Application of performance management system in infrastructure sector

(Case Study: Metro Rail Project, Ahmedabad)

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Abstract - **The research is mainly concerned with identifying various factors that affect the performance of a project in the construction industry and then ranking these factors according to their relevance and importance of their effect on project performance in a metro sector of the construction industry. The mode of obtaining data for the same was by floating a questionnaire. A suitable questionnaire, incorporating questions related to these factors, floated to different companies having undertaken similar construction works (Metro Rail Project, Ahmedabad). These responses were then analyzed using the relative importance index method. The questionnaire also involved judging these factors based on the various aspects of project performance such as, cost, time, quality, productivity, health safety and environment issues and client satisfaction. The aim of the research is to find out a general trend of the importance of factors in a particular sector of the construction industry.**

Index Terms - **Performance Management, Performance Measurement, Productivity, Performance Evaluation, process efficiency, Benchmarking.**
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I. INTRODUCTION

The core business of construction industry is undertaking projects in producing new building or refurnishing existing ones for a variety of clients. Traditional approach of performance management in construction industry is in two ways that is performance management in relation to the product as facility and performance management to the creation of product. Performance management systems are systems that have evolved over time and are instrumental in tracking and evaluating the performance of an organisation on various levels. Performance management involves measuring the performance based on various parameters of a project or the functioning of an organisation. Performance management is known to have positive impacts on the productivity of the organisation. Productivity has been reportedly increased with proper performance management systems implementation. It also involves measurement of process efficiency and allows managers to identify the best practices in an organisation. Performance management can be done for an individual or a department of an organisation or an organization's project. The system can also be applied to an entire organisation. There are various parameters that can be used to measure the performance of an organisation. These parameters are usually decided on the basis of benchmarking that is carried out in comparison to the best in business. These parameters are then judged and ranked using various statistical tools and their analysis is carried out.

II. AIM OF PERFORMANCE MEASUREMENT

Performance measurement has two main aims: to connect company goals and objectives to improvements and to set targets for improvement activity.

III. RESEARCH METHODOLOGY

Formulation of Questionnaire: A questionnaire approach was adopted for the research work which requires the development and dissemination of a questionnaire survey. To formulate a questionnaire study was done in following ways:

- Interaction with concerned people
- Taking reference and suggestions from class fellows having work-ex or managing their own firms
- Interaction with people managing their own firms
- Referring to relevant papers

Consolidation and compilation of the inputs: All the inputs were consolidated to narrow done on the major aspects of project performance. They were found to be as follows:

Cost: it relates to the various financial aspects of the project performance.

Time: this head includes causes of delays and time over runs.

Quality: this head includes the judgment of project performance using quality parameters.

Productivity: this includes the various factors which have a direct impact on the output of work. Output of work is directly affected by the factors included under this head.

Client satisfaction: it is the degree of satisfaction that a client derives from the work submitted to him.
Health safety and environment: it pertains to the various factors from health and safety point of view and the effect of project performance on environment.

Working out the major factors: A total of more than 70 factors were zeroed down on after the interactions and referring to papers. These factors majorly affected all stages of projects. However, many of them could be clubbed under the same head, or they had the same kind of effect on the project performance. Hence, by studying them, they were narrowed down to a total of 30 factors on which questions were formed.

Final formulation of questionnaire: All the thirty factors were analyzed and relevant questions understandable to the attempter were formed. This was done to make sure that the attempters were able to get the intended message or query. These questions were directed to the Metro sector of the construction industry. Moreover an example explaining how to attempt the question was also mentioned. The questionnaire also collects basic information (name, experience, designation, etc.) of the attempter and the sectors they work in. The questionnaire collects the weightages of the 6 aspects of project performance from the at-tempter's view point.

IV. DATA COLLECTION AND ANALYSIS
Floating of questionnaires
Responses received: About 350 questionnaires were floated to various people by various media. These questionnaires were sent by post or mail. Some were even filled manually by approaching the concerned parties. Out of the 42% responses received, there were responses from Metro rail sector.

Analysis of Responses: The responses collected were then subject to analysis by the relative importance index method. Relative importance index (RII) method is a tool used for ranking various factors based on the responses received.
Relative Importance Index Formula:

$$RII = (\sum_{1}^{N} W) \div (A \times N)$$

Where,
W = Weights given to each factor by the respondents and will ranges from 1 to 5, where '1' is less significant and '5' is extremely significant.
A = Highest weight, and
N = Total number of respondents.
Inference: While evaluating the importance of the factors on project performance, all those factors having RII<0.599 (i.e. 59.9%) have been considered less significant .means they have less effect on the project performance.

V. CONCLUSION AND RECOMMENDATION

Table 1 top five factors having utmost important on performance

FACTORS	PROJECT WEIGHTED RII	RANKING OF RII
Supervision	0.7542	1
Rework	0.7393	2
Reportable accidents on site	0.7300	3
Skilled persons	0.7247	4
Maintenance of plant and machinery	0.7166	5

Table 2 less significant factors as far as performance of metro sector

FACTORS	PROJECT WEIGHTED RII	RANKING OF RII
Escalation provision in contract	0.5705	29
Liquidity	0.5662	30

- The construction industry needs to form an integrated network of labors, machinery and finance. These are the three main components of any project in the construction industry. Proper coordination between the three will ensure a successful project.
- Quality of work delivered is of utmost importance in the construction industry. Hence, quality audits and checks are a must. The quality of work delivered helps the company to develop goodwill and image. Any project that is being carried out by a company is always under scrutiny by various potential clients. This goodwill and success of the project shall also help the company to gain more projects and in turn make more profits.it may also lead to repeated orders from the same client. Hence quality has both short term and long term benefits.
- Supply chain management is an important feature of the construction projects. A well- managed supply chain helps to adhere to the planned schedule and achieve deadlines with- out causing any time over runs. Hence, delivery of goods from vendors is important for the success of construction projects.

- Labor productivity is dependent on many factors such as working conditions, motivation of the labor, compensation provided to the labor, etc. these factors, if considered properly can increase the labor productivity and lead to savings in time and cost.
- The construction industry has time and again proved to be unpredictable and dynamically changing. Hence, the only way to ensure proper completion of these projects is by juggling these multiple factors well so as to create a favorable position for all parties to the project.

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