Risk Management in Power Evacuation Projects – NTCP Model

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Abstract

Risk managing is a significant pace in project success. Projects undertaken in the power sector are extensively multifaceted and have frequently noteworthy budgets, and accordingly addressing risks allied should be an importance for all company. Managing risks in power evacuation project is as a very significant activities throughout project in order to realize the project objectives in terms of time, cost, quality and scope. The risk is existing where is uncertainty, it can have an occasion of opportunity and adverse impact on projects. Negative risk may impact adversely in projects to a large extent. The main objective of this study is to examine the influence of risk factors on the success of power evacuation construction projects. This paper proposes the evaluation risk factors through NTCP model (Novelty, Technology, Complexity, Pace).

Keywords

Impact, Risk Factors, Power Evacuation Projects, Success, NTCP Model.

1. Introduction

By nature, the risk is inevitable in projects irrespective of nature and scope of the projects. Occurrence of risk is very common in complex projects like power evacuation projects and uncertainty increases with increasing as project magnitude. With the rising energy demand in India, it becomes difficult to achieve sustainable and healthy development of the economy and society, for instance, the energy shortage, structural imbalance, low efficiency, serious pollution and so on. The electrical power industry is an integration of several functions: vis-a-vis power generation, transmission, and distribution. The power evacuation systems are the fundamental part of the electricity grid. A UHV (ultra-high Voltage) transmission line project involves multiple amalgamated

stages, such as project sanction, viability analysis, design, construction, competition acceptance etc. The Project is a complex process with long investment period, massive investment measure, high technology requirement and a complex situation (Li, y; He, J; Yuan, J; Li, E; Hu, J; Zeng, R; 2013). Hence a complex and uncertain environment develops the risk to the success of a project which may impact project progress, quality, budget, schedule, and cost.

The investment of power evacuation projects is so massive that the company borrow the major funds from banks or other financial institution. Also, as a capital-intensive industry power evacuation project has a longer pay-back period which leads to a higher necessity of cash flow and financing capability. In line with the financial environment for power evacuation projects, more attention is needed on risk-related factors such as project budget risk, investment risk, and funding risk from the early phase of the project.

Project risks are uncertainties that may lead to failures in accomplishing the project goals in terms of schedule, cost, quality, safety, security and environment (Fang et al., l 2012). Such uncertainties or events may have an opportunity or adverse influence on project outcomes (scope, cost, schedule, quality etc.). Negative outcomes result in losses which are generally referred to project risks (Webb 1994; Chapman 2003). Risk management can considerably be improved by cultivating the performance and the training of labor, machinery, money, materials which in turn enables the whole construction industry. Risk management has become an important part of the management process for any project. Actually, Risk management came into the center of business works during the last two decades of the 20th century have confidence in that the situations within the construction industry had commanded to adopting risk management and analysis into exercise (Loosemore et al., 2006). Actually, (Akintoye et al., (2003). Risks differ between projects because every project is unique, particularly in the construction industry (Gould and Joyce, 2002). However, there are still many practitioners that have not appreciated the importance of including risk management in the method of delivering the project (Smith et al., 2006).

2. Motivation of Research

The key objective of this study is to evaluate various risk factors and address those factors to prevent power evacuation project failure through NTCP model.

Related Research

A risk, as a part and partial of the uncertainty, is most often preserved in the literature as a likelihood of suffering a cost. Risk can also be called as an event that may or may not occur and can lead to higher costs, an extension of the project literature, failure to quality necessities/ standards, failure to satisfy information requirements/ norms and failure to satisfy stated organizational Risk Management (L. Y. Shen, 2001). The nature of risk is like the risk before one person may be an opportunity before another. This completely depends on, from whose viewpoint the project is being judged i.e. a range of possible results, individual consequences and chance (S.Q. Wang, M.F. Dulaim & M.Y. Aguria, 2004). D. W. Stam, and L. Y. Shen proposed risk management is described as "a system which purposes to recognize and measure all risks to which the business or project is uncovered so that a conscious decision can be taken on how to manage the risks."

Construction projects have an abundance of risks, contractors cope with, and owners pay for. When developing a contract strategy, it is important for the client to communicate his objectives to the contractor to ensure that the most appropriate risk-sharing strategy is chosen D. W. Stam, 2005). The risk is best placed with that party which is involved in the management of the project and it is best able to manage the factor which gives rise to it (R. Flanagan & G. Norman, 1993). Chapman (2001) grouped risks into four subsets: Environment, Industry, Client, and Project. Shen (2001) considered them into six groups in keeping with the nature of the risks, i.e. Financial, Legal, Management, Market, Policy and Political. (Chen et al. 2004) proposed 15 risks apprehension with project cost and divided them into three clusters: Resource factors, Management factors, and Parent factors. Assaf & Al-Hejji (2006) mentioned the risk factors as the delay factors in construction projects.

Studies have described that construction industry is more inclined or observable risks and uncertainties than other businesses (Flanagan and Norman, 1993; Tuh and Eaarr, 2000) because construction process are complex and involve unique and uncertain conditions during the project lifecycle, for example, weather condition, inflation, changing company profit margins, marketplace competition, subcontractor failures and on-site output (Mustafa and Al-Baha, 1991; Karimi Azari et. al., 2011). These uncertainties eventually lead to project interruptions and cost

overruns. There sometimes terminate prior to project completion as well as affect the company reputations.

The existing literature has recognized the following major risks in E & C Engineering & Construction) project case; physical, financial and economic; political and regulation; environmental; design related; act-on-god/ force majeure; contractual and legal; safety and lifecycle-stage risks (Mustafa and Al-Bahar,1991; San Santoso et.al. 2003; Ghosh and Jintanapakanont, 2004; Schaufelberger, 2005; Iyer and Sagheer 2009; Li and Zou 2011; Dey 2012; Xiaopeng and Pheng 2013, Chen and Leu 2014).

Levin (2014) has defined project complexity with respect to triple constraints which challenges abilities to manage time, cost, scope and quality and makes it harder to deliver as exemplary work.

Below figure depict a new model for managing complex projects mentioned by Shenhar and Dov (2008) in their book titled "Reinventing Project Management". This model is known as the NTCP model to identify the project risks. The model has the following parameters of evaluation risks.

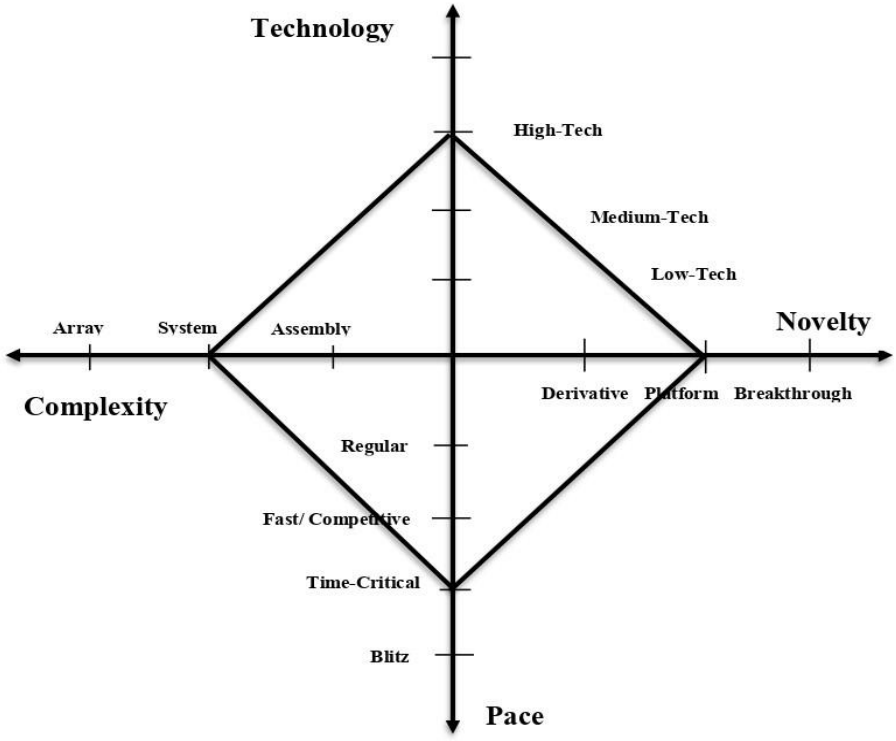

Fig-1 NTCP Model: Risk Management Approach

Each dimension (Table-1) represents four levels in which project risk factors fall.

Table-1: Dimension of NTCP Model

Dimension	Expected benefit	Potential risk
N- Novelty	Exploiting new business opportunities; bounding competition; acquisition first powerhouse benefit	Having difficulty forecasting exact business desires; lost sales targets; interesting competitors to copy of concepts
T- Technology	Improving performance and functionality	Experiencing technology failure; absent of required skills
C-Complexity	Bigger programs, bigger payoffs	Taking difficulty in synchronizing and integrating
P- Pace	Gaining early market introduction, mounting a quick response	Missing targets; making hit-or-miss

3. Novelty: How New is The Project

Project novelty is defined by how new project is to its business and potential employers. This measurement signifies the degree to which customers are familiar with this kind of project, the way to practice it, and that is, how evidently can be defined the requirements and employer needs upfront. Product novelty includes three types: derivative, platform and breakthrough.

The levels of the novelty are defined as follows:

a) Derivative products are extensions and expansions of existing projects.
b) Platforms products are a new generations of prevailing product lines. Such product replaces earlier products in a well-established business sector. A typical example is a new model of car.
c) Breakthrough products are new creation of products. They transfer a new thought or a new idea into a new creation that customers have not ever realized before.

4. Technology: Technological Uncertainty

The major causes of task uncertainty are technological uncertainty. Technological uncertainty has an influence on, between other things, design and testing, communication and interaction, the timing of design freeze, and the needed number of design cycles. It also affects the

technical capability desired by the project manager and project members. Four stages that encompass technological uncertainty are:

a) Low technology projects: rely on prevailing and well-established technologies. The most typical examples are construction projects.
b) Medium technology projects use mainly current or base technologies but include a new technology or a new feature that did not part of earlier projects.
c) High technology projects: signifies circumstances in which most of the technologies employed are new to the firm.

Super high- tech projects: are based on new technologies that do not exist at project initiation.

5. Complexity: The Complexity of A Project

A simple way to define several stages of complexity is to use ranked framework systems. Project complexity is straightway related to system scope and affects the project and the formal process of project management.

Three distinctive levels of complexity are used to distinguish among project management practices: Assembly, System and Array.

a) Assembly projects: involve generating a gathering of elements, components and modules collective into a single unit or element that performs a single purpose.
b) System projects: contain a complex collection of communicating elements and subsystems, mutually performing manifold functions to meet a specific operation need.
c) Array projects: deal with a vast isolated collection of systems that function together to achieve a common purpose (sometimes they are called "systems of systems" or "super systems").

Pace: How Critical is the Time Frame

On this scale, projects vary by urgency (how much time is available) and by what occurs at four levels of pace where are identified as: regular, fast/competitive, time critical and blitz.

a) Regular projects are those efforts where time is not critical to immediate organizational success.
b) Fast/ Competitive projects are the most common projects carried out by industries and profit-driven organizations. They are considered to address market prospects, generate a strategic positioning, or form new business lines.

c) Time, critical projects must be completed by a specific date, which is forced by a certain event or an opening of opportunities. Missing the target means project failure.
d) Blitz projects. These are emergency projects. Solving the emergency as fast as possible is the measure for success.

The objective was to build a context free framework that would not depend on the industry or specific organization and would be common adequate to capture the wide range of projects. In practice it was found supportive to expand this model, identifying that there are really two major causes of uncertainty; market (or goal) uncertainty and technological (or task) uncertainty. Thus, the NTCP (novelty, technology, complexity and pace) diamond model developed to recognized risk factors.

6. Risk Factors

Usually, risk factors in a project can be categorized based on their basis and outcome on project purposes and can be categorized in scope, time, cost, quality.

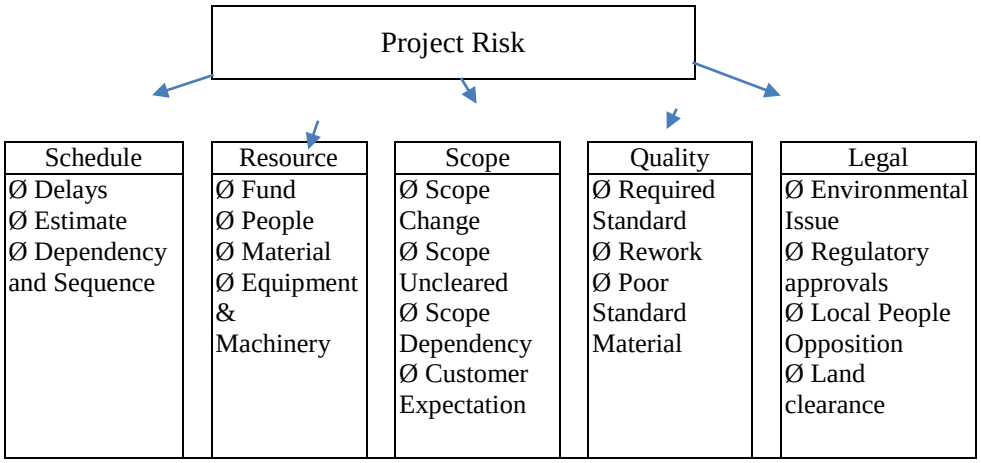

Fig-2 Risk Factors

7. Research Approach

The research methodology was chosen a descriptive and survey method. Descriptive research is used by the study of various article published in different journal, since it helped to identify major risk factors play on the power evacuation projects of repute (Generation, Transmission &

Substation and distribution), and other construction projects. Also, the factors were developed based on the past reviews 22 risk factors were mapped on 1-5-point Likert scale. 1 represents "no effect "of the project whereas 5 is the "key factors" of the projects. The questionnaire was administered respondents based on who are in specialist in power evacuation projects. Out of 30, 25 respondents were collected and analysed.

8. Findings

For plotting the Diamond Framework (Table-2) the means of the responses of 22 risk factors in power evacuation projects.

Table–2 Risk Factors

Dimensions	Factors	Mean	Final Mean
Novelty	Location of projects	4.30	4.35
	Unavailable of Historical records of similar projects	3.50	
	Project completion time	4.47	
	Objectives of projects	4.61	
	Scope of projects	4.86	
Technology	Prevention of property	1.75	3.04
	Changes in design during execution	3.30	
	Longer testing procedure	2.56	
	Unskilled manpower	3.40	
	Environmental safeguard	3.12	
	Uncleared technical specification	4.10	
Complexity	Unavailable of Price variation clause	3.25	3.88
	Dispute and Arbitration	3.80	
	Insurance and Indemnity	3.60	
	Suspension of work	4.30	
	Site Accidents	4.40	
	Labor regulations	3.70	
	Opposition from social Bodies	4.10	
Pace	Extension of time	3.90	3.63
	Penalty for delay	4.10	
	Overcoming environmental challenges	3.90	
	Inefficiency in project execution	2.60	

So, from the above Table-2, it is understood that power evacuation the maximum risk factor in the dimension of Novelty. This indicates that all projects are critical on the parameter of location, objective, completion time and scope of the project. Hence attention to be needed on the scope clarity, objective definition and management of uniqueness factors.

9. Conclusion

Plotting of the power evacuation project risk factors is one of the utmost significant aspects of managing projects. Considering such risk factors directly or indirectly supports in strategic planning and faster project execution work. Thus, this study has helped by NTCP model to identify risk factors in power evacuation projects and quantified the impact on ultimate project goal. Also, this study finds out the major risk factors are in Novelty group which are location, objective, completion time and scope of the project

10. Limitation

This study has plotted the risk factors in the NTCP model only in Power Evacuation projects. Also, this model can be used in other power sector and other projects for finding out risk factors and address to minimize adverse impact.

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