

Analysis of Project Scope Definition Comprehensiveness for Pune Ring Road Project by means of PDRI

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Abstract: It's has been learned that poor extension definition is one of the foremost reasons for project disappointment in the construction industry. In any case, the proprietor and contractual worker organizations however share the dream that it isn't monetarily reasonable to invest the time or cash, required to adequately characterize the extent of work right on time in an undertaking's life cycle. Now and then, project members are ignorant about the necessities of an adequately characterized extent of work. A tool called Project Definition Rating Index (PDRI) was made to address these issues. The PDRI is a simple to-utilize, schedule of 64 scope definition components, letting the clients to measure and deal with the level of extension definition as project arranging advances. PDRI is a rating framework which rates a task on different parameters. In PDRI rating project is evaluated out of 1000 points. Lesser the points better will be the undertaking. Least a project can get is 70 points. The entire idea of PDRI framework is to break down any undertaking from alternate points of view and rate them independently. Total accumulative is then obtained and conclusion on a project is given.

Index Terms— Project Definition Rating Index (PDRI), Pre-project planning, Planning tool, Construction Industry Institute (CII), Infrastructure Project.

I. INTRODUCTION

The Project Definition Rating Index (PDRI) is a simple and capable tool that is widely utilized by planners in the construction sector. Advancement of the task scope definition package is one of the significant sub-procedures of the pre-planning process. It is the procedure by which projects are characterized and arranged for execution. It is at this basic stage where risks identified with the project are analysed and the definite project execution approach is characterized. Pre-project arranging is the undertaking stage including every one of the assignments from project starts to detailed design.

Keeping in mind the end goal to boost the likelihood for a fruitful project, Construction Industry Institute (CII) characterizes front end planning as the way toward creating adequate arranged data with which proprietors can go to attend risk and settle on choices to submit assets accordingly. CII has created instruments that help project teams in the effective planning of projects. ^[1]

The PDRI distinguishes and exactly depicts each basic component in an extension definition stage and permits an undertaking group to rapidly anticipate factors affecting task chance. It is proposed to assess the completeness of degree definition anytime preceding the time a task is considered for advancement of development reports and development. An individual, or group, can along these lines evaluate the status of their project definition exertion amid pre-project planning and finish up their score, or level of exertion. Since the PDRI component score identifies with its risk, high risk regions that need additional work can easily be identified. ^[2]

II. AIM & OBJECTIVES

Aim:

“The ultimate aim of this work is, to learn the characteristic study of PDRI for an Infrastructure project by examination the viability of PDRI in Indian construction industry on successfully completed project and by conducting the analytical study to live project to identify risk involved in project”.

Objectives:

- 1) To understand the characteristics and structure of PDRI.
- 2) Analytical study of proposed live Infrastructure project by PDRI tool.

III. PROJECT DEFINITION RATING INDEX (PDRI)

3.1 Introduction

The Project Definition Rating Index Tool for Infrastructure Projects has been developed by CII Research Team 268 in 2008. The team comprised of selected members of the CII from both owner and contractor establishments throughout the world, and also members representing academic institutions. PDRI is a risk management tool that can help a pre-project planning team

evaluate and measure project scope definition risk elements and then develop mitigation plans. A risk management analysis is most effective when performed prior to promising funds to detailed design and construction. So, PDRI is a:

- Checklist that a project team can use to define the necessary steps to follow in defining the project scope.
- Comprehensive list of standardized project scope definition terminology used throughout the construction industry.
- Standard for rating the completeness of the project scope definition to enable risk assessment, forecasting escalation, evaluation of the impending disputes, etc.
- Means to check progress at various stages during the pre-project planning effort and to focus efforts on high-risk areas that need attention to details.
- Tool that helps in communication between owners and design contractors by emphasizing poorly defined areas in a scope definition package.
- Means for project team participants to resolve differences by providing a common basis for project evaluation.
- Benchmarking tool for organizations to use in evaluating the completion of project scope definition against the probability of success on future projects.

3.2 Structure of PDRI:

The PDRI methodology supports a complete assessment of scope definition. Templates are organized in three sections for methodical assessment of the following:

I. Basis of project decision – the business objectives and drivers.

This section consists of information essential for understanding the project objectives. The fullness of this section determines the degree to which the project team will be able to achieve alignment in meeting the project's business objectives.

II. Basis of design – processes and technical information required.

This section consists of space, site, and technical design elements that should be gauged to fully understand the basis for design of the project.

III. Execution approach – for executing the project construction and closeout.

This section consists of elements that should be evaluated to fully understand the necessities of the owner's execution strategy. Industrial PDRI was developed in the year 1996 and Building PDRI was developed in the year 1999. ^[3]

3.3 Rating of elements on the basis of level of definition:

The PDRI consists of three main sections, each of which is broken down into a series of categories. Categories are further broken down into elements. Scoring is done by assessing and rating the individual elements. Elements should be rated in ascending order from 0 to 5 based on their level of definition

Elements that were well-defined should receive a perfect rating of "one". Elements that were completely undefined should receive rating of "five". All other elements should receive a "two", "three", or "four" based on their levels of definition. Those elements considered not applicable for the project should receive a "zero". The ratings are defined as follows:

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

Figure 1: PDRI Definition Levels

3.4 Significance of PDRI Score:

It was observed that projects scoring below 200 outperformed those scoring more than 200 in three important design/construction outcome areas: cost performance, schedule performance, and the relative value of change orders compared to the authorized cost. Also, the projects scoring less than 200 performed better financially, had lesser numbers of change orders, had less fluctuation related to design size changes during development of construction documents and the construction phase, and were generally rated more successful on average than projects scoring higher than 200. ^[4]

Table 1: Summary of Cost, Schedule, and Change Order versus Authorization Estimate for Project Definition Rating Index (PDRI) Validation Projects

Performance	PDRI Score (< 200)	PDRI Score (> 200)	Difference
Cost	1% above budget	6% above budget	5%
Schedule	2% behind schedule	11% behind schedule	9%
Change Orders	7% of budget	11% of budget	4%

In general, lower PDRI scores represent scope definition packages that are well-defined and correspond to higher project success. Higher PDRI scores, on the other hand, signify that certain elements in the scope definition package lack adequate definition, and, if the project moves forward with development of construction documents, could result in poorer project performance and lower success. ^[4]

At the point in time prior to commencement of detailed design and construction. ^[3]

IV. LITERATURE REVIEW

Barrow, Benjamin (1999)

Has Prepared a "Pre-Project Planning at NASA" The PDRI can profit proprietors, fashioners and constructors and gives various advantages to the task group. These include: a point by point agenda for work arranging, institutionalized extension definition phrasing, help of hazard evaluation, help with advance observing, guide in correspondence of necessities between members, technique for accommodating contrasts between planning members, a preparation instrument, and a benchmarking premise. This usage control contains parts depicting the PDRI for building planning, why it ought to be utilized, how it fits inside NASA's planning arranging process, how to score a planning, how to dissect a PDRI score and a way forward for the utilizing this instrument. ^[5]

Yu-Ren Wang & G. Edward Gibson (2008)

Has presented a paper on A study of Project planning and Project success using and regression models that is aimed this research intends to investigate the relationship between Pre-Project planning and project success. In early stage of the project life cycle, essential project information is collected and crucial decisions are made. It is also at this stage where risks associated with the project are analyzed and the specific project execution approach is defined. To assist with the early planning process, CII has developed a scope definition tool, Project PDRI for industrial and building industry. Two techniques were then used to develop models for predicting cost and schedule growth: statistical analysis, and artificial neural networks (ANN). ^[6]

Chu Tih-Ju, Chang An-Pi, et al. (2014)

Developed IGBP-PDRI model to enhance the performance of project execution, in making buildings energy efficient and reduce carbon emissions. The objective of their study was to forecast possible risks in the development of the project. The methodology adopted to achieve the objective is as discussed further the model of evaluation is divided into 4 sections, 11 categories, and 60 elements. In this study, the green building and intelligent building emblem evaluation indicators and related regulations effective in Taiwan are incorporated into the scope of IGBP-PDRI evaluation. The PDRI evaluation model developed by the CII of USA has been adopted as the methodology in this study. As per their findings, in the course of project execution, quality requirement is satisfied through monitoring and control. This helped to ensure the operation efficiency of the project, to the extent that the automated system of the building supported by green construction can meet the goal of sustainable development. The authors conclude by proving that this model could be used as a reference for subsequent development of pre-project planning in intelligent green building projects, which is pioneering work in Taiwan. This research could thus be used as a platform for the joint action of all stakeholders at the preliminary planning stage. This model can help to forecast, prevent, and reduce possible risks deriving from the execution of projects. This model thus performs very well, particularly at the pre-project planning stage. ^[7]

Rebekha Burke, Kristen Parrish, et al. (2016)

This research paper present the first step in the research effort, determining the definition of a small infrastructure project. In 2015, CII initiated a research team tasked with developing a PDRI for small infrastructure projects to support front end planning efforts for this common project type. This paper presents the first step in that research effort, determining the definition of a small infrastructure project. The authors hosted focus groups and disseminated a targeted online survey to determine what constitutes a small infrastructure project. The authors found that practitioners separate small projects from large based on the complexity of the project; thus, this paper presents the primary factors and their associated breakpoints (i.e., total installed cost and engineering hours)

and contributing factors (i.e., construction duration, core team numbers, and availability) that determine complexity on infrastructure projects. ^[8]

Evan Bingham, G. Edward. Gibson (2016)

Developed a novel risk management tool, called the project definition rating index (PDRI) for infrastructure projects, which can be used to identify and address the issues systematically and in a structured manner.

For infrastructure projects, the FEP process assists in identifying and mitigating risks stemming from issues such as right-of-way concerns, utility adjustments, environmental hazards, logistic problems, and permitting requirements. The authors have developed a novel risk management tool, called the PDRI for infrastructure projects, which can be used to identify and address these issues systematically and in a structured manner. Input from 64 industry professionals representing over 30 organizations was used in the development of the tool. In addition to a usable definition for infrastructure in the context of the built environment, a finite and specific list of issues related to scope definition of infrastructure projects was developed with this industry input. Data from 26 completed or in-process projects are given. Results show that the PDRI assessment score is indicative of the current level of scope definition for sample projects and corresponds to project performance. Findings support the hypothesis that projects with improved early understanding of scope definition elements showed improved project outcomes; infrastructure projects with low PDRI scores (well defined) outperformed projects with high PDRI scores. This research contributes to the body of knowledge by specifically identifying those FEP elements that are critical to infrastructure projects. ^[9]

V. METHODOLOGY

The Primary data will be obtained from the site of case study and PDRI score sheet besides correlated with the present investigation. When the project is in its initiation phase of conceptualization and feasibility study, the reports covering the scope definition of the project are to be referred, to check their completeness using the PDRI score-sheet. This can be done for two to three times, depending on the length of the project, before the start of the execution. The resulting PDRI score is expected to reduce, each time down the line.

The rating is to be done by all the professionals involved in the planning department. In this research, industry experts have been consulted for rating the elements, by referring to the feasibility reports of projects.

Respective weights of all the elements, which are pre-assigned by the CII researches, are then identified. The addition of the weights of all the elements of the three sections, gives the PDRI Score.

The flow-diagram elaborates the theoretical framework of the research as shown in figure 2.



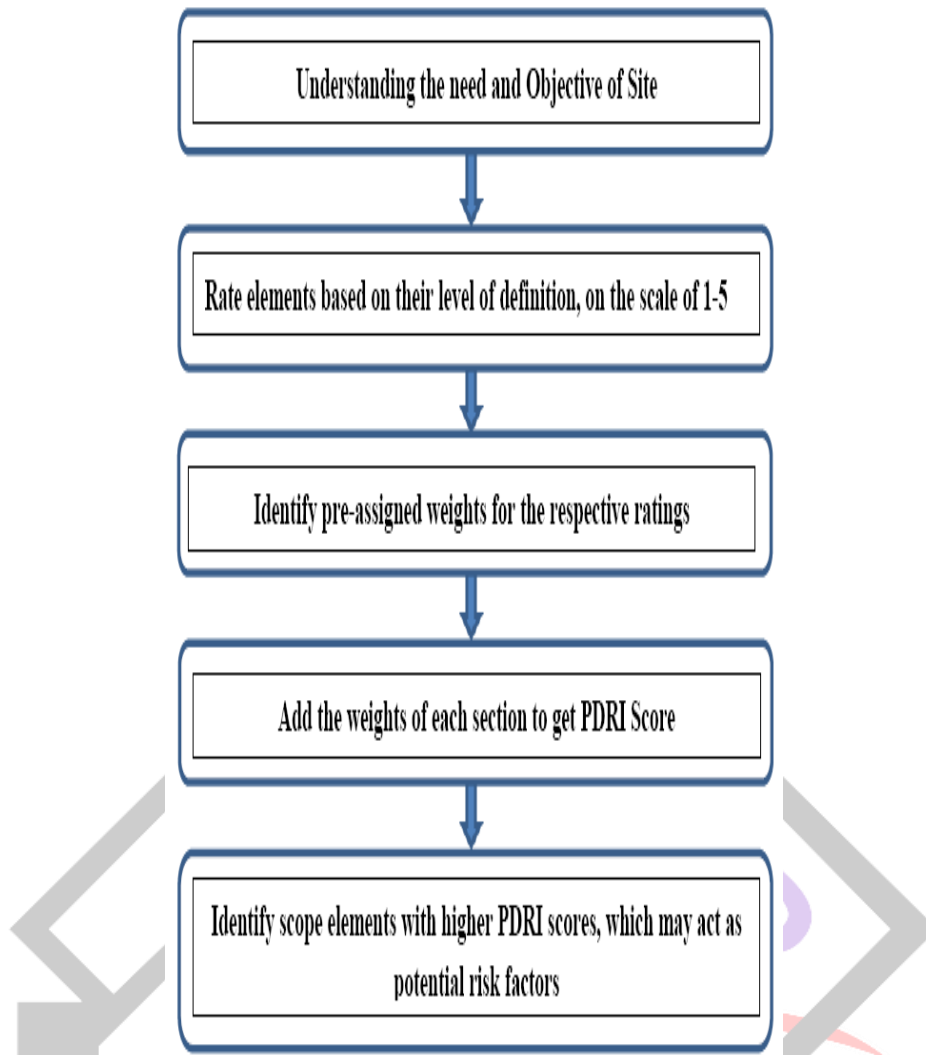


Figure 2: Flowchart showing the methodology of Research

VI. LIVE CASE STUDY

Name of the Project: Construction of (Western alignment) (Proposed)

Table 2: Project Details of Ring Road Project

Location	Pune
Concern Authority	Maharashtra State Road Development Corporation (MSRDC)
Total Length of Road	161.73 Km
Estimated Cost	104.08 Billion
Land required:	48 ha(government) and 25 ha(private)
Service Lanes:	2 on both sides
Flyovers	12

Rail Bridges	4
Over Valley Bridges	7
Subway Roads	14
Tunnels	13

Analysis of proposal

Financial and social benefit with special emphasis on the benefit to the local people including tribal population, if any, in the area.

The project will have multiple benefits. It will reduce the travel time substantially. In addition the improved road will provide other benefits like proposed activity improves the economic status of the village people along project area.

VII CONCLUSION

The success of a project is never assured, but its risk of failure or under-performance can often be reduced with proper planning and implementation of proven procedures as the PDRI demonstrates. PDRI tool is designed to control and minimize project risk at the early stages where value can be positively influenced the most with minimal cost. Thus we can say that, PDRI is an excellent method of providing the necessary scope definition to help assure better project performance.

In the first case study, a solution has been applied. The solution is a tool called Project Definition Rating Index, which has been developed through extensive research by Construction Industry Institute, USA. This tool has been applied to a completed building project, which is a Market yard project, located in Chandwad Taluka of Nashik district. This case study has been done to check the feasibility of PDRI tool in the Indian scenario. The PDRI score sheet is used to check the completeness of scope definition. The rating is done in consultation with the Project Manager. The PDRI score of this project is computed to be 174, which is less than 200. As per the conclusions drawn from the PDRI research, a score below 200 indicates that the project will get completed within estimated time and budget. And the reports show that the project has got successfully completed within proposed budget and schedule. Thus it can be concluded that the PDRI tool can be effectively used in predicting the successful completion of Construction Projects in India.

In the second case study, the tool is applied on a proposed project, which is a Road Project, to be located around the city of Pune, called Pune Ring road. This case study has been done to check if the scope definition is complete. The PDRI score of the project is computed to be 626, which is more than 200. Thus it can be said that the feasibility study is incomplete and the elements scoring higher numbers, which have been identified through the application of PDRI tool, should be reconsidered before the start of the execution of the project.

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