Manager is flexible enough to meet the varying CM's responsibility and very different from project to project. This fact forces CM firms to make use of commercial applications rather than in-house developed systems

Based on these characteristics of Construction Managers the 'construction business function' and 'systems configuration' have become the two fundamental dimensions for CM-MIS assessment.

Construction business function can be very well referenced from nine areas introduced in the body of knowledge (BOK) defined by Project Management Institute (PMI) [8]. These nine areas are "integration, scope, time, cost, quality, human resource, communications, risk, and procurement" management.

Jung and Gibson explained the fourteen business functions for the construction industry; planning, sales, design, estimating, scheduling, materials management, contracting, cost control, quality management, safety management, human resource management, accounting/financing, general administration, and R&D.

Systems configuration covers two aspects. One is the method of systems development and acquisition. Second one is 'systems configuration' variable is the data form of each construction business function.

Structured data represent that systems contains records with well-organized attribute (e.g. relational database for cost control function). *Unstructured* data may encompass various types of information (e.g. documents, spread sheets, images, pictures, and so on). The degree of structured data in an application is a measure to characterize the IS for each construction business function.

Field Applications, Case studies & Data Collection

A survey questionnaire was prepared based on the CMPMIS assessment framework and sent Construction Management companies Participants were asked to fill out the details of their construction business functions. After filling out fourteen construction business functions, the participants were asked to evaluate the weighting of 'cost control' among fourteen business functions. This value is calculated from the weightings of each package, groupware, and specialty in 'cost control' row multiplied by the weighting of 'cost control' function.

In addition to the systems configuration, the survey was also done for Information System Utilization for each construction function. Future plans for information System use were also asked in the questionnaire.

As per the survey result it has been found that around 40% of Construction Management Information Systems are in-house developed systems. Around 20% packages software like ERP, ASP etc and remaining are either groupware or specifically customized software. So finding is that Construction Management companies require high amount of flexibility in Project Management Information System,

It has been also observed that in CM-Project Management Information Systems only 50% data is structured.

Most interesting fact is, out of total unstructured data , good proportions comes from design and cost control.

This outcome clearly indicates the unique characteristics of Construction Management Companies.

The average Information System expenditure to annual revenue was just 3 % and average number full time Information System staff was just 5.

So it is highly recommended that Information Technology investment in Construction Industry should be increased to take full advantage of Project Management Information System particularly to have better control on cost, scope and time.

The survey questionnaires were also asked participants to evaluate current level of Project Management Information System use for various construction business functions. Future directions for Project Management Information System enhancement were also assessed.

Survey results shown that cost control and design are two most used system. Construction Companies inclined to use information system in future for sales and cost control, contracting and procurement. Material management is another area has shown potential for further enhancement of Project Management Information System.

But the most focused area is cost effectiveness where construction managers shown keen interest and desire to use the information system so highlighting the real need of utilizing the information system for cost effectiveness.

VI. Conclusions

This paper proposed an effective 'Management Information System for cost effectiveness in construction'. This paper explores future requirements of Management information systems (MIS) for professional Project Management Consultancy. This paper will establish ways and mechanism to utilize the MIS for cost effectiveness. This will also help in understanding effective utilization of MIS by effective scheduling, process and productivity improvements etc.

The overall objective of this paper is to investigate the contribution of MIS towards the controlling the cost of the project.

Acknowledgement

It gives me an immense pleasure and satisfaction to present this Dissertation Stage-I report on

"MANAGEMENT INFORMATION SYSTEMS FOR COST EFFECTIVENESS IN CONSTRUCTION"

which is the result of unwavering support, expert guidance and focused direction of my guide **Prof. A. A. Warudkar** and PG Co-ordinator **Prof. Abhijit N. Bhirud** to whom I express my deep sense of gratitude and humble thanks, for his valuable guidance throughout the presentation work.

The success of this Dissertation Stage-I has throughout depended upon an exact blend of hard work and unending co-operation and guidance, extended to me by the supervisors at our college. Furthermore, I am indebted to our HOD, Dr. A.W. Dhawale, Principal Dr. Sachin V. Admane whose constant encouragement and motivation inspired me to do my best. Last but not the least, I sincerely thank to my colleagues, the staff and all others who directly

or indirectly helped me and made numerous suggestions which have surely improved the quality of my work.

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