



جامعة الجميع الذكية
EVERYONE'S SMART UNIVERSITY

Everyone's Smart University

Project (Spring 2021)

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Section

Master

Date

Thursday

18 / 03 / 2021.

Course Code

(PMG510)

Project Risk Management

Instructions:

- اخر موعد للتسليم هو يوم السبت 2021-05-08 في تمام الساعة ٩ مساءً.
- الإجابة متاحة باللغة الإنجليزية أو اللغة العربية مع مراعاة أن تكون المصطلحات العلمية باللغة الانجليزية.
- يتم تسليم المشروع في صيغة ملف . pdf مع الالتزام نموذج الجامعة ولن تقبل أي مستندات أخرى.
- يجب مراعاة أقسام البحث الرئيسية (مقدمة Introduction، دراسات علمية سابقة Literature Review، طريقة البحث Methodology، النتائج والمناقشة Results and Discussion ، وأخيراً المراجع References . وان كان هناك ملحقات Appendices يتم إضافتها)
- يجب الالتزام بـ Theme موحد كما يلي:
- حجم الخط 12.
- نوع الخط Arial.
- لون الخط أسود.
- المسافة بين الأسطر 1.5 line spacing
- عدد صفحات البحث (لا يقل عن ثلاث صفحات ولا يزيد عن ست صفحات).

Instructor's Name: Eng. Mosaab M. Hamed

Project:

Risk Identification and Analysis (Based on the project you chose in APM)

The objective of this report is to identify project risks, prepare a risk probability matrix, and carry out an analysis of selected risks. Referring to the project you select in **Advanced projects management APM course**, your task is to prepare a risk management plan that identifies potential risks in **the selected stage of the project** and identify risk management strategies.

From the course content and readings, you know that the overall purpose of risk planning is to anticipate possible risk events and be ready to take appropriate action when risk events occur—to eliminate or reduce negative impacts on the project.

You may wish to begin this exercise with a brainstorming about potential risks to get candidate risks “on the table” for consideration. And then identify and refine that wording for risks that have some realistic chance of occurring in this stage. For example, potential weather problems present a real obstacle to completing field data collection by the planned completion date. It is also an issue that the project manager will ultimately have to plan for, as opposed to other issues such as a major disaster (e.g., your office burning down), is not a high-enough probability event that requires much time in planning. As described below, you will select several of the identified risks and carry out a risk analysis.

You will use the distilled list of risks to make a risk probability/impact matrix. The matrix will have at least three categories (high/medium/low) for probability and impact.

Remember that it is important to name risks effectively—use words that describe the risk event and point to the impact on the project (e.g., “injury of field technician disrupts data installation work”).

After completion of the risk matrix, document a risk analysis for the selected risks. This detailed documentation for that selected risk will include:

- a description of the risk and potential impacts (schedule, quality of work, cost, etc.) on the project.
- indicators or triggers that would be monitored to help identify the risk as early as possible.
- specific risk response strategies to take.

Using probability and impact matrix calculate the **Expected Monetary Value (EMV)** for all risks that have the impact in terms of cost \$\$.

Best of luck...

INTRODUCTION

- Project Title: Ibn Zahr LTRS-1 Project

• Product Capacity:

- The LTRS unit shall be capable to recover and deliver the 99.5% of the C4's contained in the LTRS feed (100% = 21740 kg/h). As well the slip stream shall be contain not less than 85 kg/hr of H2 (as 100%) and purity of about 80% vol. minimum. Project Affiliate/Owner: Owned by Ibn Zahr
- Project Site: Ibn Zahr – Jubail Industrial City
- Project Cost: Class-I ($\pm 40\%$): Refer to the document "Class-I Cost Estimate".
- Project Key Economics: Refer to the document "Update Feasibility & Economics".
- Project Mechanical Completion: Q2, 2023 (Refer Approved L1 Schedule)

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• Conclusions and Recommendations

In IBN ZAHR MTBE-1 plant, the unit that recover C4 which called Low Temperature Recovery System (LTRS-1) is not performing well therefore an idea initiated to replace LTRS-1. The Project is aiming to improve LTRS-1 unit stability and performance by increasing C4 recovery from 48 KTA to 84 KTA which resulted in Increase MTBE production by 50 KTA. By replacing the current LTRS-1, IBN ZAHR can utilize the full allocation of Butane and produce MTBE as a value added downstream product. As MTBE startegy cash out the assets, focus on asset improvement and grow based on opportunity.

2.0 PURPOSE

The purpose of this document is to identify and assess project risks in order to recommend risk response plans for the project development and execution.

The Project Risk Analysis is done using SABIC's Risk Assessment Methodology with the available project data at Phase 2.

1.0 Executive Summary

This report is for project risk analysis of workshop for phase 2 conducted in SABIC 1, on October 13, 2019 for 2 day/s, and schedule risk analysis performed on October 21, 2019 and Monte Carlo simulation result on October 21, 2019, in order to comply with established SABIC E&PM Project Risk Management procedures for IZ LTRS-1 project.

Qualitative risk analysis workshop was facilitated by PRM Risk Engineer.

Summary of Active Risks:

Risk Analysis	Threat	Opportunity
Major	3	0
Significant	6	2
Minor	3	0
Insignificant	1	0
Total	13	2

Risk Heat Map:

Consequence	Very High									
	High		5		8	12		1		
	Moderate		4 10 11	2 3 7 13 14		9		15		
	Low		6							
	Very Low									
	Very Unlikely	Unlikely	Possible	Likely	Very Likely	Very Likely	Likely	Possible	Unlikely	Very Unlikely
	Likelihood									

Schedule Risk Analysis Results:

(based on schedule and three-point activity
duration estimate)

A) Findings of Schedule Quantitative Risk Analysis for Contract Award:

Contract Award	Probability(%)	Remarks
8 months	18%	Planned date for Contract Award
8 months + 26 days	80%	80% Probability for Contract Award
8 months + 64 days	100%	100% Probability for Contract Award

B) Findings of Schedule Quantitative Risk Analysis for LLI Procurement:

LLI Procurement	Probability(%)	Remarks
20.25 months	11%	Planned date for LLI Procurement
20.25 months + 43 days	80%	80% Probability for LLI Procurement
20.25 months + 99 days	100%	100% Probability for LLI Procurement

C) Findings of Schedule Quantitative Risk Analysis for Mechanical Completion:

Mechanical Completion	Probability(%)	Remarks
26.75 months	9%	Planned date for MC
26.75 months + 49 days	80%	80% Probability for MC
26.75 months + 110 days	100%	100% Probability for MC

D) Findings of duration sensitivity analysis for various activities in order of decreasing sensitivities:

- The “Manufacturing 1st LLE (Cold Box)” activity has a high sensitivity factor of 60%.
- “Manufacturing 2nd LLE (Compressors)” is the second most sensitive activity with a factor of 39%.
- “Basic Engg. & 30% Detail Engineering.” is third most sensitive activity with a factor of 29%.

Key Recommendations:

- As the probability of achieving MC date of 01-Nov-2022 is 9%, it is therefore recommended to add seven weeks of contingency to the schedule, which can be used if any risk materializes during EPC phase. Accordingly, risk adjusted schedule is attached.
- PMT to work with EPC to utilize the unit SD in 2021 as an opportunity to execute the required tie-ins to avoid requirement of another SD and delay the MC. This need to be reflected in the ITB for the contractor to be prepared.
- To avoid a long clarification cycle both affiliate and TM need to review the scope and ensure the scope is covering all the requirements and very detailed.
- (TM/Manufacturing P&EM) to ensure a quality report is issued and close follow up with SEEC to avoid possible delay in receiving the SEEC permit approval.
- Corporate Sustainability team to conduct a meeting to discuss how to capture the opportunities from the (sustainability opportunity assessment workshop) with no cost impact on the project since the execution strategy is rapid route and the opportunities need to be evaluated before execution.
- A geotechnical report need to be developed since the latest one is older than 5 years.
- Since the selected execution strategy for this project is a rapid route, the project scope need to be defined with the requirement of the execution strategy.(Part of ITB).
- Project Manager to take Lesson Learnt from other Projects which

adapting same strategy.

- Project Manager to develop in house benchmarks to measure man-hours, schedule, quantity, etc.
- The requested parameters by the cost section need to be provided from the LLIs vendor to avoid having a poor cost estimate.
- Due to Sole engagement of EPC during signing the Technology without proper review and approval of SABIC licensing department as a result from the selected execution strategy, alignment between GPP, Licensing department to ensure the license agreement is signed by the licensing team not EPC contractor. In addition, the PM need to ensure the licensing department is the one signing the license agreement with licensor not EPC.

Notes:

1. This report is valid for approved & submitted schedule, strategy and scope provided at the time of conducting Risk Workshop.
2. Detailed report is presented in following pages.

In IBN ZAHR MTBE-1 plant, the unit that recover C4 which called Low Temperature Recovery System (LTRS-1) is not performing well therefore an idea initiated to replace LTRS-1. The Project is aiming to improve LTRS-1 unit stability and performance by increasing C4 recovery from 48 KTA to 84 KTA which resulted in Increase MTBE production by 50 KTA. By replacing the current LTRS-1, IBN ZAHR can utilize the full allocation of Butane and produce MTBE as a value added downstream product. As MTBE strategy cash out the assets, focus on asset improvement and grow based on opportunity.

3.0 Purpose

Purpose of this document is to present Project Risk Analysis and recommend mitigations during development & execution phases of the project, and determine the robustness of the project schedule according to the risks of the project. This assessment is being done following SABIC's Risk Assessment Methodology and with the data available in phase 2 of the project.

4.0 Project Risk Analysis Methodology

The workshop objective was to assess the risks associated with this project at phase 2 and create the Risk Register.

Attachment 1 shows the list of attendees in the Risk Analysis workshop.

During the PRA workshop, the Risk Register was created, identifying

risks according to the established risk categories and other Risk assessment procedures. The risks were then ranked according to likelihood of occurrence and consequence of the event. Risk response plan (mitigation actions) is agreed and documented for all Major and significant risks.

5.0 Project Qualitative Risk Analysis and Response Plan

Details on the risk description, Likelihood and Consequence assessment can be found in the Project Risk Register, Attachment 2.

Following table shows all of the Significant Risks with respective response actions:

6.0 Project Quantitative Risk Analysis

Schedule risk analysis uses statistical techniques to predict a level of confidence in meeting a project's completion date. This analysis focuses on key risks and how they affect the schedule activities. The analysis does not focus solely on the critical path but covers activities on near-critical path also. This is because when some of the risks materialize; any affected activity may potentially change the project's completion date.

6.1 Scheduling Basis

The schedule bases are as follows:

- ☐ 8 months duration consideration for ITB Preparation, Bid Evaluation & Contract Award
- 20 months for the manufacturing, shipment and delivery of Long Lead Item i.e. Cold Box.

6.2 Results of Monte Carlo Simulation

The **Quantitative Schedule** Risk Analysis was conducted on DD-MM-YY after getting 3 points duration estimation from the workshop attendees.

Attachment 4 shows Project Schedule three point values.

Monte Carlo Simulation was conducted on the Schedule and subsequent results for major milestones are as follows:

A) Findings of Schedule Quantitative Risk Analysis for Contract Award:

Date	Contract Award	Probability(%)	Remarks
20-Aug-2020	8 months	18%	Planned date for Contract Award
15-Sep-2020	8 months + 26 days	80%	80% Probability for Contract Award
21-Oct-2020	8 months + 64 days	100%	100% Probability for Contract Award

B) Findings of Schedule Quantitative Risk Analysis for LLI Procurement:

Date	LLI Procurement	Probability(%)	Remarks
07-Jun-2022	20.25 months	11%	Planned date for LLI Procurement
20-Jul-2022	20.25 months + 43 days	80%	80% Probability for LLI Procurement
14-Sep-2022	20.25 months + 99 days	100%	100% Probability for LLI Procurement

C) Findings of Schedule Quantitative Risk Analysis for Mechanical Completion:

Date	Mechanical Completion	Probability(%)	Remarks
01-Nov-2022	26.75 months	9%	Planned date for MC
20-Dec-2022	26.75 months + 49 days	80%	80% Probability for MC
19-Feb-2023	26.75 months + 110 days	100%	100% Probability for MC

6.3 Interpretation of Results

6.3.1 Finish Dates

- Contract Award Date:
The most likely chance of achieving the deterministic date of 20-Aug-2020 is 18%. However, project has 80% probability of achieving the Contract Award on 15-Sep-2020 and 100% Probability on 21-Oct-2020.
- LLI Procurement date:
The most likely chance of achieving the deterministic date of 07-Jun-2022 is 11%. However, project has 80% probability of achieving EPC award on 20-Jul-2022 and 100% Probability on 14-Sep-2022.
- Mechanical Completion Date:
The most likely chance of achieving the deterministic date of 01-Nov-2022 is 9%. However, project has 80% probability of achieving MC

on 20-Dec- 2022 and 100% Probability on 19-Feb-2023.

6.3.2 Tornado diagrams have been used for deterministic sensitivity analysis - comparing the relative importance of variables in the schedule. For each activity on critical or near-critical path, optimistic, most-likely and pessimistic values of activity durations are considered. The sensitive variable (duration of one of the activities on critical path) is modeled as uncertain value while all other activities on the critical path are held at their most-likely value. This allows to test the sensitivity/risk associated with duration of one activity in the schedule. The Tornado Graphs are available in Attachment# 6.

- **Duration Sensitivity Index analysis (Tornado Chart).**

Duration sensitivity is a measure of the correlation between the duration of a task and the duration of the project. The task with highest duration sensitivity is most likely to increase the project duration.

The activity "Manufacturing 1st LLE (Cold Box)" has a high sensitivity factor of 44%. "Prepare ITB for BDP & EPC" is the second most sensitive activity with a factor of 32%, "Bid Finalization" is third most Sensitive activity with a factor of 25% in entire plan of tasks.

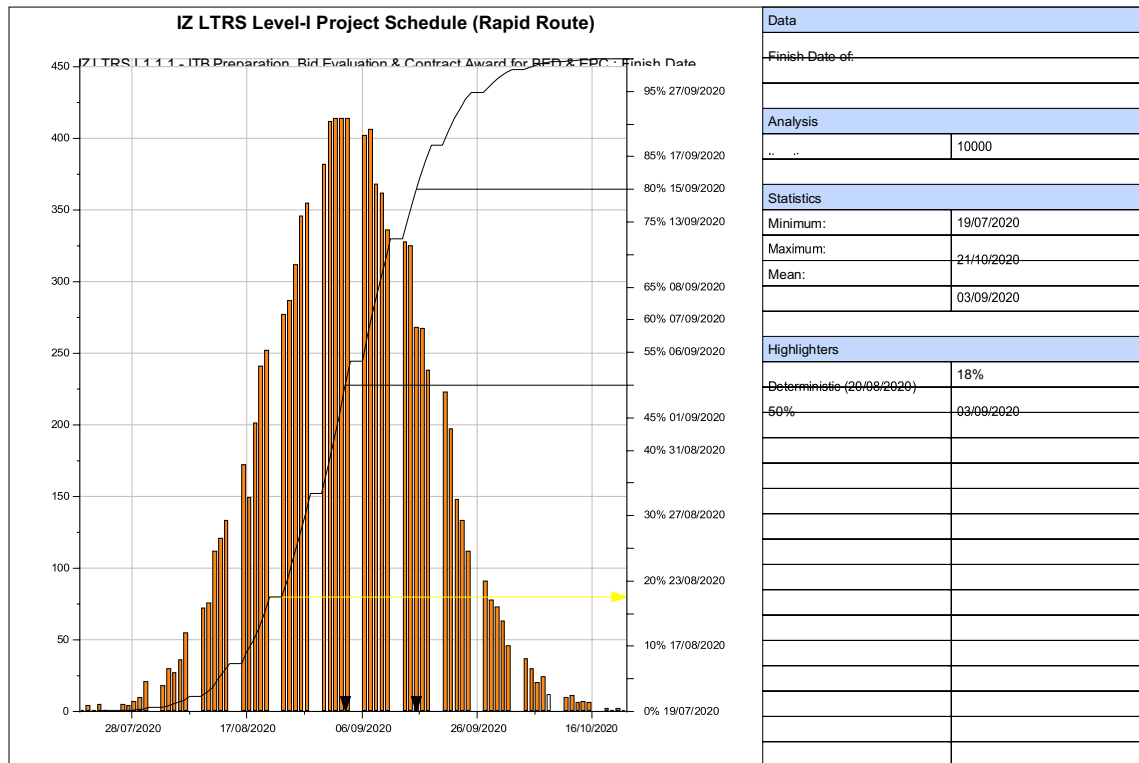
- **Schedule Sensitivity Index analysis (Tornado Chart).**

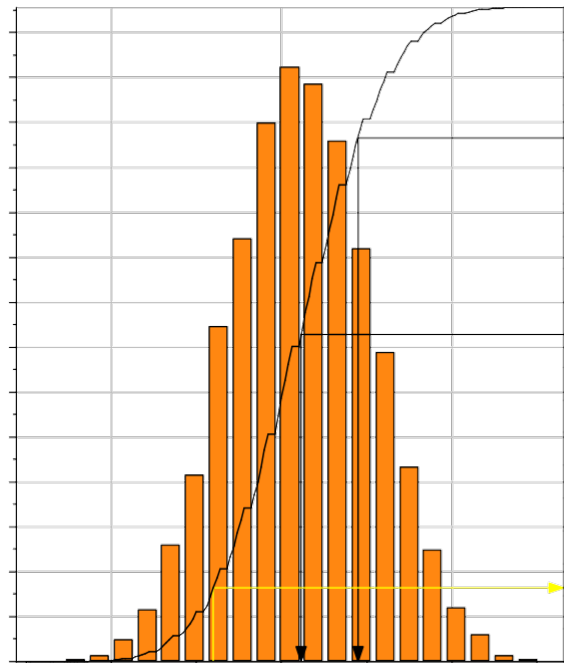
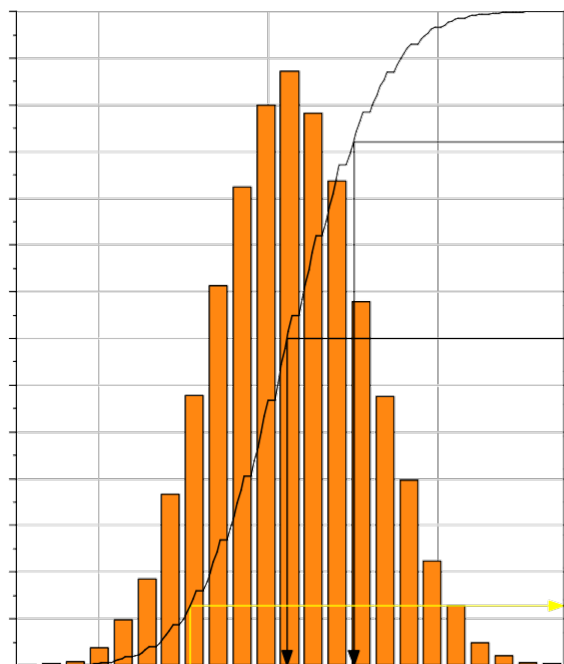
Schedule sensitivity index identifies and ranks the tasks most likely to influence the project completion date.

The activity Manufacturing 1st LLE (Cold Box)" has a high sensitivity factor of 60%. "Manufacturing 2nd LLE (Compressors)" is the second most sensitive activity with a factor of 39%, "Basic Engg. & 30% Detail Engineering" is third most Sensitive activity with a factor of 29% in entire plan of tasks.

6.4 Scheduling Recommendations

Based on the above results, following changes have been done in the



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