

# Roadmap for Project Risk Management in Asset Propelled Industries using Tollgate Approach



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**Context:** Globalization and technology changes have increased the challenges for managing the projects of asset propelled industries, which has also increased the likelihood of risks. This scenario motivates to provide a roadmap for project risk management in asset propelled industries.

**Objectives:** The objective of this study is to develop a roadmap for project risk management in asset propelled industries using the tollgate approach.

**Methodology:** The methodology starts with a literature survey in the domain of Project Risk Management (PRM), and project management. Further, a roadmap for PRM has been developed based on a tollgate approach and discussed the usage of tollgate approach for PRM with example.

**Findings:** Usage of tollgate approach makes project risk management simple and comprehensive.

**Conclusions:** Adoption of project risk management practices in the initial phase of project management improves the success rate of the project. The usage of tollgate approach improves the effectiveness of PRM for project management.

**Keywords:** Project Risk Management, Project Management, Tollgate Approach, Asset Propelled Industries (API)

## 1. Introduction

Asset Propelled Industries are associated with many industries such as oil and gas, Original Equipment Manufacturing (OEM), mining and raw materials, construction industries, and service-providing industries. Different activities involved in API are asset management, asset health monitoring, utilization, performance monitoring, and other activities related to the asset. API are more focusing on managing the assets to ensure the maximum profit and high customer satisfaction, which involves complex and multi-objectives decision making. The complexity in asset management introduces many risks and increases the likelihood of risk occurrence in project management of API. To overcome this situation and to increase the success rate of the project, API are looking for the solution. This situation of API cultivates the need for developing a roadmap for project risk management in asset propelled industries. In the next section, a literature survey has been performed in Project Management (PM) and project risk management to understand the concepts of PM and PRM.

## 2. Literature Survey

### 2.1. Project Management

Project management is the implementation and integration of skills, knowledge, and techniques to ensure the success of the project, and many researchers have contributed to PM, out of which few are discussed in this section. A. Tenera and L. C. Pinto (2014) proposed a project management improvement model using Lean Six Sigma (LSS) approach and DMAIC cycle. R. A. Salawu and F. Abdullah (2015) assessed maturity levels of current RMC contractors for Federal highway projects in Nigeria. M. Mazlum and A. Fuat Güneri (2015) used fuzzy PERT and CPM techniques to improve the planning of project management. Gabriela Fernandes et al. (2013) developed a framework to enhance the use of project management practices in an organization. Andreas Økland (2015) documented a literature review of sustainability in project management and briefly looks into sustainability in PM standards, stakeholder analysis, governance frameworks, performance indicators and measuring schemes. A. Maravas and J. Pantouvakis (2013) reviewed the existing body of knowledge in time and cost uncertainty modeling in project management, portfolio management, and programme management and developed the guidelines to achieve the best alignment between project and programme strategy. A. Miklosik (2015) analyzed proposed a framework for enabling continual improvement of project management performance through capability maturity measurement. M. Bahrami et al. (2012) proposed to use Failure Modes and Effects Analysis (FMEA) technique in the implementation and management of projects to identify, prevent, eliminate, or control of potential errors causes in a system/process/project. M. L. Tseng and A. S.F. Chiu (2012) integrated multiple criteria decision making (MCDM) techniques to evaluate the green innovation practices under uncertainty. R. Wang (2012) proposed a framework based on fuzzy set theory to elucidate the linguistic information and analytic hierarchy process (AHP) to address the complicated criteria. O. Seroka-Stolka (2014) presented determinant factors that can influence the sustainable development of the green logistics concept in companies. N.Z. Azizi et al. (2015) Identified Eighteen soft cost elements (SCEs) and categorized into three groups namely Professionals, Procedures, and Legal Requirements.

### 2.2. Project Risk Management

Project Risk Management is the method of identifying, assessing, responding, monitoring, and reporting the risks involved in

the project. Many researchers have contributed to this domain, out of which few are discussed in this section. S. Greenberg et al. (2011) integrated communications planning, risk assessment, and project management into project planning, and constitutes the basis of public communications to ensure consistent, factual information. Britta Ganz (2015) evaluated the expert reports to quantify the exploration of risks for geothermal projects in Germany. ThirupathiKanchu, M. Manoj Kumar (2013) identified the risks faced by the banking industry and examined the techniques implemented by the banking industry for risk management. Syed Aftab Hayat (2014) assessed the enterprise risk management (ERM) process of a fiberboard manufacturing company and identified critical risks affecting the company. R. R. Junior, M. M. Carvalho (2013) comprehended the impact of risk management on project performance and investigated the degree of diffusion of risk management practice in Brazilian companies. L. C. Di Serio, et. al. (2011) described the implementation of Enterprise Risk Management (ERM) in three world-class Brazilian companies. Stern R., Arias J.C. (2011) analyzed the five methods of risk management and concluded that the suitable method depends on the specific criteria of any given project. Yuri Raydugin (2012) proposed a method to consistently utilize the project risk management practices for selecting engineering design options during Front End Engineering Design (FEED) phase of project development. Simon S. Gao et. al. (2014) investigated the current perceptions and practices of financial risk management at small businesses in China. MohamamdAbdolshah (2015) reviewed quantitative and semi-qualitative risk assessment methods associated with fuzzy sets theory (FST) and considered three steps of the risk assessment process, namely: definition, measurement of parameters, fuzzy inference, and defuzzification. Henrik Berglund (2007) explored the risk conceptions of innovators in two large corporations and identified the relationship between risk and innovation in the corporate setting. Peter Massingham (2010) developed a framework based on knowledge management tools and techniques to manage organizational risk.

### 2.3. Research Gaps based on Literature Survey

The exhaustive literature survey shows that many researchers have developed the frameworks for PRM and used different tools and techniques to solve issues related to PRM. The survey identifies the scope of developing the roadmap for the effective implementation of PRM in asset propelled industries using the tollgate approach.

## 3. Research Methodology

The research methodology starts with a literature survey in the domain of asset propelled industries, project risk management, and project management, to know the current situation of API and to understand the concept of PRM. Further, different phases of project management and PRM are identified. The literature survey helps to understand the different activities to be performed in each phase of PM and PRM. Similarly, the resources are identified to execute the PM and PRM phases. In the next step of research methodology, tollgate approach is used to develop linkages between PRM and PM to develop a roadmap for PRM in asset propelled industries. At the end of the methodology, the roadmap has been discussed using example and derive the conclusions.

## 4. Roadmap for PRM using Tollgate Approach

The roadmap for PRM in asset propelled industries using the tollgate approach has been shown in Figure 1, which includes the different phases of project risk management. The roadmap starts with project analysis, which involves different key steps such as development of business case, feasibility study, development of project charter, identification of stakeholders, selection of project team, review of the project and approval. Similarly, a few key steps are involved in each phase of project management. In this roadmap, the risks involved in each key step of project management phases are identified, and the solutions are proposed to mitigate or transfer or reduce the likelihood of risk. The roadmap is discussed by taking one example of heavy assets, which are used in construction industries for performing different work such as digging the land, transporting raw materials, and other activities related to construction projects.

In this study, the business case has been considered for discussing the PRM road map, such as a selection of heavy assets to perform the different tasks efficiently and effectively related to construction projects. The wrong selection of heavy assets may lead to a huge loss to the construction industry in terms of money, effort and time. This business case covers different risks such as wrong selection of assets, sudden breakdown of asset, and high fuel consumption. The risks can be identified by reviewing external and internal audit reports, financial analysis and market study. The identified risks are further analyzed using qualitative and quantitative techniques, which helps to identify the critical risk involved in a given business case. The qualitative risk analysis involves expert judgment, risk categorization based on PESTLE (Political, Economical, Social, Technological, Legal, and Environmental) wherein quantitative risk analysis involves sensitivity analysis, cost risk analysis and schedule risk analysis. The experts are selected from construction industries to identify critical risks, who has experienced more than five years. The discussion with experts has identified a critical risk as a wrong selection of assets. Developed some strategies to avoid the wrong selection of assets, identify the parameters for monitoring asset performance, which can help to select a correct asset for a given situation. Use multi-criteria decision-making methods for asset selection. Provide some guidelines for asset selection. The effect of improvement measures is compared with existing results and again risk impact analysis has been performed to know the impact of risk.

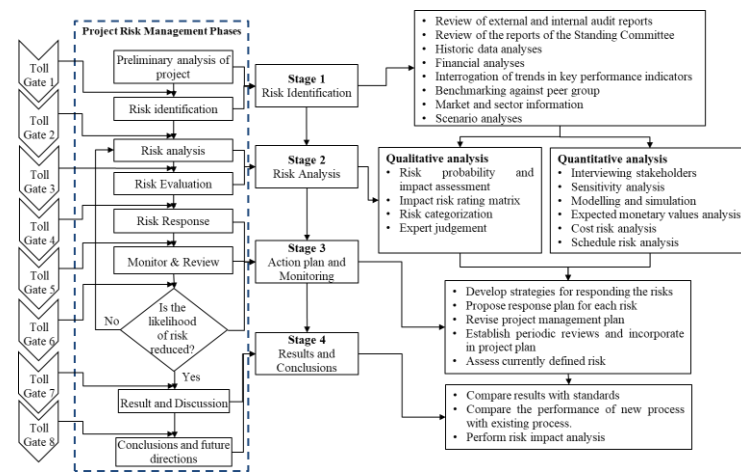


Figure 1 Roadmap for Project Risk Management using UNIDO Model

## 5. Conclusions

In this study, the different tools and techniques used in project risk management are explored and understood using the literature survey. The literature survey further helps to understand the tollgate approach and its applicability for project management. The roadmap is developed for effective project risk management in asset propelled industries using tollgate approach. The developed roadmap gives a comprehensive approach for project risk management in API. The developed roadmap is discussed based on the example of heavy assets, which are used in construction projects to perform the different tasks related to construction projects. The tollgate approach gives a systematic and logical solution to mitigate or reduce the likelihood of critical risk. Implementation of the tollgate approach is simple and quick. The roadmap also suggests that the project risk management approach must introduce from the initial phase of project management to improve the success rate of the project. In future studies, a similar roadmap can be used for different industries with suitable tools and techniques.

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