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Performance Management in Construction

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ABSTRACT: Projects are organized to accomplish complex tasks that cannot be handled by lone individuals but by multidisciplinary teams in the construction industry. Project success depends upon how well the personnel can work effectively to accomplish objectives within scope, cost and quality constraints. Project Managers and Engineers are entrusted with the task of integrating the disciplinary and the inter-organizational efforts under changing environment for successful accomplishment of the specified objectives. They operate independently of the normal organizational chain of command, with the sole aim of achieving the specified goals within the available resources. They assume total responsibilities and accountability for the success or failure of the project. Hence, the need for performance management as a system for managing and integrating organizational and employee performance. Performance management is about directing and supporting employees to work as effectively and efficiently as possible in line with the needs of the organization. In this thesis, knowledge on performance management is obtained and a study on its various measurement methods is done. A questionnaire will be prepared by identifying the important aspects of the project which the personnel should know for performing his work effectively.

KEYWORDS: Construction industry, Performance indicators, Performance management, Performance measurement.

I. INTRODUCTION

Projects are organized to accomplish complex tasks that cannot be handled by lone individuals but by multidisciplinary teams in the construction industry. Project success depends upon how well the personnel can work effectively to accomplish objectives within scope, cost and quality constraints. Hence the need for performance management as a system for managing and integrating organizational and employee performance. In past, many researches have been done to frame an effective performance management system for construction industry based on the flaws in the existing systems adopted globally.

Performance management is a continuous process of identifying, measuring and developing performance in organizations by linking each individual's performance and objectives to the organization's overall mission and goals

Performance management is the process of creating a work environment or setting in which people are enabled to perform to the best of their abilities. It is the main vehicle by which managers communicate what is required from employees and give feedback on how well they are achieving job goals.

The performance of a successful project team is measured by three factors; technical success according to agreed project objectives; Performance on project schedule (finish on time); Performance on budget (finished within financial constraints) A manager you need to adopt performance management practices that will facilitate continuous review and ongoing development of your department team in order to deliver departmental objectives. The underlying assumption is that by managing the performance of the individual and team, departmental and organizational performance will follow and by raising individual and team levels of performance, organizational performance will also improve. Equally when performance of individuals is not managed, this can lead to frustration and discontent amongst team members

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II. OBJECTIVE

The main objective of the thesis is to frame the aspects of a project required for the efficient performance in construction industry, which are vital that Project managers and site engineers should be aware of. It is done via questionnaire survey [1]. The measures derived by taking study on various literatures collected regarding performance measurement. The thesis also involves study of various performance measurement methods in existence. Based on the performance measures a questionnaire will be prepared and the same will be used to take survey on the project managers and site engineers to know whether they are aware of their work nature. The data collected will be used to interpret results and based on the results suitable suggestions will be made to improve the performance management [2].

III. NEED FOR STUDY

In the present scenario of the construction industry it is vital to measure the performance of the engineers to check whether their work is in line with the strategies of the organization. But it is not being followed in many companies as they are expecting positive financial turn over for the company regardless of the performance of their employees [3]. It is important to measure the performance of the employees based on the non-financial performance measures. This process will help the employees to be aware of the work nature and also he can track the performance by self. The thesis involves identifying various aspects of a project which are vital for the measurement of performance of the project managers and site engineers. The project manager can also track his subordinates' performance using these measures [4].

The thesis will help the engineers to identify the roles and responsibilities; the measures can be used to upgrade the knowledge of engineers towards the project scenario and the same can be implemented for a successful completion of a project; the same measures can also be helpful for the engineers to have a track on their own performance; helps the Project managers to guide the engineers under him and can bring the best out of his employees; effectiveness and efficiency of the employees can be increased by defining their roles via performance measures [5].

IV. METHODOLOGY

The methodology of the thesis involves selecting a title. Then the literatures based on the project are collected. Then the work done on the similar projects are understood. Then the study area is defined [6]. Then the methodology is framed how to proceed the project. The methodology involves study on performance management and identifying the performance management methods in practice and the different aspects of a construction project with respect to those methods are framed out. Then a questionnaire survey is prepared. The same will be used to collect data from the project managers and site engineers of various companies. The survey is done to check the awareness of the aspects among the engineers. The questionnaire prepared will be a weighted scale type. Then the data obtained from the survey are analyzed and results are obtained. Based on the obtained result suitable suggestions are made that what should be done to enhance the performance of the engineers [7].

V. PERFORMANCE MANAGEMENT

a. An overview of performance management

Performance management is the process of planning, implementing, monitoring and improving the efficiency and effectiveness of the organization, its agencies and its internal units and individual staff [8]. The objective of performance management is to improve individual, team and organizational performance. An integral part of this objective is the establishment of management accountability for Equal Employment Opportunity (EEO) and Affirmative Employment Program (AEP) practices and principles.

b. Performance Evaluation and Development

The performance evaluation and development system is designed to:

- Assess past levels of goal achievements;

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- Assess past levels of performance;
- Assist employee and supervisor in identifying future performance goals and objectives;
- Encourage and improve communication between employee and supervisor.

c. Timing of Performance Evaluations

The performance evaluations will be conducted:

- After completion of the probationary period (for new employees or after transfer/promotion to a new position);
- Annually once in a quarter;
- As deemed appropriate by the department head/supervisor.

d. Measurement of Performance Management

Within every organization, Performance Management is a critical issue influencing all the other components of Human Resources management [9-11]. It contributes to the identification, development and retention of high-potential employees and key contributors. The current economic environment is characterized by downsizing, mergers and acquisitions, and cost-cutting through consolidation and centralization measures. Performance Management can strongly influence these corporate events and can mean the difference between their success and failure.

In a nutshell, performance can be defined as the evaluation of employee contributions to the business strategy. Measuring performance should be consistent, i.e. measured in accordance with a single set of principles and rules. However, conveying the importance of measuring individual performance can only be achieved if senior management sets the example [12].

As a result, performance management may also be considered as a strong link in a company's corporate culture, via the impact and behavior it generates.

e. The performance management cycle

Defining objectives and evaluating achievements over a given period requires communication between each employee, their direct manager and also a higher-ranked manager [13]. There is significant value in discussing, negotiating and commenting on such performance objectives. Evaluation sessions where performance is reviewed may be scheduled to tie in with a specific business cycle, such as at the end of a mission or project. This process helps managers to sharpen their "coaching" abilities by forcing them to identify problems as early as possible. Short review cycles enable corrective actions to be taken, priorities to be changed and even crisis situations to be avoided [14].

VI. PERFORMANCE MANAGEMENT IN CONSTRUCTION

Throughout the last two decades a number of industries, primarily manufacturing, have introduced new methods and techniques to shift traditional paradigms in order to improve their performance. This has led to the creation of new philosophies such as concurrent engineering/construction, lean production or construction and many others such as JIT, TQM, and TPM etc [15]. The main driver behind those philosophies is to optimize an organization's performance both internally and externally within its respective marketplace. Inevitably, this has led to the 'rethinking' of performance management systems through effective performance measurement. Bititci explain the distinction between performance management and measurement in that the first is seen as a closed loop control system which deploys policy and strategy, and obtains feedback from various levels in order to manage the performance of the system whereas the performance measurement system is the information system which is at the heart of the performance management process and it is of critical importance to the effective and efficient functioning of the performance management system [16].

Therefore, performance measurement is the process of determining how successful organizations or individuals have been in attaining their objectives and strategies. To achieve this, the outputs of organizational strategic and operational

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processes are measured, in a quantifiable form, to monitor the vital signs of an organization. The relationship between performance management and measurement can be seen in its wider context from a process view i.e. input-process-output. The elements of the process provide a critical review of the literature in order to develop the performance process conceptual framework for predominantly the construction industry [17].

VII. PERFORMANCE MEASUREMENT

The importance of identifying an organization's performance is evident throughout the world-wide markets, the results of which are to attract future investment, increase share value and attract high caliber employees [18]. Therefore, it is important to consider how an organization's performance is measured and how it can be communicated to the wider market i.e. how can it be understood and interpreted by the potential investors, employees and customers. The basis of formulating performance indicators that achieve the latter have been in operation as early as the beginning of our century. Those performance indicators have traditionally concentrated on finances e.g. return on investment, sales per employee, profit per unit production, but financial measures are useful but they tend to measure the past and they tend to measure the easily measurable. The apparent inadequacy of financial measures for contemporary businesses is criticized because:

- Encourage short-termism
- Lack strategic focus and fail to provide data on quality, responsiveness and flexibility
- Encourage local optimization
- Do not encourage continuous improvement

The main reason for the above failings of financial measures is they are lagging metrics in that they report on results and decisions made in the past and therefore of little use in improving current performance [19]. In effect, they are reporting on the organisations past performance rather its current performance. A simplistic analogy to illustrate this point can be drawn from the field of sports, and in particular football, where knowing the result of a match offers you an indication of how the team performed but it does little to suggest future improvements, identify mistakes and wrong strategies, assess individual performance or identify weaknesses.

Performance Management and Measurement using financial measures alone can identify their past performance but not what contributed to achieve that performance [20]. Therefore, in addition to measuring 'what' the performance of an organization was, the 'how' that performance was achieved should also be identified on an on-going basis. It is only by understanding how the organization arrives to a particular performance, and designing metrics (leading as opposed to lagging) to measure the 'how' that an organization might start to improve and increase market share. This has been the focus of research since the late 80's when increased global competition has forced companies to consider non-traditional measures provide an interesting comparison of traditional and non-traditional measures. As a result of this a new field of study has emerged which aims to identify the right number and type of performance metrics, in an integrated, to the organization, manner.

VIII. PERFORMANCE MEASUREMENT METHODS

a. *Balanced scorecard*

The Balanced Score Card (BSC) is a performance management system which incorporates four main measurement categories (perspectives) each of which with a wide range of potential sub-measures. It was devised by Harvard business school professor Robert Kaplan and Renaissance Solutions president David Norton. The difference with traditional approaches to performance measurement is that it includes a range of "leading and lagging" indicators - customer perspective, internal/business processes, learning and growth, and financial - to evaluate whether a business is moving toward its strategic goals. Indeed, the BSC emphasizes that on order to manage strategy an organization must measure its performance through performance indicators after analyzing its operations in an iterative way. The BSC recognizes that the financial measures are lagging indicators and therefore the result of the other three leading indicators. In other words the

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leading indicators deal with issues that will eventually impact on the financial performance, but crucially, before they have had time to have any effect.

Therefore, failures or shortcomings can be seen and addressed before they impinge on the bottom line. This is achieved by setting goals for each of the perspectives and develop respective measures or performance indicators. Since its original inception the BSC has received favorable support by academia and industry but also criticized for over simplicity and for not providing a complete performance measurement system. There are a number of potential mistakes that can happen when implementing a BSC, like measuring the wrong things right; measure all the necessary activities rather than assume that some of them are immeasurable or the people undertaking those activities are "too professional"; conflict between managers along functional lines. Also, a number of the strong points of this method include:

- It guards against sub-optimization by forcing senior managers to consider all the important operational issues
- It communicates objectives and vision to the organization
- If implemented properly then it focuses the organization's efforts in a relatively small number of measures with relatively low costs

However, it is suggested that there may be two omissions in the way the BSC is compiled and implemented within an organization but more importantly when joined ventures between companies are in operation under a project environment. Firstly, the BSC does not make an attempt to identify the relationship between the measures developed for certain goals, assuming that all measures will only be specific to a particular goal. In fact, the reality is that the performance of internal and external business and operational processes will have an effect in the customer perspective and perhaps vice versa. Secondly, a large number of organizations and in particular within the construction industry, operate by undertaking projects with a number of collaborators and suppliers. For those companies the 'projects perspective' and the 'supplier perspective' may be explicit. It has been identified in three case studies that BSC is generic and that the perspectives might be different for different businesses. For example other perspectives might include competence, people etc.

b. Performance metrics:

An effective performance management system will greatly depend on the performance metrics used to define the performance of the organisation from a number of perspectives. It is very important to design those metrics as to relate directly to the various perspectives that an organisation decides to adopt. This relationship between the performance management system and the metrics used to measure performance, illustrating that an organisation cannot claim to have an effective performance management system if the metrics used do not relate to the strategic goals of the organisation. The design of performance metrics has been the subject of research for some time now and a number of interesting studies have illustrated the benefits and potential pitfalls of performance metrics. It is stressed the dangers of measuring the 'wrong things right' when the sole purpose of an exercise is to design performance metrics, which might not necessarily relate to strategy. This can usually occur when a large number of performance metrics is present in an organisation where "everything is measured but little that matters. This is not only unnecessary but it is performed at a great expense to the organisation, in terms of the efforts made to capture and manage the necessary data. It is suggested that the design of a performance measure is a process with inputs and an output. In providing a structure to support this process they have suggested the

'performance measure record sheet'. The performance measure record sheet offers a solid framework for designing performance measures, but it does not necessarily provide a framework by which performance measures can be evaluated to the extent to which they relate with strategy and with other performance measures.

c. Performance Process Framework

Performance Process Framework (PPF) is achieved by taking balance scorecard as a base and identifying number of limitations in its implementation. The main aim of the frame work is to present a complete performance measurement process, in that it satisfies the need to represent input, process and output of the process.

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The Input

The first level of a performance measurement system model is the development of the organisational strategy. The development of strategy for an organisation is one of the most fundamental management activities that provide a vision of where the organisation wants to be in the short and long term future. It is inevitable therefore, that any performance management system will need to have strategy as the main input, so that any results coming out of the system could be used to evaluate the extent to which the organisation has met its strategic goals.

The Process

A process is any activity or group of activities that takes an input, adds value to it and provides output to an internal or external customer. Processes use an organisation's resources to provide definitive results. Therefore, a performance process framework will take strategy as an input; deploy the strategy so that it can derive a number of measures which are effectively activities; add value to the strategy by examining its validity and implementation; and deliver the performance results to the organisation or its shareholders and customers. This is in essence the approach followed by the balanced score card (BSC) through the deployment of strategy to a number of goals and the development of measures to measure the effectiveness of those goals.

The Output

The number/percentage (if the metric is quantitative) or other result (if the metric is qualitative) forms the output of the process. The results form an indication to which an organisation achieved its goals. However, an organisation is as successful as its customers perceive it to be and the degree to which the marketplace i.e. competition 'allows' it to be.

d. The last planner system

The Last Planner System (LPS) for production control has been implemented in construction projects with varying levels of success, to increase the reliability of planning, improve production performance, and create a predictable workflow. Through the LPS methodology, project teams commit to complete assigned tasks in a given week. Some lean construction practitioners refer to percentage plans complete (PPC) as a metric for commitment reliability. According to Forbes and Ahmed a PPC value does not measure the level of utilization of a work flow (efficiency). Instead it measures production planning effectiveness and workflow reliability. At each weekly meeting, time is given to learn and understand why certain tasks were not completed as planned in the previous week, before creating a new weekly plan to be executed. The uncompleted plans are studied and analyzed to determine the barriers and root causes that affected the implementation process.

IX. PERFORMANCE MEASUREMENT IN THE CONSTRUCTION INDUSTRY

The construction industry's core business is undertaking projects in generating new buildings or refurbishing existing ones for a variety of clients. Therefore, it is not a surprise to find that traditionally performance measurement in construction is approached in two ways:

- a) in relation to the product as a facility
- b) in relation to the creation of the product

In particular, the latter of the two has been the prime performance assessment (in terms of success or failure) of construction projects. When assessing the success/failure of construction projects, a common approach is to evaluate performance on the extent to which client objectives like cost, time and quality were achieved". Indeed, cost, time and quality are the 'three traditional indicators of performance' used in the construction industry. Although the 'three measures' provide an indication as to the success or failure of a project they do not, in isolation, provide a balanced view of the project's performance. Furthermore, their implementation in construction projects is usually apparent at the end of the project, and therefore they can be classified as 'lagging' rather than 'leading' indicators of performance. Looking back on the conduct of a project, what sticks in the mind is often not so much financial success or early completion, but memories of other people involved and abiding impressions of harmony, goodwill and trust or, conversely, of arguments, distrust and

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conflict. The client's willingness to pursue a given procurement route to achieve a future project is likely to be strongly influenced by these factors.

Therefore, it is clear to see that the traditional measures of the performance of construction projects are not enough to assess their 'true' performance. It can be argued that the methods used to measure performance in construction industry fall into the three main categories of the BSC:

1. **Financial Perspective:** how do the project's financial stakeholders view the project? For example cash flow forecasting and cost benefit analysis.
2. **The Internal Business Process Perspective:** how are we performing in our key process activities? For example critical path analysis
3. **The Customer Perspective:** how do our existing and potential customers see us? For example quality assurance.

However, there has been some interest in 'emerging' techniques and philosophies such as total quality, benchmarking, business process re-engineering and business process management that have shifted the focus from 'lagging' towards 'leading' indicators of performance. The majority of those concepts have been imported to construction from the manufacturing industry. Furthermore, these measures have tended to concentrate on construction productivity and those factors that influence it, with the aim being to achieve continuous improvement. Therefore, the fourth perspective of the BSC was also introduced in the 'organisational learning.' This however can be problematic since the participants of construction projects are 'joined' temporarily until the completion of the project where the aim is to achieve consistency of application by the integration of 'traditional' and 'matured' practices.

X.CONCLUSION

A vast study has been conducted on the performance management and the various performance methods being used in the construction industry. Most of the methods have its own advantages and drawbacks. For a effective performance the organizations should give more importance to the non-financial measures than the financial. If done so it will indirectly reflect the improvement in the financial performance of the organization. The various methods have given significance to the non-financial measures. Further works of the thesis involves preparation of questionnaire based on the various aspects of a project as per mentioned in the methods and a survey will be done in various companies to check the related knowledge of the personnel towards those aspects. Having knowledge on these aspects will indirectly reflect in their performance. Further the data collected will be analysed and suitable suggestions will be framed according to the data.

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REFERENCES

- [1] R.K.Sahu, "Performance management system", Excel books, New Delhi 2007.
- [2] Subhashree A.R., Shanthi B., Parameaswari P.J., "The Red Cell Distribution Width as a sensitive biomarker for assessing the pulmonary function in automobile welders- a cross sectional study", Journal of Clinical and Diagnostic Research, ISSN : 0973 - 709X, 7(1) (2013) PP. 89-92.
- [3] Joy P.K., "Handbook of Construction Management", Macmillan India Limited, New Delhi, 1994
- [4] T.V. Rao, "Performance Management and Appraisal Systems", Response books, New Delhi, 2004.
- [5] Gopalakrishnan K., Prem Jeya Kumar M., Sundeep Aanand J., Udayakumar R., "Analysis of static and dynamic load on hydrostatic bearing with variable viscosity and pressure", Indian Journal of Science and Technology, ISSN : 0974-6846, 6(S6) (2013) PP.4783-4788.
- [6] Bo Terje Kalsaas, "The Last Planner System Style of Planning, Its Basis in Learning Theory", Journal of Engineering, Project, and Production Management 2012.
- [7] Robert S. Kaplan, "Conceptual Foundations of the Balanced Scorecard", 2010.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

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- [8] Srinivasan V., "Analysis of static and dynamic load on hydrostatic bearing with variable viscosity and pressure", Indian Journal of Science and Technology, ISSN : 0974-6846, 6(S6) (2013) PP.4777-4782.
- [9] Matti Salminen and Marja-Leena Viitala, "Handbook on Performance Management", 2006.
- [10] M. Deru and P. Torcellini, "Performance Metrics", 2005.
- [11] Elaine D. Pulakos, "Performance management, Society for human resource management", 2004.
- [12] Michail Kagioglou, "Performance Management In Construction A Conceptual Framework", 2001.
- [13] Jaikumar S., Ramaswamy S., Asokan B.R., Mohan T., Gnanavel M., "Anti ulcer activity of methanolic extract of *Jatropha curcas* (Linn.) on Aspirin-induced gastric lesions in wistar strain rats", Research Journal of Pharmaceutical, Biological and Chemical Sciences, ISSN : 0975-8585, 1(4) (2010) PP.886-897.
- [14] Roshana Takim, "Performance Indicators For Successful Construction Project Performance", 2002.
- [15] Namho Kim, "Performance Management Method For Construction Companies", 2007.
- [16] Kumar S.S., Rao M.R.K., Balasubramanian M.P., "Anticarcinogenic effects of *indigofera aspalathoides* on 20-methylcholanthrene induced fibrosarcoma in rats", Research Journal of Medicinal Plant, ISSN : 5(6) (2011) PP. 747-755.
- [17] Mladen Vukomanovic, "Leading, Lagging And Perceptive Performance Measures In The Construction Industry", 2010.
- [18] Aki Pekuri, "Productivity And Performance Management – Managerial Practices In The Construction Industry", 2011.
- [19] Saad Sarhan, "Performance Measurement In The UK Construction Industry And Its Role In Lean Construction Concepts", 2013.
- [20] Donghoon Lee, "Management Performance Evaluation Model Of Korean Construction Firms", 2013.
- [21] Dr. T.Nalini, Dr.K.Manivannan, Vaishnavi Moorthy, Efficient Remote Data Possession Checking In Critical Information Infrastructures Ensuring Data Storage Security In Cloud Computing, International Journal of Innovative Research in Computer and Communication Engineering, ISSN (Online): 2320 – 9801,pp 12-18, Vol. 1, Issue 1, March 2013
- [22] Dr.K.P.Kaliyamurthie, Cervical Cancer Screening and Classification Using Acoustic Shadowing, International Journal of Innovative Research in Computer and Communication Engineering, ISSN(Online): 2320-9801,pp 1659-1662, Volume 1, Issue 8, October 2013
- [23] Dr.K.P.Kaliyamurthie, Automated Information Retrieval System Using Correlation Based Multi-Document Summarization Method, International Journal of Innovative Research in Computer and Communication Engineering, ISSN(Online): 2320-9801,pp 4328-4335, Vol. 1, Issue 7, September 2014
- [24] Dr.K.P.Kaliyamurthie, D.Parameswari, Modelling Cloud Storage, International Journal of Innovative Research in Computer and Communication Engineering, ISSN: 2249-2651,pp 1-5, Volume1 Issue3 Number2–Dec2011
- [25] Dr.K.P.Kaliyamurthie, D.Parameswari, Implementation of Customized Grencall Algorithm for Energy-Efficient Of Wireless LANs, International Journal of Innovative Research in Computer and Communication Engineering, ISSN: 2249-2615,pp 15-21, Volume1 Issue 1 Number2-Aug 2011

