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Developing a Performance Measurement Framework for Residential Construction Projects in India

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Abstract - *Construction industry is a project-based industry which is influential in nature. The need to identify the weak points and search solutions to build on performance of construction organization is extremely crucial. Performance measurement has the main focus of helping organizations to understand how decision-making processes can be used to improve accomplishment rate in past activities and how the understanding from the present and past can lead to future advancements. Distinctly, the extensive performance measurement practice must develop the achievement of the key aim of the project associates, the objectives of the project itself, and the needs of the users all of which should be capable of being represented in raw data to be manipulated and measured by a performance measurement tool. Basically, the efficiency and effectiveness measures of a project are essential benchmark for assessing project performance and success. This study found that a total absence of performance measurement concept process permeates the management of the residential construction projects. To close this gap, this study was undertaken upon to investigate and identify the various performance measurement approaches and frameworks that are used to support the guidance of project performance toward success. In particular, this study highlights the importance of stakeholder needs and expectation forming the bases of residential construction projects in India. Distinctly, this study suggests that the measurement of project performance in residential construction projects in India should be integrated in an extensive framework containing several elements that will help to guide construction projects toward accomplishment.*

***Key Words*: Project Management System, Performance Measurement, Critical Success Factor**

1. INTRODUCTION

Indian economic growth rate that is the second fastest in the world (8.9%) and a GDP that is the fourth largest in terms of Purchasing Power Parity (US$ 3.6 trillion), India is an upcoming global business giant (Ernst and Young, 2012). The population of India is forecast to rise up to 1.7 billion by 2050, making it 400 million in excess of currently the most populated country which is China (UN population bureau, 2012). As a result, this will place a large stress on the existing infrastructure and construction industry to brace this demand. In spite of this growth and demanded expansion, India is facing issues of inadequacy or inefficiency, which could pose a disaster in future of the construction industry and the development of its infrastructure.

Performance measurement system (PMS) have become fundamental tools in the successful management of organizations in order to ensure they achieve their goals. Performance measurement is referred to as the process to determine to what extent the aim and objectives of a project have been attained. It can be performed in order to improve an organization's ability to formulate superior plans, to better carry out innovation and learning and to permit gradual organizational development. Therefore, the concept, definition, purpose, problems, and processes of performance measurement shall be investigated. Three specific models of performance measurement shall be discussed which are the Balanced Scorecard (BSC), the European Foundation for Quality Management (EFQM) Excellence model and the Baldrige Criteria, as well as two generic methods of performance measurement are Key Performance Indicator (KPI) and benchmarking which shall be discussed in greater detail. The three specific models of performance measurement are branded PMS with prescribed processes; whereas, the two generic methodologies are performance measurement tools that can be applied in any PMS.

2. OBJECTIVE OF RESEARCH

Review existing performance measurement framework being used in the construction industries of the developed countries; Identify the procurement and execution procedures of construction projects in India; Examine the current process and approach to managing and measuring construction projects in India and problematic areas; Explore and determine the performance management process, CSFs, and PMs and PSMs in the implementation of Residential construction projects

3. LITERATURE REVIEW

3.1 Definition of Performance Measurement

Performance measurement is often extensively discussed; however, it is not often defined (Ghobadian & Ashworth, 1994). Before starting to review and investigate the previous research regarding performance measurement, it is necessary to define some terms that are applicable to PMSs: -

Ahmad, Gibb, & McCaffer (1998, p. 187) defining performance measurement as "a process that involves the assignment of numerals to objects or events according to rules or to represent properties".
Performance measurement is "the process of determining how successful organizations or individuals have been in attaining their objectives" (Sinclair & Zairi, 1995, p. 50).
Performance measurement is defined as a "process of assessing progress toward achieving predetermined goals, including information on the efficiency with which resources are transformed into goods and services (outputs), the quality of those outputs (how well they are delivered to clients and the extent to which clients are satisfied) and outcomes (the results of a program of activity compared to its intended purpose)" (Kulatunga, Amaratunga, & Haigh, 2007, p. 679).
Performance measures are the numerical or quantitative indicators that show how well each objective is being met (Sapri & Pitt, 2005). Moreover, they area "vital sign of the organization and how well the activities within a process or the outputs of a process achieve a specific goal" (Sapri & Pitt, 2005, p. 432).
Performance measurement systems are "a systematic way of evaluating the inputs, outputs, transformation and productivity in a manufacturing or non-manufacturing operation" (Neely et al. 2005 p. 1242).

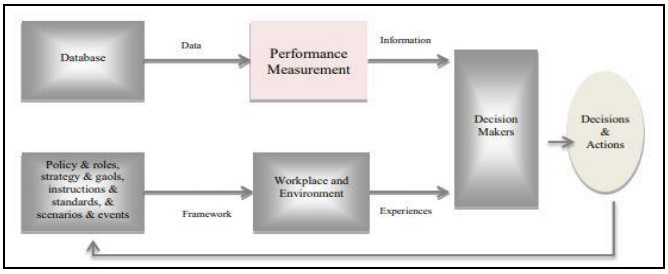

Fig 1- Performance measurement and manager roles (Phusavat et al. 2009)

3.2 Process of Performance Measurement

In general, Ghobadian & Ashworth (1994) state that any PMS has four phases: -

- Determine requirements and identify PMs;
- Identify desired goals;
- Monitor achievements; and,
- Have on-going reviews of areas of failure

4. METHODS OF PERFORMANCE MEASUREMENT

1. The Balanced Scorecard
2. European Foundation for Quality Management
3. Baldrige Criteria for Performance Excellence
4. Key Performance Indicators

4.1 The Balanced Scorecard

The BSC model was designed in 1992 by Kaplan & Norton as a new method to measure the performance of the four business "dimensions": -

Financial;
Customers;
Business processes;
Learning and innovation.

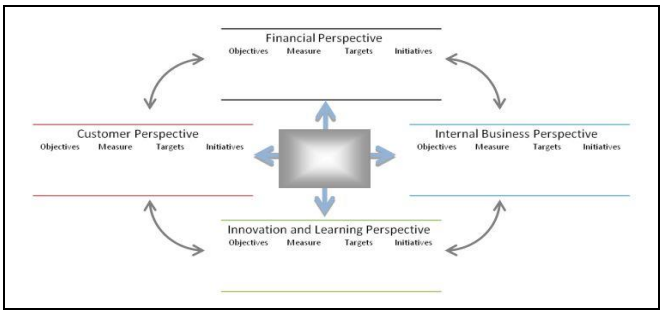

Fig 2- Translating vision and strategy (Kaplan & Norton, 2005

Research suggested that to overcome the weaknesses of the BSC model, it has to be enabled to answer the following questions: -

- Who are our key stakeholders and what do they want and need?
- What strategies do we have to put in place to satisfy these needs?
- What processes do we need to have in place to execute our strategy?
- Which capabilities do we need to perform our processes?
- What do we expect from our stakeholders in return?

The answers to these questions are to encourage and enable an organization to design a comprehensive and integrated success framework.

4.2 European Foundation for Quality Management

The EFQM Excellence Model has been utilized by companies in the construction industry and others such as manufacturing, finance, insurance, and as part of management through Total Quality Management. It is suggested for use as a means of self-assessment in order to benchmark with other organizations, as a guide for improvement, an approach to thinking, and a structure for the organization's management system (EFQM, 2010). Beatham et al. (2004) added that the purpose is to conduct a regular review of an organization's activities. The main aim for application of the EFQM model is to identify the performance improvement areas.

The key distinction between EFQM Excellence Model and the BSC is that the EFQM model is designed to deal with best practice; whereas, the BSC model is focused on

communication and performance measurement. However, the EFQM model is criticized as being less comprehensive and less clear than the BSC model despite the shortcomings mentioned previously. There are also other aspects mentioned as criticisms, such as resistance to change, documentation difficulties, insufficient time and funds allocation, and ambiguities in terms of defining areas of improvement (Yang et al. 2010). A schematic of the EFQM model can be seen in Figure 3.

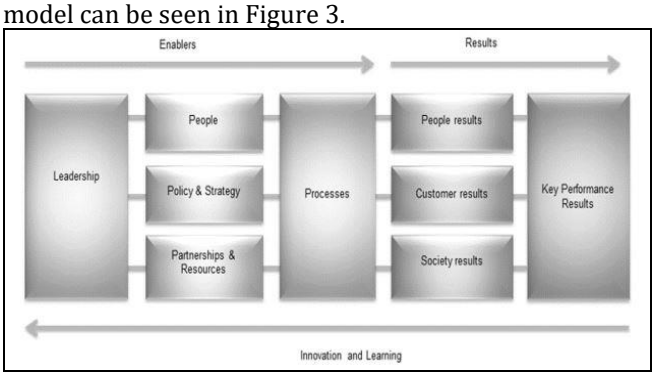

Fig 3- The EFQM model (Beatham et al. 2004)

4.3 Baldrige Criteria for Performance Excellence

The MBNQA was established by the Malcolm Baldrige National Quality Improvement Act of 1987 to improve organizational competitiveness by focusing on the outcomes of customer satisfaction and organizational performance (Jacob, et al. 2004). The Baldridge Award, via the Baldrige Criteria for Performance Excellence, is considered a driver for quality and customer satisfaction, which measures outstanding features in several dimensions: leadership (how leaders manage their organizations), strategic planning (how to set strategic orientations and plans implementation), customer and market (requirements and expectations), information and analysis (manage and analyze data in order to support performance management), human resources (training and skills improvement), process management, and business results. The Baldridge Criteria is the equivalent of the EFQM model in European countries. According to Bassioni et al. (2004) both are utilized as performance measurement frameworks. Despite the range of these categories, there are key aspects that are considered to be fundamental to all: leaderships, system, aims, and measures. The basic idea of the Baldridge Criteria was to focus on leadership and customer satisfaction with less emphasis on the outcomes; although, there has been a recent shift towards quality and operational results (Hodgetts et al. 1999). The main objectives of MBNQA are not only to enhance management quality, but also to provide a comprehensive framework to assess an organization's development and progress towards excellence through employee and customer satisfaction. However, critics have noted some weaknesses in the Baldridge Criteria: the application itself consumes time and money, and the financial measures are also deemed to be poor (Jacob et al. 2004). A schematic of the Malcolm Baldridge Criteria can be seen in Figure 4

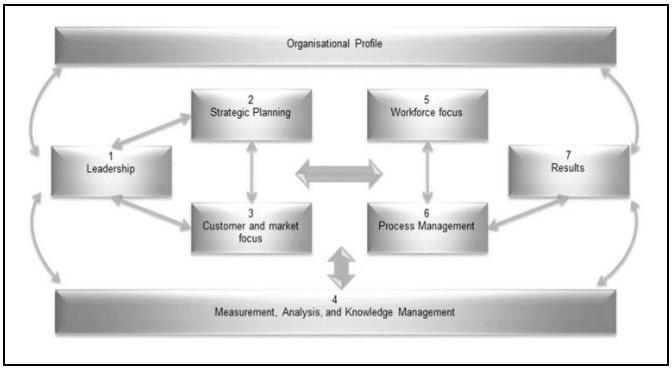

Fig 4- Malcolm Baldridge Criteria (Vokurka, 2001)

5. KEY PERFORMANCE INDICATORS

According to previous research, KPIs have been designed and used in the UK construction industry to measure client satisfaction, defects, construction time and cost, productivity, profitability, impact of environment, etc. The first usage of the KPI concept was in 1961 in the companies of D Ronald Daniel to refine business strategy. The performance measurement indicators theory is driven by the concept of benchmarking (Haponava & Al-Jibouri, 2009). According to the Egan Report (1998), KPIs were improved by the Government's Movement for Innovation and the Construction Best Practice Program (CBPP). Many other KPI models exist, including the CBPP method, which is used in the construction industry as a benchmark against other companies. There are currently 38 KPIs and a business solution has been launched whereby trained advisors help organizations select KPIs that meet their business needs as can be seen in Table 1

Table 1: Founder and years designing KPIs (adapted) (Beatham et al. 2004).

Organizations	Key Performance Indicators	Objectives
The CBPP, 1998	Client satisfaction (product, service), profitability, productivity, defects, safety, predictability (time, cost), construction time and construction cost.	Measure different stages of a construction project and to support of benchmarking
The ACE with DETR, ICE, RIBA, RICS, and CIC, 2001	Client satisfaction (overall performance, value for money, quality, time delivery, health and safety awareness), training, productivity, and profitability.	measure construction project performance and support benchmarking
Respect for People (RFP), 2002	Client satisfaction (overall performance, value for money, quality, time delivery, health and safety awareness), training, productivity, and profitability.	Assess construction project performance and to support of benchmarking
The Construction Industry Research and Information Association (CIRIA), 2000	Clients' needs, design process, integration of design with supply chain, internal cost/time management, risk, re-use of design, experience, innovation, and client/user satisfaction	Used for self-assessment
Design Quality Indicator	Build quality, functionality, and impact.	Measure design quality, assessing and managing

(DQI)		value of the product
Satisfaction of Service KPIs (SoS KPIs)	Cost management and reporting, program management and reporting, planning, flexibility, communication, team working, innovation, managing the environment, managing safety and after care service.	Costumer focused

Beatham et al (2004) notes that the initial concept of KPIs and performance measurement has shifted in the construction sector and that KPIs are now used mainly as a comparison method for benchmarking. The KPI model can measure performance of the project at organizational and stakeholder levels. The successful implementation of KPIs features seven steps as can be seen in Figure 5

4.2.1

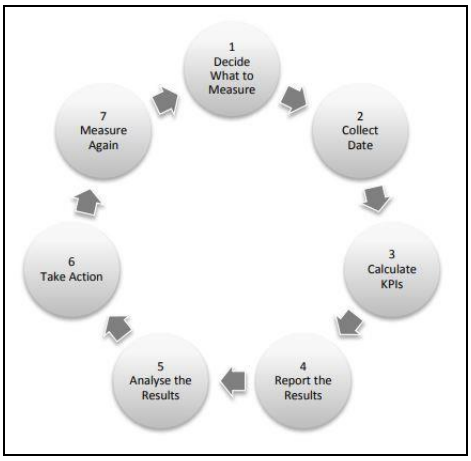

Fig 5- Seven steps to implementation of KPIs (Ibrahim et al. 2010)

5.1 Types of Key Performance Indicators

KPIs can be categorized as objective and subjective measures. The objective (quantitative) measures are calculated mathematically by formulae and give numerical values; whereas, the subjective (qualitative) measures are stakeholders' opinions and perceptions (Chan & Chan, 2004).

Objective measures include construction time, speed of construction, time variation, unit cost, percentage net variation over final cost, net present value, and accident rate. Subjective measures include quality, functionality, end-user's satisfaction, client's satisfaction, design team's satisfaction, and the construction team's satisfaction (Toor & Ogunlana, 2009) as can be seen in Figure 6

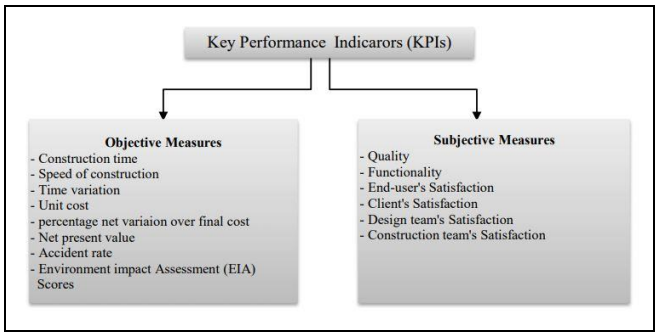

Fig 6- KPIs (Toor & Ogunlana, 2009)

5.2 Characteristics of Adequate KPI

There are fundamental principles that should be taken into account before using KPIs.

- Consider why they are being used
- Measure what is critical to success
- Keep it simple
- Set up a system to use the KPIs and to benchmark them
- Limit the number of indicators to about 8-12

Similarly, Beatham et al (2004) suggest that adequate measures have similar characteristics, are: -

- In order to be successful in the in the use of KPIs, it should be recognized that there are differences between KPIs (leading), KPOs, and perception measures.
- Good measures have a all inclusive overview and they depends on leading and lagging indicators.
- They support the decision maker with updated information.
- They have to be balanced between the organization's strategy and interests.
- They must be involved as a basic component of the system and the process of execution.
- There must be staff involvement in the improvement of the measures.
- The results must be up to date and valid to be useful to the organization for benchmarking their achievement (internal and external).
- The processes and stages of design and construction have to be recognized and clear.
- The measurement systems have to be upgrade and take into consideration processes and sub-processes.

Finally, it is important to note that the reorganization of KPIs is not in itself sufficient for the success of a PMS, but it should be considered carefully in the process of measurement and its application. The major issue in using KPIs is that they are concerned with past events (lagging indicators). As a result, these measures offer little chance to change the future.

6. METHODOLOGY

This research has been undertaken on the basis of measuring the performance of the construction projects in India through all stages of project execution. In addition, theoretical approaches are included to review previous research further to practical approaches that are concerned with field work to collect information and data through questionnaires and interviews. The research program can be classified into five basic phases as seen in Figure 7.

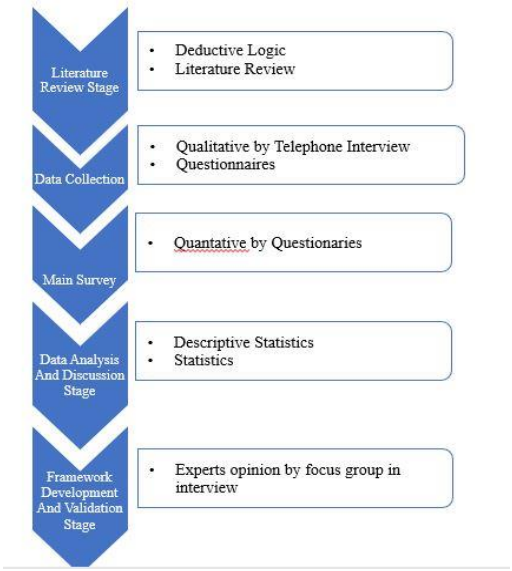

Fig 7- Research Methodology Diagram

7. FINDINGS

The task under this objective is to review existing performance measurement framework being used in the construction industries of the developed countries. The purpose of this objective is to present an in-depth review of existing performance measurement frameworks that are being applied in the different construction industries in developed countries. The review showed that the majority of developed frameworks are mostly useful for financial oriented projects and rely on lagging measures instead of leading measures. While a majority of the frameworks are tailored towards measuring organizational performance, only one of them, KPIs, are tailored towards measuring project performance, however, it was not clearly designed to measure the project in stages. For instance, no single measure is specialized only for measuring a particular stage, but as a collection of measures for the whole stages in a project. Further, none of the existing frameworks has considered stakeholder concerns and needs separately or in each of the stages for alignment at the end of the project. They have also not determined specific objectives for each stage of the project. Despite the importance of CSFs in the delivery of successful construction projects in both implementation and final outcome results, none of the systems that are applicable for construction project integrate CSFs with PMs that are based on objectives of each of the separate stages. Municipal organizations have the responsibility to deliver public service efficiently, by providing construction projects for citizens' use, and its success are determined by citizens' satisfactions. The measures for efficiency and effectiveness have not been applied as a part of the existing frameworks that are applicable for measuring municipality construction project outcomes.

8. Conclusions

The concept of performance measurement as a discrete process has been present since the 1940s, and although variously defined, it is the process of collecting, analyzing and presenting data on the performance of a project or organization. Historically, the initial focus of measurement was on lagging quantitative indicators; however, they have evolved to incorporate virtually all available aspects of an organizational process, including qualitative and leading indicators, in order to measure progress and improve outcomes.

PMSs are now considered a fundamental tool to control and monitor organizational and project performance to ensure that processes achieve overall goals. Performance measurement is being applied as a key management method to determine success or failure of performance whether in the private or public sector; however, the adoption of these systems is not as common in the public sector or in the construction sector. There is clearly reluctance within these sectors to adopt PMSs either through a lack of understanding or senior leadership, or due to cultural resistance to change The success of a PMS relies fundamentally on including benchmarking as part of its process. This research has shown that the objective of measuring performance in public and private sectors is to improve productivity, effectiveness, efficiency, and the quality of the delivered service in the three levels of "organization", "project" and "stakeholders", in addition to determining expenditure and increasing accountability. Benchmarking as part of a PMS is considered as a means to determine areas of strength and weakness, as well as to monitor competitors' abilities. Despite this, the importance of performance measurement and benchmarking are not widely applied.

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