



## Mitigation model in the initiation phase of energy projects

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### Abstract

*Risk management is a vital decision making process essential for the successful delivery of projects. However, the full systematic practice is still not carried out during the project definition. The probability of risks occurrence and rigorousness of risk identification and evaluation in the project initiation stage has positive influence on project implementation. This paper will focus on the systematic model approach in the project initiation phase: evaluate and establish limitations to which risks are controllable per the stage gates, and which risks are specific to the certain analysis in the early project definition phase. This research has to determine the need for such a suitable risk model response, mitigation action plan and show the need of the early project risk awareness.*

**Key words:** Mitigation, Risk Management, Risk Model, Project Management

## 1. INTRODUCTION

Risk presents the exposure to the consequences of uncertainty [1]. Risk management refers to a coordinated set of activities and methods that are used to direct an organization and to control the many risks that can affect its ability to achieve certain objectives. Risk management has to answer on how it intends to manage such a risk by systematically applying management policies, procedures, applying management components, approaches and resources that will be used [2]. Risk project management in general is divided into nine-stages entitled Project Risk Analysis and Management (PRAM): define, focus, identify, structure, ownership, estimate, evaluate, plan and manage. From the detailed or quantified approach, risks could be avoided, retained, reduced and transferred by suitable techniques in carrying risk management practices.

During the last decades, risk management has gained attention from both, academicians and practitioners. Project Management Institute (PMI) [3] included risk management as one of the ten knowledge areas in project management and described the following six main processes: Risk management planning, Risk Identification, Qualitative risk analysis, Quantitative risk analysis, Risk response planning, and Risk monitoring

and controlling. Many authors emphasized that essential part of risk management is response action plan [4], [5], assuring the proactive problem solving.

Various studies have shown the needs for project risk management and its benefits. Different authors revealed that quality of cost-estimates, decision making [6] and scheduling [7] are significantly improved with risk management models, while more reliable risk allocation is being facilitated [8].

Although the existing literature covers the importance of risk management models, there are only few studies on their application success when it comes to different industries.

Considering previously said, the aim of this study is to identify the major needs for the systematic risk model approach in the energy projects initiation phase. In the engineering industry project risk management is still very ineffective due to the lack of the participation in the risk management assessment, as well as the lack of the knowledge. One reason for the study comes from the research gaps where such a risk treatment in the early stage is not taken serious enough. The second reason comes from practical experience in the field, working on the numerous projects. In practice, most of the times risk is handled through the arrangement of contingencies (per the needed funds) or deviations

(time) constrains that are not determined based on a systematic comprehensive analysis of the risks. On the contrary, in many cases it is clearly insufficient to cover the consequences of risks that occur during the project implementation. Thus, in most of these cases projects end with costs overruns and being late.

### 3. METHODOLOGY

There are many models on the market that cover the qualitative and quantitative methodologies. Both of the noted approaches probability models suffer from two major limitations [9].

One of the limitations is that some models require detailed quantitative information, which is not normally available at the time of definition and preparation, and the applicability of such models to real project risk analysis is limited, because either the internal risk works shops or the third party agencies participating in the project have a problem with making precise decisions. The second limitation is that some of the problems are ill-defined and vague, thus requiring subjective evaluation which classical models cannot handle.

There is a need for systematic risk management approach in the definition of preparation phase of the project. As the proactivity is needed in the engineering industry this has to be overcome by resolving the potential problems in the early definition and implementation phase of the project [10]. The aim of the early definition phase is to prepare the plan of the mitigation and narrow all known and unknown risks before it's moved to the next step. If we are looking from the qualitative way of approach in resolving these issues software, development projects are not different as project planning is done with minimum information. However, the degree of risk varies with complexity, size [9] (both in terms of schedule and budget), and location. Few studies presented risk management frameworks from developers' perspective, which integrate the software development cycle and involve the concerned stakeholders [9]. Main message from all of the studies is that successful projects try to resolve potential problems before they occur. That should be the proficiency of risk management and aim of the presented study.

This paper proposes methodology approach that will use a quantitative technique with the active involvement of stakeholders in order to identify, analyse and respond to risks. The entire methodology is based on approach, which will be based on phase before of any project implementation and project development. The model will provide details in steps that will support the research from the point of decision-making in concerning the quantitative approach of risk assessment to be effective as possible as it can be. Quantitative risk management is an activity that integrates recognition of risk and risk assessment [12]. Presented model implies developed strategic steps to manage risks and use the corrections or mitigation of risks by knowledge of the managerial resources as well

as given criteria [13]. By this quantitative approach with the consideration of the quantitative risk factors and integrating the risk management, preparation process will be developed through stage gates steps which will enable better implementation of the project risk management.

### 4. CASE STUDY

There are many factors in the project management industry [12] that can influence the execution of the projects. We will focus only on risk negatively impact, thus it is increasingly important to anticipate risks and implement the best solutions. Therefore, the preparation of the project before execution is crucial for any project. This model approach sets out to improve project preparation risk process for execution of large [14], [15] or small project, or in general, to help project management decisions. Presented model will have three main corrective groups:

- 1) Systematic process matrix with steps one through six;
- 2) Risk registration and control flow plan;
- 3) Risk support documents and data with applicable criteria.

*Systematic risk management model* [9] has six major step elements or how it is named- the stage gates. The proposed model will introduce the key element, systematic approach by involving the all FAMs into identification of risk opportunities, assessment, refine, development and the decision-making leads [11]. In the systemic presented model, it will be created the basic criteria of the model and some constrains with the different stage gate owner's responsibilities. The proposed systematic model will follow the tasks of the risk management, systematically by breaking it down to the following stage gate criteria:

- Define the risk opportunity (past history, known, unknown and new);
- Assess the unknown & new risk opportunity;
- Assess the known & new risk opportunity;
- Narrow and refined risk elements of the known & unknown;
- Develop and refine risk mitigation analysis;
- Risk identification oversight (RIO) report.

*The detailed risk control flow plan requirement approach* helps in monitoring and assessing the project risks with the active involvement of project group owner's or the focal points developer's representatives were all functional area managers (FAMs) involved. The back up or the resource data for the map stage gates scope was classified to form a hierarchical structure (work breakdown structure) per the risk identification flow plan.

*Risk support documents and data with applicable criteria:* Each set of the risk data documents has to be acknowledged through the risk registration and control flow plan before it is moved into next stage gate. The systematic process matrix will be developed further into more detailed elements to create more criteria for the flow plan decisions and supported through the risk data

documents with applicable criteria. Purpose of the risk data documents will be to narrow documentation assessment collection as an applicable it can be as we continuously progress into next stage gates.

Figure 1 presents the systematic model risk methodology flow chart, representing the integration of

the results from Whelton et al, 2002 [7] and Ostaz & Okman, 2005 [16].

Model elements are: project definition activity model, generic cross functional team, project definition role, alignment of client strategy and project definition strategy and the steps of the judgmental risk analysis process.

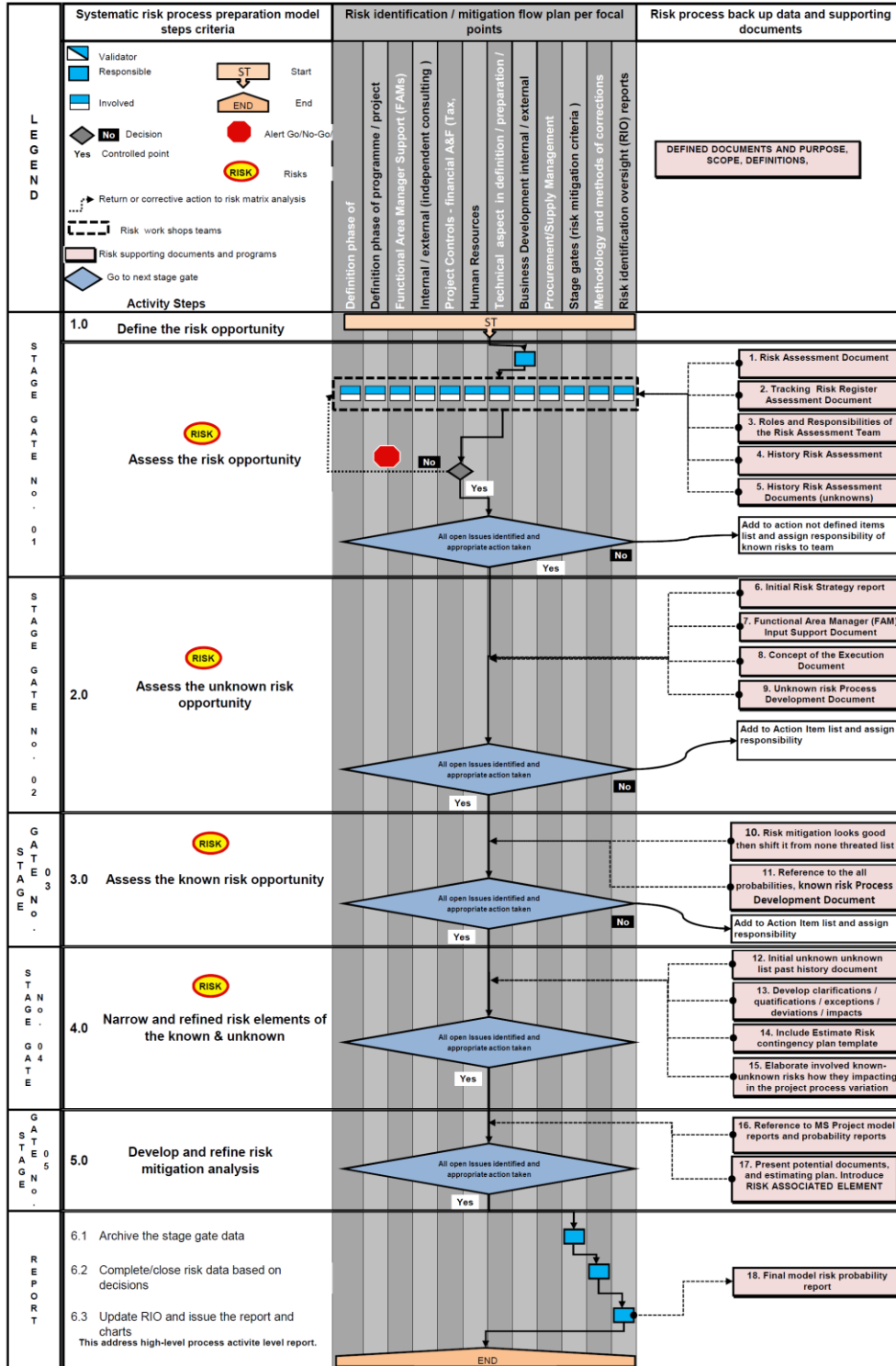


Figure1. Systematic model risk methodology flow chart [7], [16]

On the end of the process, the aim of the presented model research is to pass all the stage gates with the given criteria and to produce the final risk mitigation report. Risk mitigation report can be used on to improve

the final mitigation schedule results in MS project, or other schedule applications.

## 5. CONCLUSION

The research objective of this paper is to provide a framework based on systematic approach, best knowledge and best engineering practices in engineering industry to improve the risk mitigation results. Risk management based on this methodology will have the ability to propose improvements for risk management based on the detection of gaps during evaluation. This vital common risk definition approach eliminates misunderstandings and confusion during the risk management process. The expected results have been introduced with the main objective to improve the risk management awareness and to give much more focus in the early definition phase of the project. Main possibilities of the results usage are lean approach and better systematic categorization and identification to be able to predict faults in schedule and budget. At this moment, first preliminary maturity model has been defined and in the future research we plan to continue development and to verify a detailed risk management model customized for Energy industry. The next research efforts can be given in direction of detailed methodical web-based application model that can be used and accessed by companies through servers

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