

CHAPTER 1

INTRODUCTION



1.1 Introduction

Managing the project requires systematic management to achieve the desired objective. Incidentally, some sources of failure can occur during the project progressing. The organization must consider the situation that can affect to the progress of project.

Risk, a thing can occur and affect to any project. It must be considered when manage a project in order to avoid the failure in any objective. Risk has been defined in various ways. It may equivalent to the word “*uncertainty*”. According to Raftery (1994), “*Risk and uncertainty characterize situation where the actual outcome for a particular event or activity is likely to deviate from the estimate or forecast value*”. In contrast, risk and uncertainty can be distinguished in the way that risk can be quantified, but uncertainty does not. To quantify the risk, it is the multiplication of probability of event with magnitude of loss/gain (Raftery, 1994).

Risk management can be applied in many fields. Project management in construction is a specified field, which has typical risk depending on the field of construction: Building, Facility, Petrochemical Plant. Risk management for construction project management should cover all tasks and carefully analyzes, which requires a considerable amount of detail from the project in order to ensure that all important risks are identified and appropriately recommended. A way to achieve a successful project management not only depends on how to manage the project, but also depends on how to manage the risk.

To identify the scope of risk analysis, risk analysis, which has been defined by GAO (2004), is “*a technique to identify and assess factors that may jeopardize the success of a project or achievement of a goal. This technique also helps define preventive measure to reduce the probability of these factors from occurring and identify countermeasures to successfully deal with these constraints when they develop*”. Risk analysis is widely used to manage and determine which situation must be considered, when starting any project.

There are many factors that can affect to the project, which is mainly due to the following factor:

- Internal factors
- External factors

Theory of project is the transformation of inputs to outputs. Project management of each engineering business is expected to manage products or services to meet customer requirement.

There are many definitions of project management, which have been defined in various ways. According to IAPMC (2002), “*Project management is concerned with the overall planning and co-ordination of a project from inception to completion aimed at meeting the client's requirements and ensuring completion on time, within cost and to required quality standards*”. Successful project management requires cooperation of all level to effectively work within organization, and also deals with external concerned organizations.

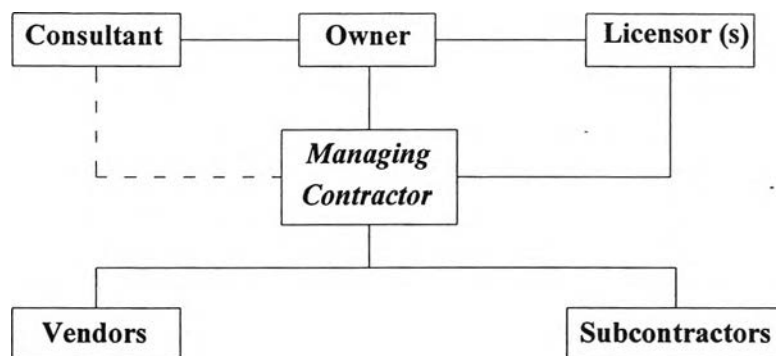


Figure 1.1 Basic Relationship of Project Management

The case organization is a subsidiary of the oversea corporation, which have been founded in Thailand for many years. Major business areas are construction and consultant for petrochemical industry. Project management composes of many work divisions. Work structure is depended on business type and the project. The traditional project E/P/C work (engineering, procurement and construction) weight distribution generally depends of the size and scope of the project case by case.

Contents of Engineering Work

- Work break-down (Estimation of number of documents)
- Control budget
- Applying code and specification
- Arranging plan schedule
- Manpower mobilization/Subcontracting work
- Establish document control system

Engineering schedule will be prepared based on the project master schedule and inter-relation between functional departments such as construction sequence, expected delivery time of construction material and work sequence of engineering activities. Department manager will mobilize sufficient manpower to make sure that the document under the responsibility of his department can be provided on time. For main engineering work, it covers the detailed engineering design for all type and size of projects, including: process, piping civil and structural, electrical and mechanical, instrumentation and equipment. Overall design stage, which is the first stage, depends on project description. Its objective is to create the system for the project, and to specify material and equipment for the project. Design work not only generates by the company, but also by the clients themselves. Details of design work will be sent to procurement work to purchasing stage.

Contents of Procurement Work

- Define of work volume (Requisition plan/Sub-contract plan)
- Qualified vendor list
- Control budget
- Authorization
- Procurement plan
- Inspection plan
- Expediting plan
- Manpower plan

Requisition plan will be provided by project manager under the assistance of engineering team. Qualified vendor list will include the vendor specified in contracts. Inspection plan will be based on the requirement specified in requisition document. Major activities of procurement work are purchasing of materials for overall project. In case appropriate, subcontracting work is also included in this part. Details of material and equipment from design stage will be purchased with carefully inspection in order to match with specification. Shipping and transportation of all equipment and material are managed within schedule and budget.

Contents of Construction Work

- Construction schedule
- Control budget
- Manpower/Construction equipment mobilization plan
- Subcontract plan
- Temporary facilities
- Material control plan

Construction schedule will be based on project master schedule, preliminary work volume (include major equipment, depth of excavation and major time consumed items,) provided by engineering team, delivery of major equipment, construction sequence, etc.

- QC plan
- Rigging/Transportation plan
- Safety/Security plan
- Environment control plan
- Document control plan
- Handover plan

QC work will be developed, which based on engineering (specification, code, regulation, etc.) requirement. Environment control includes the disposal, effluent, construction noise, vibration and emission. All purchased material and equipment, including fabricated

equipment, will be installed by the supervision of coordinating with client and subcontractor. This stage will be well controlled in order to make sure that the project will be finished on time within the budget.

Pre-commissioning and commissioning work are in general handled by engineering team after finishing the design works.

The aim of this thesis is to manage the risk in the project, which ensures the project to be appropriately managed along with the risk. Details of risk management are including the identification of the risk, analyzing the risk, recommendation and control.

1.2 Problem Statements

Successful project management must simultaneously manage the basic elements of a project. Several organizations manage each project by following traditional work structure without carefully consider to the risk of the project. The problems that the organization has to face with mostly come from unpredictable situation, improper working or error during working. Those are kinds of risk.

The effects from each stage of the project can lead to the problem of other stages.

- Delay in engineering work can result in procurement and construction work late.
- Over budget on procurement work results in the decreasing of engineering and construction budget.
- Incomplete or failure in quality of construction work also results in project failure, e.g. customer dissatisfaction or loss of profitability.

Many risks affect the project have been founded, which can cause the project failure. The major problems that project management has to handle are how to set up the plan to achieve the targets of project control of:

- Quality (conform to the requirement of contract and regulation)
- Cost (meet the control budget)
- Schedule (meet the contract requirement)

Without appropriate management and considering to the risk, those three targets are actually affected by each other, which are the cause of the problem.

1.3 Scope of Study

In the project management of petrochemical construction business, it mainly composes of engineering work (E), procurement work (P) and construction work (C). This study will focus on applying risk management to construction project management for petrochemical plant. The viewpoint of project management is focused, which the major tasks of the project on E/P/C work will be used as a scope to be analyzed.

Risk Analysis will be utilized as a technique to identify and prioritize the impact of each risk factor for the project management. Development of important tasks, which have major effect to the project will be considered. Risk response will be developed only for selected risks. Risk control will also be the plan to further monitor.

1.4 Objectives

The objective of this thesis is to establish the appropriate way to manage the risk of all main tasks on a specified project in order to ensure that the project will meet the its goals.

1.5 Expected Benefits

After the accomplishment of this study, benefits could be gained in the area of project management. The expected benefits from using risk management for construction project management are the effective management on:

- Quality (conform to the requirement of contract and regulations)
- Cost (meet the control budget)
- Schedule (meet the contract requirement)

to achieve desired objective.

1.6 Research Methodology

On risk analysis, all tasks of the project will be listed in order to be evaluated, which are categorized in to E/P/C work. Work Breakdown Structure (WBS) will then be a guideline to categorize all tasks. All information and data in the selected case study will be evaluated.

Then, potential risk factors that may interrupt and relate to the project will also be identified by categorized into three main groups of risk:

- Quality Risk (Risk makes failure in quality level.)
- Cost Risk (Risk makes over budget leading to loss of profitable)
- Schedule Risk (Risk makes failure in duration.)

After potential risks are identified, risk rating criteria for potential risks will be set as a guideline for evaluator. The riskiness (scale) of cost, quality and schedule is organized.

Next, the identified potential risks on each task will be evaluated by related evaluator. Results from estimation will be recorded on task worksheet, and ranked to prioritize the importance of risk.

After ranking, result from risk ranking will show the prioritization of project risk. Risk response will be applied for the selected risks to further develop strategy as a guideline for the project in the future. Strategy and action plan will then be created to deal with the risks. Each risk has a different way to manage, which the strategies and actions include, (Caltrans, 2003):

- Avoidance
- Transference
- Mitigation
- Acceptance

Finally, risk monitor and review plan will then be prepared to keep track of present and future risk in order to ensure that risk in the project will be in control. The system will be monitored to see that the actions are taken as planned.

Summarization of research methodology is shown below.:

1. Literature survey on related materials (literature and theory)
2. Select a project (execution plan) as case study, and analyze the situation and task, which have been occurred during management.
3. Study the practice, standard, and theory about project management,
4. Assess the project management by the use of risk analysis:
 - List all main tasks within project
 - Identify potential risks for the project into three main groups (quality cost and schedule)
 - Set up risk criteria for risk rating
 - Risk estimation
 - Risk response (treatment) management
 - Risk monitor and control
5. Evaluate the result.
6. Summarize the result and recommend for the project.
7. Thesis write up and submission.

1.7 Research Plan and Schedule

Task	August	September	October	November	December
1. Literature survey on related materials					
2. Select a project, and analyze					
3. Study the practice of project management					
4. Risk analysis on the project					
5. Evaluate the result					
6. Summarize the result and recommend for the project.					
7. Thesis write-up & submission					