

# Project Quarterback Rating to Assess Performance of Construction Project

Ravi Ranjan<sup>1</sup>, Dr. G. A. Hinge<sup>2</sup>

<sup>1</sup>Civil Engineering post graduate scholar Department of Civil Engineering BSCOER Pune

<sup>2</sup>Professor and Research Guide, Department of Civil Engineering, BSCOER Pune (India)

**Abstract:** The construction industry is one of the largest industries in the world. Construction projects are often acting as catalyst to the development of countries. Therefore construction projects have become the indicators of economic growth. The project comparison and selection of best one is a complex task in construction industry as it involves various variables. To address this issue, an attempt has been made to evolve a new procedure of project benchmarking based on project quarterback rating. A new framework proposed in the study will demonstrate thrust performance areas of construction from contractor's perspective. In all five key variables have been identified and considered for analysis. At present the analysis of three measurable variables is completed on quantitative basis so as to rank the project. The procedure developed here will be useful to those firms which are carrying out multiple projects to select the best performer and adapt the best practices followed by that project in their future projects.

**Keywords:** PQR, Construction Industry, Key Variables, Ranking.

## 1. Introduction

The construction industry is most dynamic industry with new technologies surfacing at frequent interval; therefore it is very much important for a contractor based company to predict which project is best project. Generally variables associated with the project are large in number; therefore it is difficult to benchmark the project. Every project has different scope and size, thus if contractor is able to compare and find out key variables of construction then this will predict contractor to find out best project. This will also help the contractor to ensure continuous improvement and to decide if new practices he or she is trying to adopt are worth the time and resource invested. As a result there will be growth and development of construction industry Every project differs in many ways as size, shape, scope, complexity and functionality. Due to change in market

Condition every project is unique. Hence there is room for improvement for contractors. If contractor is able to find out one variable, which could evaluate overall performance of construction projects. As due to dynamic and unique nature of every construction project there is no any metrics which can be used to make comparison between various projects of construction. As it is very difficult to develop a perfect model which can include every variable affecting performance of construction. Rather if some of the important metrics of some important performance areas of construction are figured out, then it will be easier to benchmark the project. The technical important part is that to find out key indicators of construction project very minutely. The key variables should be common in every construction projects. Lastly quantitative analysis for variables is done to achieve desired result.

The project quarterback rating (PQR) <sup>[1]</sup> is the new concept which is described in the paper. It is an approach to assess performance of construction project by analysis of key variables of construction. The objectives which are stated in the paper are finding the important variables and analyzing it

mathematically and using them to assess the performance of construction. Another objective is to use this new concept (PQR) in industry settings

PQR Definition and Explanation:

P: Project

Q: Quarterback

R: Rating

Quarterback is a position of a player in a football team, i.e. in national football league, Canadian Football league (CFL). Quarterback is that position of a player which is very important i.e. efficiency of a player at this position is directly proportional to the winning of the match. As it reflects the passers efficiency, we can say that quarterback rating combines key sports metrics to compare quarterback's player. Similarly the PQR take addition key performance metrics which are important for construction project

## 2. Research Problem Statement

Suppose

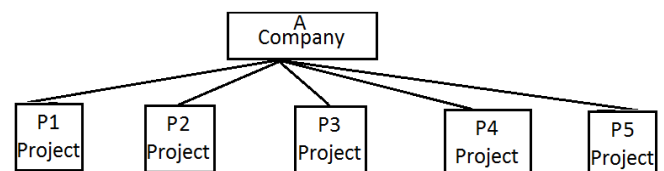


Figure 1: Problem Statement Flow chart

LET PROJECTS

P1 → (I1, p1, D1 ..... N1)

P2 → (I2, p2, D2 ..... N2)

P3 → (I3, p3, D3 ..... N3)

P4 → (I4, p4, D4 ..... N4)

P5 → (I5, p5, D5 ..... N5)

If

In = investment

Pn= profit

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Dn= duration  
 .....

Nn= N no of variable

Question arises for a company A or contractor which project is your best project.

Then best project decision is given when...

Best project performance is compared and analyzed by comparing all the variables

For each project

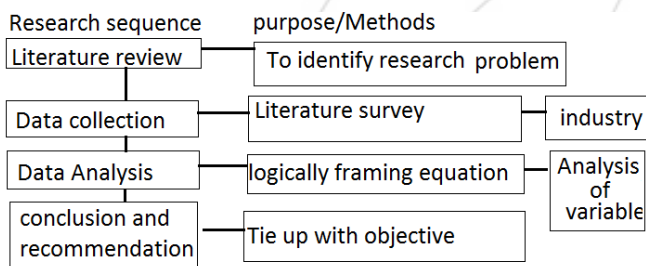
Here

- (I1, p1, D1.....N1)
- (I2, p2, D2.....N2)
- (I3, p3, D3.....N3)
- (I4, p4, D4.....N4)
- (I5, p5, D5.....N5)

Thus there are number of variables associated to be best performer.

**Question is that there is no any single score or variable which can be used to measure performance by taking consideration of all the variables.**

### 3. Methodology



**Figure 2:** Methodology Flow chart

### 4. Literature Review

Numerous studies have been conducted to find a factor or variables of construction project success. The intensive literature survey has been done to identify variables of construction. Roshana Takim and Akintola Akintoya (2002) give criteria for successful construction project in accordance with performance indicators of construction. Important variables of construction project performance from contractor perspective by Cindy L.menches, Awad .s. Hanna (2006).AzlanAli, Ismail Rahmat (2009) Suggested that functionality and client satisfaction are two of the most important criteria whereas time and cost are least important for measuring construction project performance. Concept of PQR, the three tired model on basis of key variable is given by EI Asmar (2012). EI Asmar, m.Hanna, A...and Loh, W (2013) suggested (Ipd) oriented integrated project delivery is emerging construction project delivery system that collaberatically involves key participant very early in the project timeline. According to vyas gayatri, kulkarni saurabh (2013) indicated about quantitative and qualitative key indicators of construction project performance.

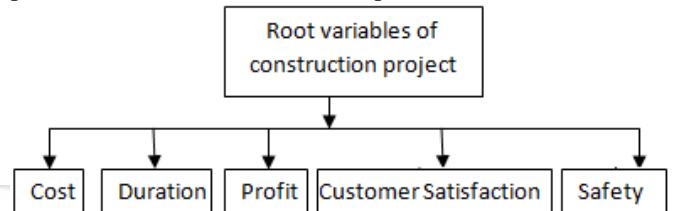
S.Hanna, w Loftfallah, G Aoun, EI Asmar (2014)” defines the mathematical formulation of unique performance metric

called project quarterback rating (PQR) which is based on key variables of construction.

In order to find out key variables of construction all the historical data had taken which act as reference to think minutely on key variables. Most of the past studies have found of different variables but no one has tried to merge one variable to another in order to minimize no of key variables.

### Discussion on Key Variables

After various literature survey and meeting with industry persons it was noticed that five important variable are there.



**Figure 3:** Key Variables

Various variables cannot be combined directly because they contain different unit of measure. For example cost/investment, profit is measured in terms of financial metric whereas duration is measured in terms of time span. , customer satisfaction and safety is qualitative data. Thus if the entire variable are taken directly for analysis then there will be unequal influence, because of inconsistent scales. Therefore to eliminate disparity a single method of standardization is required.

### 5. Analysis Key Variables

Parameters involved

1. INVESTMENT
2. PROFIT
3. Duration

Procedure for setting clause so as to logically frame Equation

1. Consider the project having least investment as best performer.
  - a. Note: condition applied- quality maintained as per IS code.
  - b. Turnkey or without material
  - c. Market condition stable.
2. On the % basis the project having least investment should get 100%.
3. There is heavy variation in construction projects.(in reference any variation can occur at any time)

Logically framed equation. [1]

$$rank = \frac{\text{investment by best performer of project}}{\text{investment by any project}}$$

**Table 1:** Data for Processing

Investment (crore)	10	8	12	11	9
Profit (Crore)	4.5	4	6	5.5	4.5
Duration (Months)	20	24	24	18	16

If calculated for 10 years i.e. period of 120 Months  
 No. of Projects

**Table 2:** Data for Processing after considering duration

Period of 120 Months/ Duration	6	5	5	6.67	7.5
Investment X No of Project(cr)	60	40	60	73.37	67.5
Profit X No of Project(cr)	27	20	30	36.68	33.75

**Table 3:** P/I ratio

Investment	60	40	60	73.37	67.5
Profit	27	20	30	36.68	33.75
P/I	0.45	0.5	0.5	0.49	0.5

Now from least investment as best performer = 40 cr i.e. project 2 and using eqn 1

**Table 4:** Rank by investment criteria

Rank	0.6	1	0.6	0.54	0.59
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Now from Profit least investment as best performer

**Table 5:** Data for profit with least investment

Profit	27	20	30	36.68	33.75
Investment	60	40	60	73.37	67.5

By interpolating for least investment revised Profit Will be and rank given by logically framed equation. [2]

$$rank = \frac{profit_{by\ any\ project}}{profit_{by\ best}}$$

**Table 6:** Final rank with profit criteria

Profit	18	20	20	19.72	20
Rank	0.9	1	1	0.98	1

## 6. Result

It is found that the investment is key as well as unique parameter for assessing the performance of construction project. If all the three variables are given i.e. investment, profit, duration then attempt can be made to find best project or benchmark the project.

## 7. Conclusion

If investment, profit, duration are key variables of construction project and then will be able to find who is the best performer by the method. As it is an attempt but validity of method can be found by various sets of data. We use above for ranking purpose. This study provides the construction engineering management with an attempt to identify root variables (key variables) of construction and then finally rating it on the basis of key variables which is termed as PQR. The framework is based on relatively logical framing equation and doing analysis with the help of key variables. The limitation of this paper includes validity of method by few no of combination of data to illustrate the model. And also limited to three key variables

For analysis. Future research on two more key variables is underway in hope of getting more accurate and comprehensive model.

## 8. Applications

There is a significant opportunity to improve project performance in construction industry in benchmarking the project. As (Important key variables of construction is figured out) this study will feel gap between practical and theory. Also the importance given to that variable that can be found out so as to assess performance of construction. This key variables and an illustrated model can be considered important while industry setting.

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## Author Profile

**Mr. Ravi Ranjan**, Post Graduate Scholar, Construction Management, Civil Engineering, TSSM's Bhivarabai Sawant College of Engineering and Research, Narhe, Pune, Maharashtra, India.

**Dr. G. A .Hinge**, Professor & Head of Department Civil Engineering, TSSM's Bhivarabai Sawant College of Engineering and Research, Narhe, Pune, Maharashtra, India.

