

EXAMINING THE FEASIBILITY OF PDRI FOR MARKET YARD PROJECT NASIK, MAHARASHTRA INDIA

Suresh Sakare¹, Dr. D. B Jasutkar²

^{1,2}Padmabhooshan Vasantdada Patil Institute of Technology, Bavdhan, Pune, Maharashtra, India

ABSTRACT

The Project Definition Rating Index is a powerful and simple tool that is comprehensively used by planners for pre-project planning of large-scale projects in the United States construction sector but not much common in the Indian construction industry. It is the process by which construction projects are defined and organized for execution. It is carried out at the initial stage where risks associated with the project are analyzed and the definite project execution approach is defined. Pre-project planning is the project phase including all the tasks between project initiations to detailed design. PDRI was made by the Construction Industry Institute, United States to address these scope issues. The PDRI is a simple-to-utilize schedule of 64 scope definition components, letting the clients 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 the project is evaluated out of 1000 points. The feasibility of PDRI in India project has been analytically studied with the help of successfully completed Market yard project, located in Chandwad Taluka of Nashik and the Comprehensiveness of tool is studied for Indian market and find suitable as the computed value is 174 which indicate that project get completed within estimated timeline and cost.

Keywords: Project Definition Rating Index, Front End Planning, Scope Management.

1. INTRODUCTION

1.1 General

The Project Definition Rating Index (PDRI) is a powerful and simple tool that is extensively used by planners in the construction sector. Development of the project scope definition package is one of the major sub-processes of the pre-project planning process. It is the process by which projects are defined and prepared for execution. It is at this critical stage where risks related to the project are analyzed and the definite project execution approach is defined. Pre-project planning is the project phase including all the tasks between project initiations to detailed design.

The PDRI offers an all-inclusive checklist of 64 scope definition elements in a score sheet format. The PDRI score sheet is supported by detailed descriptions of these elements. Each element is weighted based on its relative importance to the other elements by experts in the construction industry (Chung Suk Cho, et. Al). The Project Definition Rating Index for Infrastructure Projects is a commanding and simple tool that helps meet this need by offering a method to measure project scope definition for completeness. A PDRI score of 200 or less has been proven to greatly increase the possibility of a successful project.

1.2 Benefits of the PDRI

A significant feature of the PDRI is that it can be utilized to fit the needs of almost any individual project, small or large.

Elements that are not applicable to a specific project can be zeroed out, thus eliminating them from the final scoring calculation.

The PDRI is quick and easy to use. It is a "best practice" tool that will provide numerous benefits to the infrastructure projects. A few of these include:

- A checklist that a project team can use for determining the necessary steps to follow in defining the project scope.
- A listing of standardized scope definition terminology throughout the infrastructure project.
- An industry standard for rating the completeness of the project scope definition platform to facilitate risk assessment and prediction of escalation, potential for disputes, etc.
- A means to monitor progress at various stages during the front end planning effort
- A tool that aids in communication and promotes alignment between owners and design contractors by highlighting poorly defined areas in a scope definition package.
- A means for project team participants to reconcile differences using a common basis for project evaluation.
- A benchmarking tool for organizations to use in evaluating completion of scope definition versus the performance of past projects, both within their organization and externally, in order to predict the probability of success on future projects.

2. AIM AND OBJECTIVE

2.1 Aim

“The main aim of this work is, to learn the characteristic study of PDRI and examination the viability of PDRI in Indian construction industry on successfully completed project”.

2.2 Objective

- 1) To understand the importance of pre-planning on construction project.
- 2) To check the feasibility of PDRI project in Indian construction industry by checking the PDRI score for a successfully completed project.

3. LITERATURE REVIEW

Barrow, Benjamin (2019)

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.

Yu-Ren Wang & G. Edward Gibson (2021)

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).

Chu Tih-Ju, Chang An-Pi, et al. (2022)

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.

Rebekha Burke, Kristen Parrish, et al. (2022)

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.

Evan Bingham, G. Edward. Gibson (2022)

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.

4. PROJECT DEFINATION RATING INDEX

4.1 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.

4.2 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.

4.3 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

4.4 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.

Table 1: Significance of PRDI Score

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.

5. METHODOLOGY

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

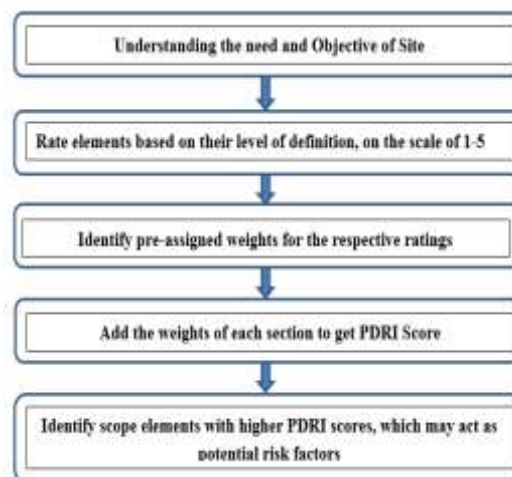


Figure 2: Flowchart showing the methodology of the Research

6. CASE STUDY

6.1 Project Brief

Brief detail about the case study project has been shown in tabular form in following section

Table 2: Brief Project Details

Name of the Project:	Agricultural Produce Market Committee
Location:	Chandwad, Tal. Chandwad, District – Nasik, Maharashtra
Type of Structure:	Building Project
Name of Contractor:	M/S B. B Lahamge
Tender Amount:	Rs. 5,30,72,818.44 /-
Project Duration:	18 Months

6.2 Proposed Infrastructure

The project includes the market yard building as well various other infrastructure that has been illustrated below

Table 3: Summary of proposed Infrastructure Facility

No	Particular	Amount
A	Basic Infrastructure	
1	Water Tank	457291.95
2	Sale Hall	3213023.59
3	Internal Roads	8743589.97
4	Open Auction Yard	20997978.80
5	Street Lighting	1546622.00
Total A		34958506.31
B	Productive Infra.	
1	Godown (1000 MT)	10068079.70
2	Grain Gradation Unit	3642687.59
3	Shetkari Niwas	1955385.89
Total B		15666153.18
Total A+B		52143399.28

6.3 PDRI Section Weight

The PDRI tool was applied on the Project to assess its Scope Definition Completeness. The rating has been given through the discussions with the Project Manager. It has been found that, the PDRI Score of the Project is 174, which is below 200.

Section	Weight
I. Basis of Design	36
II. Basis of Project Decision	103
III. Execution Approach	35
Total	174

6.4 Summary

The PDRI tool was applied on the Project to assess its Scope Definition Completeness. The rating has been given through the discussions with the Project Manager (Mr. Ashish Sakat).

It has been found that, the PDRI Score of the Project is below 200 and the result is evident in its Cost and Schedule reports. What was planned to be completed in 18 months and a budget of Rs. 5,30,72,818.44/-, got completed in 3 months prior with a budget of Rs. 5,15,45,555.03/-.

Thus, we say that, due to the application of the tool, Projects can be successfully completed within planned budget and schedule.

7. CONCLUSION

As per the CII research, projects scoring below 200 perform better in terms of cost and schedule.

The result is evident in the Cost and Schedule reports of this project. What was planned to be completed in 18 months and a budget of Rs. 5,30,72,818.44/-, got completed in 3 months with a budget of Rs. 5,15,45,555.03/-.

Thus, we say that, due to the application of the tool, Projects can be successfully completed within planned Budget and Schedule.

8. REFERENCES

- [1] Building project scope definition using project definition rating index by Chung Suk Cho and G. Edward Gibson. Published in Journal of Architectural Engineering, Volume 7, Issue number 4 in Dec 2001, page 115-125.
- [2] Project Definition Rating Index Use on NASA Facilities Produced under the guidance of the NASA Pre-Project Planning Team published in April 2000.

- [3] Analyzing project scope definition completeness by using PDRI for an infrastructure project by Shweta Kasnale, V. U. Khanapure & M. A. Khandare. Published in International Journal of Engineering Sciences & Research Technology on July 2017.
- [4] Scope management using project definition rating index by Peter R. Dumont, G. Edward Gibson, John R. Fish. Published in Journal of Management in Engineering, Volume13 and Issue number 5 on Sep 2017, Page 54-60.
- [5] Barrow, Benjamin, (2019) "Pre-Project Planning at NASA", University of Texas at Austin, in partial fulfillment of the degree of Master of Science.
- [6] Chung-Suk Cho and G. Edward Gibson, Jr.(2019) "Building Project scope definition using project definition rating index" ©ACE, ISSN 1076-0431/01/0004 0115
- [7] Pere Andreu Ubach de Fuentes "Validation of the Project Definition Rating Index (PDRI) for MIT Building Projects" Civil Engineer Polytechnic, University of Catalonia, 2020
- [8] Yu-Ren Wang & G. Edward Gibson, Jr ISARC (2021) "Pre-Project Planning and it's Practice in Industry"
- [9] Yu-Ren Wang & G. Edward Gibson, Jr.(2021) "A study of Project planning and Project success using ANN and regression models"
- [10] Evan Bingham (2021) "Development of the Project Definition Rating Index (PDRI) for Infrastructure Projects"
- [11] Bhosale A., Dr Pimplikar S. S. (2022) "Evaluation of Contractual Relationships Between Client-Consultant-Contractor on A Mass Housing Project-JNNURM Scheme" SPPU in partial fulfillment of the degree of Master of Engineering
- [12] Chu Tih-Ju, Chang An-Pi, Hwang Chao-Lung, Lin Jyh-Dong (2022), 'Intelligent Green Buildings Project Scope Definition Using Project Definition Rating Index (PDRI)', in 4th International Conference on Building Resilience, 8-11 September 2014, Salford Quays, United Kingdom
- [13] Rebekha Burke, Kristen Parrish, 'Infrastructure Project Scope Definition Using Project Definition Rating Index', in Construction Research Congress 2022.
- [14] Evan Bingham, G. Edward. Gibson, 'Infrastructure Project Scope Definition Using Project Definition Rating Index', in Journal of Management in Engineering 2022.