



جامعة الجميع الذكية
EVERYONE'S SMART UNIVERSITY

Everyone's Smart University

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Student Name	Salem Yahya Alharbi	اسم الطالب
Students I.D	2021201706	الرقم الجامعي

Section

Master

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Project Risk Management

مع تمنياتي بالتوفيق..

Manufacturing and Development of unsaturated Polyester Resin (UPR)

1. Introduction:

Project risk is defined by PMI as, "an uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives.[1] The main principle of risk management is that it delivers value to the organization. Risk management activities are designed to achieve the best possible outcome and reduce volatility or uncertainty of outcomes. Risks are divided into four categories:

- 1) Compliance risks
- 2) hazard risks
- 3) control risks
- 4) opportunity risks.

organizations will seek to minimize compliance risks, mitigate hazard risks, manage control risks and embrace opportunity risks.

Manufacturing and Development of unsaturated Polyester Resin (UPR). First, owning the technology of manufacturing UPR of general purpose. Then develop UPR with different properties such as flame retardancy, thermally stability, and UV stability with high mechanical properties according to the customer requirement. The importance of the project is to have a self-sufficiency of UPRs with special applications that was imported from outside the Kingdom. The suppliers for the imported UPRs are no more producing the UPRs which meet the requirement.

There are many risks may occur in this project. Schedule Delay, Budget Overrun, Materials leakage, Equipment delivery time, sick leave and employee absent, fire hazard, Employee injured and employee breathing issue.

2. Literature Review:

In last years, the industry was severely influenced by violent incidents, health crises and natural disasters. These incidents have a huge impact on economic activity, for example, Ericsson lost 400 million EUR after their suppliers of semiconductor plant caught fire in 2000, and Apple has lost order of DRAM in Taiwan in 1999 after an earthquake [2]. British petroleum has lost more than 1.5 billion USD after the Texas City Refinery explosion in 2005 that was considered as the worst industrial disasters in recent US history. The consequences of these accidents are uncertainly for this reason, the risks management in the industries has emerged as an important topic in the global logistic chain, indeed, the risk is absolutely linked with the uncertainty [3]. Risk is defined as possible events whose unfavorable consequences are difficult to accept or are even unacceptable [4]. Nowadays, the risk assessment is an important research theme because the risks were always present in the industrial activity. In the literature, we find several studies on risk management, these studies focus only on downstream risks or upstream risks or production risks.

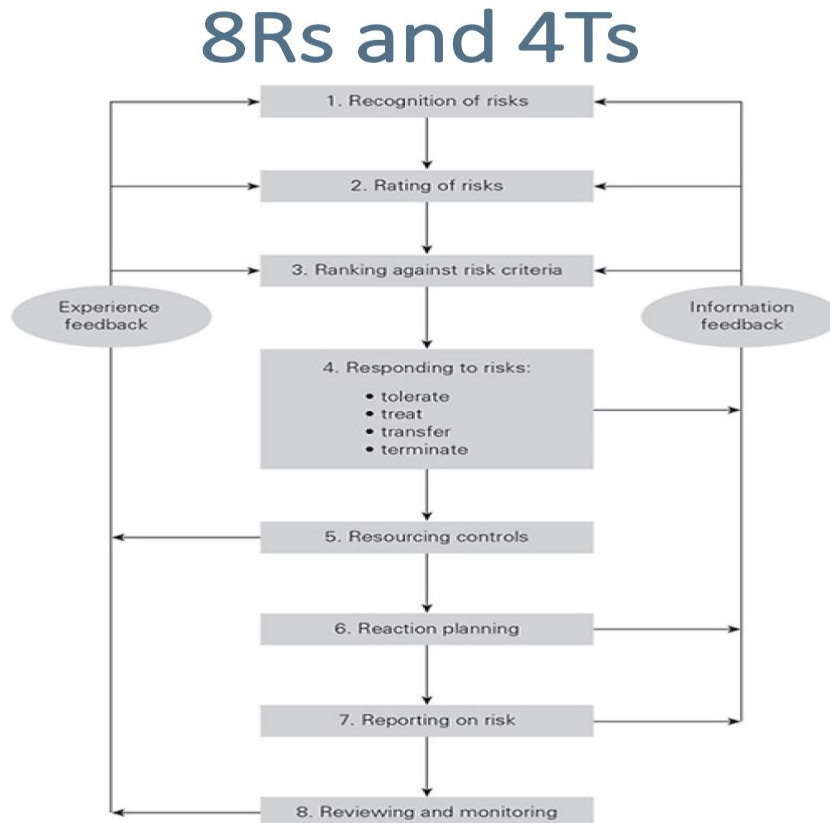
3. Methodology:

3.1. Identifying risks:

1. Brainstorming: it is done with a group of people who focus on identification of risk for the project.
2. Delphi Technique: A team of experts is consulted anonymously. A rundown of required data is sent off experts, reactions are compiled, and results are sent back to them for additional consideration until an agreement is reached.
3. Risk Register: A Risk Register is a living document that is updated regularly throughout the life cycle of the project. It turns into a piece of project documents and is historical records which is used on future projects. The risk register includes:
 - I. List of Risks
 - II. List of Potential Responses

- III. Root Causes of Risks
- IV. Updated Risk Categories

3.2. Risk management process is 8Rs and 4Ts:



3.3. Risk likelihood and magnitude are best demonstrated using a risk matrix.

Project Risk Assessment Matrix can be prepared by these steps:

- 1) List down the Risks.
- 2) Rate for Probability and Impact.
- 3) Classify the Risks.
- 4) Decide on Mitigation Planning.

3.4. Expected monetary value (EMV) is a risk management technique to help quantify and compare risks in many aspects of the project. EMV is a quantitative risk analysis technique since it depends on specific numbers and quantities to perform the calculations. EMV relies on two basic numbers.

- I. P – the probability that the risk will occur.
- II. I– the impact to project if the risk occurs.

The risk contingency is equal to the probability multiplied by the impact.

4. Result and Discussion:

4.1. Risk Identification:

Risk	Identification
Schedule Delay	Any Delay at any stage of Project (product is not deliver on time)
Budget overrun	Lost of material and equipment damage could case budget overrun
Materials leakage	Material did not store well may cause fire or can damage other materials
Equipment delivery time	Any delay on delivery time will make project stopped until it delivered
sick leaves and employee absenteeism	May cause disturbance between employee which will affect the quality of product and dependency.
Fire Hazard	Damage material and equipment and harm people.
Employee injured	Lack of experience and safety may cause injurey
Employee breathing issue	If Vacuum fan and fresh air system closed it may cause breathing issue according to MSDS

4.2. Identifying probability, impact, calculate the Risk rate.

Risk	Probability	Impact	Rate
Schedule Delay	1	2	2
Budget overrun	2	4	8
Materials leakage	2	5	10
Equipment delivery time	1	3	3
sick leaves and employee absenteeism	2	2	4
Fire Hazard	3	5	15
Employee injured	2	4	8
Employee breathing issue	3	5	15

4.3. Risk matrix:

		Probability				
		Remote	unlikely	Possible	Likely	Certain
Severity		1	2	3	4	5
Catastrophic	5	5	10	15	20	25
High	4	4	8	12	16	20
Medium	3	3	6	9	12	15
Low	2	2	4	6	8	10
Negligible	1	1	2	3	4	5

The possible results for Risk matrix are:

1. Controlled (1 to 2) — Limited monitoring only.
2. Serious (3 to 6) — Active monitoring.
3. Disruptive (8 to 9) — Investigation needed.
4. Severe (10 to 16) — Rapid action is required.
5. Critical (20 to 25) — Immediate, crucial priority.

4.4. EMV

Risk	P(Risk Probability)	I (Cost Impact)	Risk Contingency $P \times I$
Schedule Delay	0.1	200,000	20,000
Budget overrun	0.1	230,000	23,000
Materials delivery time	0.15	30,000	4,500
Equipment delivery time	0.2	50,000	10,000
Fire Hazard	0.2	400,000	140,000
Employee injured	0.1	20,000	2,000
Employee breathing issue	0.1	20,000	2,000
Total		950,000	221,500

The potential impact to your project is SR 950,000. The total contingency request for this project is SR 221,500, which could be added to your budget as risk contingency.

4.5. Risk register

Risk	Probability	Impact	Rate	Mitigation plan	owner	control type	risk trigger
Schedule Delay	1	2	2	Reduce Strategy: Procure active and clear communication in the team and create a plan for delays avoidance	project manager	loss prevention	Delay at any stage
Budget overrun	2	4	8	Brainstorming to check the budget many times and calculate everything also calculate EMV in order to add it the project budget.	project manager	cost contamination	any delay and losses
Materials leakage	2	5	10	Use leakage contain systems and make sure that all materials are stored well and according to material safety data sheet MSDS	sales manager	damage limitation	smoke and spillage alarm
Equipment delivery time	1	3	3	Mitigate Strategy: Constant communication with the supplier. Understanding the supplier delivery process.	sales manager	loss prevention	supplier didn't ship the equipment
sick leaves and employee absenteeism	2	2	4	Create an employee strong attendance policy and keep tracking absences. Reward good behavior employees.	HR Dept	loss prevention	HR attendance mail
Fire Hazard	3	5	15	Make a schedule to check firefighting system, fire extinguishers and smoke detector are working efficiently. Draw and write an evacuation plan and try it many times.	safety Dept	cost contamination	fire alarm
Employee injured	2	4	8	Wear PPE and make very strong penalty if any employee didn't wear it.	safety Dept	loss prevention	employee call
Employee breathing issue	3	5	15	Make preventive maintenance to make sure that vacuum fan working very well	safety Dept	loss prevention	smoke and spillage alarm

5. References:

1. [*"Practice Standard Project Risk Management"*](#). PMI.
2. Tang C., Perspectives in supply chain risk management, International Journal of Production Economics, Volume 103, 451–488, 2006.
3. Tang O., Musa S.W., Identifying risk issues and research advancements in supply chain risk management, International Journal of Production Economics (133), 25–34, 2011.
4. Tsai M.C., Lai K.H., Lloyd A.E., Lin H.J., The dark side of logistics outsourcing-Unraveling the potential risks leading to failed relationships, Transportation Research Part E (48), 178-189, 2012.