

# A Critical Review on Project Performance Assessment in High Rise Construction

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**Abstract:** Several countries at various levels of socio-economic development have recognised the need and importance of taking measures to improve the performance of their construction industry. One of the means to this end has been to ensure performance efficiency in construction project execution. As has been widely acknowledged, this requires a deliberate process of continuously monitoring the performance of projects based on relevant indicators. To this end, several models have been proposed in literature assess projects under the broad headings of critical success factors and key performance indicators. This paper presents a study in construction industry to improve the performance of construction. The main objective of this study is to review existing performance measurement framework being used in the construction industries and public authorities of the developed countries including the performance measurement process, project stages. The purpose of this study is to identify performance criteria which are relevant to Indian construction and propose a method of scoring the performance indicators for the total building performance. Furthermore, the study also proposes some recommendations for performance assessment in construction industry.

**IndexTerms - Performance Assessment, Performance Management, Quality Management.**

## I. INTRODUCTION

The construction industry plays a key role in the performance of all economic sectors. The Indian Government has supported construction projects through substantial investment in infrastructure projects including roads, parks, buildings, bridges, and irrigation etc.

There is significant pressure from high level authorities to deliver such projects to citizens, hundreds of these projects commence annually. However, a lack of experience, insufficiently skilled staff, routinely poor execution processes, and poor project management practices, such as monitoring, control, and performance measurement, have been major weaknesses with in Indian construction projects. Due to this, Project is failure to achieve goals with respect to the basic success criteria which are; time, quality and target.

So far, in India, there has been little consideration given to applying Project Measurement System in the construction sector. Despite the lack of interest in the application of PMSs in construction sector, the three basic criteria of time, cost, and quality can still be applied to determine the success of the project. However, ambiguity and weaknesses in the relationship between the owner and contractor of construction projects are still present and have not been investigated adequately.

With regard to the practice of performance measurement in the construction sector, it is apparent from previous research that the understanding of the concept of performance measurement is limited and not applied efficiently and properly.

Several reasons were being responsible for the poor performance of construction projects during their lifecycles (planning stage, execution stage, and operation stage). The most important factor was found to be the lack of a comprehensive performance framework for all phases of the project.

Thus, it is obvious from the above that there is an urgent need to develop a system through which to determine current performance, resolve problems and benchmark them against best practice in order to meet the expectations of stakeholders, owner, contractors and consultant.

This study intends to investigate issues relating to the difficulties of project performance measurement and project performance improvement in India and the benefits derived from best practices (as applied in developed countries) and their potential application in India.

Three specific models of performance measurement

- (1) CONQUAS-Construction Quality Assessment System
- (2) QCLASSIC-Quality Assessment System in Construction
- (3) TBP-Total Building Performance

Following different components are assessed in different method of performance measurement:

**CONQUAS:**

- 1) Structural Works
- 2) Architectural Works
- 3) M&E Works

**QLASSIC:**

- 1) Structural Works
- 2) Architectural Works
- 3) M&E Works
- 4) External Works

**TBP:**

- 1) Thermal
- 2) Acoustic
- 3) Indoor Air Quality
- 4) Spatial
- 5) Building Integrity
- 6) Safety & Security

**II. CRITICAL LITERATURE REVIEW**

The following are the previous research review based on performance assessment of construction projects.

**Salapatas, James N. et al. (1985)** described the detail overview of performance measurement for projects and project management. The productivity formula is output over input. Productivity involves the effective and efficient use of resources. Performance includes Productivity, Quality of work, Quality of working life, Innovation. Researcher has suggested that the success-failure method is not practical for most projects because of the complex nature of project work and the almost infinite number of variables involved. Monitoring systems and key indicators are necessary factors for measuring both projects and project management. Projects are measured by monitoring facts and status. Project management is measured by monitoring actual conduct to a model and quality of decision making. (20)

**Pheng Low Sui, Kee Tan Boon, Leng Allen Ang Aik et al. (1999)** found that implementation and certification of quality management systems to ISO 9000 standards in construction firms has helped them to achieve higher construction quality standards through higher CONQUAS scores. (18)

**C. M. Tam, W. T. Leung et al. (2001)** described that after years of implementation of PASS and ISO 9000, systems require to be audited. This paper has provided some clue in enhancing the system by putting forward some recommendations. The ultimate objective of any quality management systems is to inculcate a quality culture in the industry of which the industry is lacking. Other structural changes (such as the procurement systems, reward for quality systems, the labour only subcontracting system, etc.) need to be synchronized in order to expedite the change. (6)

**Cheung Sai On, Suen Henry C.H., Cheung Kevin K.W. et al. (2004)** identified project performance measure categories for inclusion in the PPMS are People, Cost, Time, Quality, Safety and Health, Environment, Client Satisfaction, and Communication. The design of the PPMS aimed to streamline the project performance monitoring process, from data input to the presentation of results. PPM facilitates to prompt managerial responses to real or potential problems. Researcher also suggested that benchmarking can be achieved if the system can be adopted as an industry platform where benchmarks developed from project performance data are contributed by contracting organizations. (19)

**Marton Marosszeky et al. (2005)** described all ways in which performance has been measured on construction projects, tracing the gradual changes from project based assessment, then a focus on inputs driven by government development policy, to a process based approach that is being used with success in other sectors and by leading construction industry businesses. This paper presented a case for adopting process management approach that balances performance based management with more traditional cultural based initiatives to ensure that the most effective performance drivers are combined with the cultural commitment that is necessary for continuing improvement in safety performance. (15)

**Bhimraya A. Metri et al. (2007)** presented a benchmarking practice tool to provide the best practices and directions for improving quality in construction industry. This tool developed based on the literature review and best practice survey of 70 large construction firms coupled with in-depth interviews of managers of four top Indian construction firms. In this paper, researcher argued against the trend in the construction industry and suggested that there is an urgent need to pay attention to best practices that promote continuous improvement in processes and services of project management. (3)

**Mbachu Jasper et al. (2008)** used descriptive survey method. 243 contractors and 307 subcontractors registered with the Gauteng Master Builders Association of South Africa were surveyed. Results showed that quality record is the most important criterion for selecting high performing subcontractors at the pre-qualification stage, and for assessing their performance at the construction stage. Tender price exerts the most significant influence in the subcontract award. The concepts of pre-qualification eligibility rating (PER), qualification rating for subcontract award (QRSA), and performance rating (PR) could provide a holistic framework for the assessment of subcontractors' eligibility for tender invitation, award and subsequent performance at the construction stage. (16)

**Gyadu Asiedu et al. (2009)** developed assessment tool that used to determine a means by which construction project performance can be assessed at any stage of the project execution with criteria that reflect the perspectives of the client and practitioners as well as the particular circumstances of the project and with in different socio-economic settings. (10)

**Craig Langston et al. (2012)** described a new method for comparing international construction performance, and in so doing integrated cost with time and quality to determined ratios capable of ranking projects, building contractors, cities and even entire industries not only today, but retrospectively over time. In this paper, researcher outlined the new model and tests it using one of the largest samples of construction project data across two sample countries: Australia and the United States.

The research comprises 337 high-rise projects of 20 storey or more, completed between 2003 and 2012, throughout the five largest cities in Australia and the United States and representing two-thirds of the known population of such buildings in these locations. (8)

**Ng Chuu Jiun et al. (2012)** developed a holistic framework based on the TBP approach for the assessment of office buildings. Researcher identified performance criteria which are relevant to the topics and propose a method of scoring the performance indicators for the assessment of total building performance. Researcher derived a TBP score which integrates the effects of the identified performance parameters concerned with building performance into a single number for future Benchmarking. (17)

**Gayatri S. Vyas, Saurabh S. Kulkarni et al. (2013)** described that performance indicator (PI) is industry jargon for a type of performance measurement. Performance indicators are commonly used by an organization to evaluate its success or the success of a particular activity in which it is engaged. Researcher described some of the very important indicators regarding the construction projects and also emphasizes the point of value management as one of the most important performance indicator in construction project. Construction project professionals need to better monitor and control their organization's performance at both the field and office levels. In this paper, Performance indicators that is found important in Indian scenario are Units/MH, Rs/Unit, Cost, On-Time Completion, Lost Time Accounting, Quality Control or Rework, Percent Complete, Earned Man-Hours, Resource Management, Motivation, Employee Turnover, Absenteeism, Safety etc. and if proper care at the initial stage is taken, all these indicators can be controlled. (9)

**Shweta N. Istape, M. R. Apte et al. (2014)** provided information regarding assessment of contractor's performance, from the point of view of achieving quality on site. The checklists was provided as part of the evaluation process for the quality assurance plan. By adopting the above frameworks, researcher observed that, quality in construction is maintained high. In cases of occurrence of non-conformities, they are corrected and some non-conformity is mitigated by adopting preventive measures for each item in specialized formats. (21)

**Arunmozhi S., Suguna K. et al. (2015)** described necessary information that is needed for clients, project managers, contractors, and designers to better manage the quality of building construction projects. In this paper, researcher find underlying factors affecting the quality of building construction projects. A study was conducted in a detailed manner through questionnaire and collecting the responses from quality engineers, site Engineers, contractors from various construction projects. 35 five factors have been identified as critical factors of quality and based on survey. The identified critical factors are to be given much priority in the real time monitoring. The identified critical factors revealed that the quality training is more important among all employees in construction industry. This study revealed that there is a gap in training about quality management among employees of construction projects. (1)

**Kaviya B., Hema C. et al. (2015)** found that for effective performance, 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. Researcher also concluded that various methods have given significance to the non-financial measures. (11)

**C. M. Tam, W. T. Leung et al. (2015)** reviewed the global performance measurement and benchmarking initiatives, with cross initiative comparisons. A study concluded that a system parallel to the existing CONQUAS would be established to measure a broader set of performance and organizational systems should be considered when developing performance measurement and benchmarking initiatives. Performance metrics should include not only the quantitative ones but also the qualitative measures relating to stakeholder satisfaction, site management, etc. (7)

**Badawy Mohammed, El-Aziz A.A. Abd, Idress Amira M., Hefny Hesham, Hossam Shrouk et al. (2016)** described different method for exploring key performance indicators in different directions including manual, selection, or prediction approaches. Researcher noticed that the prediction approach is still a vital field for research as most of the researches are based on a determined point. In this paper, Researcher proposed a new approach for predicting key performance indicators with no determined point to start and provide a complete prediction for the key performance indicators including the suitable key performance indicators for the problem and their possible value range. (2)

**Lau Yeong Chergng et al. (2017)** concluded that the main hurdle by applying quality assessment system for developer is insufficient skilled worker, follow with time constraint, technology limitation and insufficient budget and also concluded that both developer and contractor in Malaysia prefer to apply CONQUAS 21 rather than QLASSIC. Researcher concluded that majority of the both developers and contractors perceived that the quality assessment system will improve the quality of works, reputation improvement, time saving and cost saving as the first, second, third and fourth advantage. (13)

### III. CONCLUSION

From the above literature review we can conclude the following things:

1. There is lack of knowledge about performance measurement technique and also lack of knowledge about how to implement those techniques on field.
2. Main hurdle by applying quality assessment system for developer is insufficient skilled worker, follow with time constraint, technology limitation and insufficient budget.

3. For an 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.
4. In performance assessment process, Critical factor are identified and priority to each factor are determined. Then higher priority factors given much priority in the real time monitoring.
5. Performance metrics should include not only the quantitative but also the qualitative measures relating to stakeholder satisfaction, site management, etc. to ensure high efficiency in performance measurement.
6. To reduce the construction cost, productivity data should be collected and monitored for which quality training for all the employees must be given.

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