

Project Risk and Procurement Management

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Abstract— One of the most important keys/factors that affect the project implementation and cause a losses and fail is (Risk Factor), hence, the project risk and procurement management is about how to plan, act, monitor and control the expected project risk. The nature of risk involves an element of uncertainty because of the need to consider hypothetical future events. The event may or may not happen, after the global financial crisis, and the unexpected factors that happened in that period, global organizations / companies started focusing on the risk management, so, it is important to any organization/company to set-up a strategy to manage the project risk and plan for risk responses; each risk probability and impact should be determined and measured first. There is a different level of risks; therefore, several ways to response are available; in other word; managing the risk is linked with the natural and degree of risk and the organization risk attitude. Planning in advance for project risk will assist the project manager to ensure the successful of project in term of time, cost, scope, quality and resources, etc. and this key will help the organizations in making Go or No Go decisions, the decision that will be taken based on advance plan will definitely release the pressure from the project team and improve the work performance; Finally, Global organizations, which include the teamwork or partners from different nationalities must have a clear context for risk communications, it is also necessary to define the roles and responsibilities by allocating risk owners, who know what to do if the threats become true.

Index Terms—Risk, Management, Techniques, Plan

I. INTRODUCTION

The concept of the risk management is uncertain event or set of events that, should it occur, will have an effect on the achievement of objectives. Put another way, a risk is something that may or may not occur in future, but if it does it will have some impact (positive or negative) to the project objectives [1], so, it is important to project management is how to complete the project according to the scope of work on time, within allocated budget and desired quality, therefore, before the implementation of any project, it is important to any company / organization to know the source of the risks that could harm the planned objectives [2] and [3]. the set-up of the risk management plan will prioritize where leading threats with the highest probability of occurring are handled first. Subsequently, the low risks with rare chances of happening are managed in descending order. Practically, the process of evaluating the risks associated with the entire project may be complicated. The balance of physical resources used in the mitigation process can be mishandled if a professional does not handle the process.

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In the case of Modern Construction System Company (MCS), this company will take the led to build tower in Baghdad with 320 m high, (largest tower in Iraq), due to this project is consider as the first of its kind to be implemented in Iraq, where it contains many technical complicated details such water system supplies and the complicated air-conditioning system, hence, there are many risks that a company will face during implementation, in addition to that this type of work is required skilled employees / workers and certain equipment must be imported from outside Iraq, the threats identified include the delay supply of equipment because of poor roads and transport infrastructure. Similarly, lack of skilled workers, financial risks, addition to the unstable security and political situation there are potential risks that have been identified in the process of project assessment.

therefore, the evaluation proposes mitigation measures, which may include but not limited to the use the local skilled workers, purchasing the equipment from an experienced trader, and sign an agreement with the Iraqi Insurance Company to cover the necessary equipment and employees working in the site. hence, this paper critically analyses the risk assessment in the implementation of this project that will face the Modern Construction System company (MCS) and management. As per the project proposal, it is anticipated that the construction process of this tower will take about four years. The process will involve a risk identification, evolution, mitigation and laying down of functional contingency plans.

II. PROJECT RISK AND PROCUREMENT MANAGEMENT CONCEPT

The risk management is a comprehensive practice of risk identification, assessment, and mitigation of the hazardous factors that are likely to occur in the process of project establishment [4]. hence, the process of project management is conducted to eradicate the detrimental effects of risks associated with the scheme and may cause adverse outcomes to the project. According to [5], the entire process of project management should be creative and disciplined to realize the expected results.

In general, the risk is divided for several type, such as:

- Operational risk
- Contracting risk
- Financial risk
- Legal risk
- Electronic risk
- Environmental risk

all the above risks are controllable and could mitigated except the environmental risk (earthquakes, floods, weather conditions) in addition to that, when we work in unstable countries, we can add the political risks to the above risks,

like the change of the government, or any event that could occur and effect on the security situation in negatively, (as will be discussed in this paper) the controlling of this risk is depend on the situation and the type of the communication adopted in

the project management. the risk management in the project is going through sequential stages [6] :

- Identify project risk
- Measuring the risk (evaluate and asses)
- Plan for response
- Monitor and control the risk
- Communication

The first four stages are sequentially, while the communication should be prepared from the beginning of the project. Therefore, the project manager should establish a good communication network between the project and the relevant stakeholders to achieve the ideal management of projects. Know that each of the above-mentioned stages has its own input and tactics to implement [2].



Figure 1: Managing Successful Project with Prince2 TM

III. RISK IDENTIFICATION

The Risk Identification process, as the initial step of risk management, forms the structure of the whole process [7] , As the first step in the risk management is how we can identify the key risks and their sources in the project, this step is very important in the start of the project to help us to ensure the successful for implemented project, and there are tools and techniques should follow by the organization/company to identify the risks, therefore, Risk identification (RI) forms the base for the next steps of risk analysis and control and allows organizations to learn about the areas in which it is exposed to risk.

IV. TECHNIQUES OF RISK IDENTIFICATION

There are various techniques are followed that help us to identify the risks, the most common tools and techniques are [8]:

- Documentation Reviews: This review assists to recognize the strengths and weaknesses of groups or an observation framework.
- Diagramming Techniques: in general, those techniques are following by most of the organization to identify risks in their projects, according to the [9], the techniques are:
 - Cause and Effect Diagram: This diagram is also known as **Ishikawa diagram** or **Fish-bone diagram**. It is referred to as

the "Ishikawa diagram" because Dr. Kaoru Ishikawa, a Japanese quality control statistician, developed this diagram. The name "fishbone diagram" is derived from the fact that the entire diagram resembles a fish skeleton. The diagram illustrates the main causes and sub causes leading to an effect. It is used to identify potential root causes to problems.

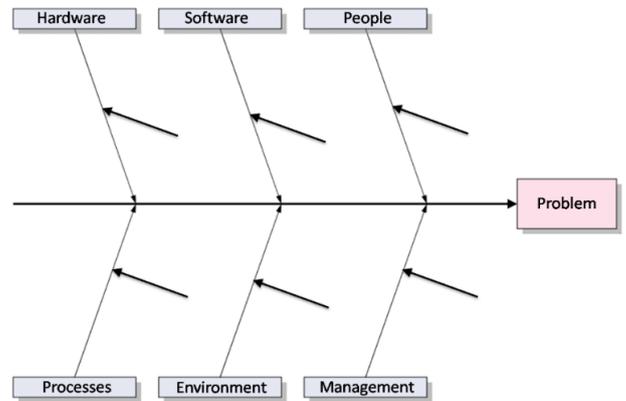


Figure 2: Fishbone Diagram

System Or Process Flow Charts: System flow charts are very helpful to show how various elements of a system interrelate. They can be used to analyze an entire process by following the logical steps leading to an outcome or an objective. Flow charts are acclaimed for their ability to identify bottlenecks and superfluous processes.

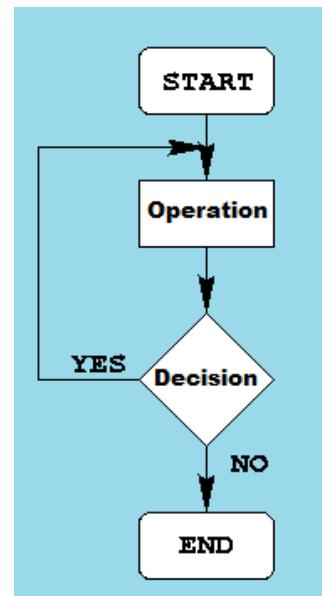


Figure 3: Flow Charts

Influence Diagram: Influence diagrams are graphical representations of situations showing causal influences, time ordering of events and other relationships among variables and outcomes. Influence diagrams show how risks influence one another.

- Information Gathering: The most important techniques in this method include interviewing, brainstorming, Delphi technique and root cause analysis. the interviewing and brainstorming techniques as the most utilized information gathering techniques in risk identification.

[10].

• SWOT Analysis: Strengths, weaknesses, opportunities, and threats-SWOT analysis is essentially a directed risk analysis designed to identify risks and opportunities within the greater organizational context. The main difference between this and other analysis techniques is that SWOT reinforces the need to review risks and opportunities from the perspective of the organization as a whole rather than just from inside the project vacuum [11]



Figure 4: SWOT analysis

Checklists: This technique is known as a basic method of risk identification in which preidentified threats and opportunities are investigated for signs of potential risk situations [12]

- Expert Judgment; People with specialized knowledge, either part of the organization or involved in a specific activity of the business, are known as the experts of the business [13]

V. AN EXAMPLE OF APPLYING THE RISK IDENTIFICATION TECHNIQUES

The MCS followed some of the techniques which mentioned above, such Expert Judgment and the Checklist, regarding the expert judgment, MCS hired consultation company with relevant experience of similar business areas to review the identified risks by MCS and in order to obtain the best possible outcomes and solutions, hence, MCS has succeed in using this technique by following the recommendations of hired consultation company and use their suggested solutions. In order to ensure the success of the project, in addition to Expert Judgment, MCS followed the Checklists Analysis technique to identify specific risks factors, MCS presented the checklist technique as the source of the Risk Breakdown Structure (RBS) which supports the team in better understanding of involved risks, according to [14] "people" is one of the likely potential threats in any project. The 'people' category entails the MCS employees. The risk of lacking skilled workforce to complete this project or the lack of such labor may be viewed as a key risk to the MCS company. The employees working in implementation of such heavy projects in unstable working environment face the risk of illness or even death.

The procurement threats that are likely to be encountered in the MCS include the delay of the arrival the required equipment and materials. similarly, there is a possibility of loss of both management and employee's confidence because of the unstable situation, apart from the reputational risk, the project as well is likely to encounter procedural risks. The threat may arise if the key stakeholders will fail to manage for the implementation period.

The natural occurrences such as the extreme temperatures (above 55 C) in the summer in Iraq may as well emerge as the potential threat that can increase additional costs and delay in completing the project. additionally, the political factors which is reflected negatively on the overall security situation. Remarkably, David of risks will be identified using specific categories tabulated in a table containing the details of increasing levels to the right side of the table. The identification of events and risk factors that may go wrong while implementation the MCS project is set out in (Figure1) as demonstrated by John Moves' model guide. The results of WBS are a clear understanding of where exactly the risks are likely to occur. Hillson's approach as well can be helpful in the identification of the known risks. However, it is limiting when it comes to identifying the unknown prospects (see the below figure).

LEVEL 1	LEVEL 2	LEVEL 3
MSC Plan	workers / Employees	Unskilled employees
		Environmental factors (the temperatures above 52 c)
		Injury, death, and illness
	Delayed equipment supplies	Delayed delivery the equipment and materials at the boarder ports.
		Delayed delivery due to poor infrastructure {road transport}
	Labor-related risks	Lack of experienced labor
	Financial risk	Lack of necessary funds
		Currency fluctuation
	Political threats	Security Situation
		Currency fluctuation
Public opinion		
Non-cooperation of the boarder ports authorities		

Figure 5: Risk Breakdown Structure

VI. RISK MEASURING (RISK EVALUATION)

Risk evaluation of the potential threats based on the likelihood at which the risk will occur [15] . [16] indicate that the actual loss expected will as well be estimated irrespective of the fact that not all identified risks are of the same magnitude. For example, some threats are more likely to occur such as the delay of the imported equipment and materials at the borders ports for more than expected periods and not entering Iraq (because of the political instability which is reflected negatively on the government's administration of border ports in Iraq), we will focus only a

few critical risk factors, as such, risk assessment is used to develop the necessary understanding of the process of risk management plan and threat mitigation. As a part of the risk measuring, we can assess the probability and impact of each identified risk. This can be done as a rough estimate such as high or low. For instance, in (Figure 2), there is a connection between the MCS project risks and the design and implementation complexity. Since the venture is a new project and entails using new technology in the digging of foundations, such as (Climbing Formwork System), this way is a special type of climbing used in skyscrapers and towers, there is a probability of having a high rate of complexity corresponding to project risk. As such, the team managers will be compelled to assign enough resources to the technical experts to ensure that the overall goal of the project is attained. Therefore, for such a project, which is complex, more financial resources are needed to realize the expected outcome.

VII. PLAN FOR RESPONSE

Risk management provides support to identify and select among alternative risk responses. The risk responses mentioned in the COSO framework are divided into four familiar groupings [17] :

- **Avoid:** Eliminate uncertainty by making a threat impossible to occur or find another way to achieve objectives that can reduce the impact of the risk to zero
- **Reduce/mitigate:** Actions are taken to reduce the likelihood or impact, or both, of a risk to an acceptable level for the entity.
- **Share/transfer:** Reduce likelihood or impact of a risk by transferring or sharing risk to another stakeholder better able to manage the risk.
- **Accept:** Recognizing that the risk should be taken, and no action is taken to affect risk likelihood or impact

According to Hilson's division which mentioned above, MCS team came with the mitigation plan, which is meant to address the effects of the risks as well as all unforeseen events, MCS's plan was as follows:

Avoid: regarding the human risk, the extreme temperatures (above 55 C) in the summer in Iraq, MCS decided to stop the work during the noon hours for 3 hours, started from 12:00 till 15:00 and compensate for these working hours in the evening and increase the safety factor through conduct awareness sessions for the staff (employees and workers) and ensure fund resources to avoid the delay of the completion.

Reduce/mitigate: MCS decided to rely on local labor by %40 to reduce the risk of the public opinion and recruit foreign employees to train the local employees to use the modern technologies and improve their skills.

Share/transfer: The consultation company which hired by MCS recommended to share the responsibility of the security risk with the government. Hence, MCS has agreed government to enhance the security forces in the work site through deployment of security forces around the work site, regarding the lack of the cooperation of the boarder ports authorities, according to the recommendations of the consultation company, MCS decide to transfer this risk on the government through agree with them to assign official

committee whose main task is to coordinate between the company and the boarder ports authorities.

Accept: regarding the currency fluctuation, MCS decide to accept this risk through reliance on the US dollar in its financial transactions as a reliable and stable currency.

VIII. MONITOR AND CONTROL THE RISK

The likelihood and severity of risks may change in time of the project. Therefore, we need to pursue the monitoring of risks and operative management. Risks must be continuously reassessed. This happens regularly or periodically as needed. If there is a new or secondary risk in time, we repeat the process of identification, quantification and planning. If there is remission of threats, not current risk can be overlooked [18] . This phase also includes evaluation of the effectiveness of risk management. For example, whether there is a selection of appropriate strategies in response to the risk. Whether the strategy was effective and what the problem is so managed to avoid. It is also necessary to evaluate the effectiveness of prevention. For future projects should be retained documentation of obtained knowledge and knowledge from previous projects, so it is possible to trace the risks that have been identified and how they were managed and with what result. This approach can greatly facilitate the work with the risks to the future. MCS assigned risk management team to follow up the implementation of the recommendations of the consultation company which hired by MCS and track of changes in the identified risks and ways of addressing them, new risks that develop, monitor the remaining risks and remove risks that disappear from the risk list. The risk management team was able to control the risk through following the below techniques:

- Risk re-assessment through identify new risks, evaluating the current risks, evaluating the risk management process and closed the ended risks.
- Risk auditing through examination the effectiveness of the risk responses and to determine whether changes are required. The team also examines the processes to identify, evaluate, respond to, and control risks.
- Meetings: through conduct regular meetings with Project managers, MCS staff and stakeholders (the representatives of government) to facilitate the risk management processes.

IX. CONCLUSION

It is very important for organizations/companies to establish a risk and procurement management strategy before initiating any project, by this strategy, we will be able to ensure achievement of the objectives and the staff will be ready to face any issue during the implementation of project, the effective risk and procurement management process encourages the organization/companies to identify the risks in the start of the implementation and reduction those risks.

Risk management in the project management context is a comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the project objectives. the risk management is very important part in the project management, because the failure in managing project risk

will result a project failure, wherefore Organizations/companies need to recognize the risk level/type that may be affect in their activities, processes or projects. The most important part of risk and procurement management is communication, where project management must use this technique at all stages of the project to ensure communication with all relevant actors/ stakeholders and identify their responsibilities in the project.

In general project risk and procurement management, it's a set of organized processes that linked to each other, to be managed efficiently it must be taken into account to choose only the appropriate tools and techniques and determine the responsibilities and distributed to the team and stakeholders so as to ensure that the project is under control throughout its life cycle.

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