

Risk and Disaster Management in Construction

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Final Term Exam paper

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Answer Sheet

Answer Q1:

1. Purpose and Objectives

Risk Management is the systematic process of identifying, analyzing, and responding to project risks. It includes maximizing the probability and consequences of positive events and minimizing the probability and consequences of adverse events to project objectives. This risk management plan defines how the project team will handle risks to achieve the goal.

1.2. Overview of the Company and Project

Size:	With a budget of 10,000,000, this project is a medium sized project
Complexity:	This project involves multiple divisions within the organization, but does not involve any other agency or external organization. The project does work with complex formulas. We rate this medium complexity.
Importance to Business:	This project is determined to be of high priority within the agency.
Visibility:	While not directly public facing, delivers very important public information.
Project Manager.:	Project Manager does such project frequently.
Agency Project Team	About 45% of the company have done a similar project

- : **Risk** is uncertain event or condition if it occurs, has a positive or negative effects on the objectives of a project. Risk originates from the Latin term *risicum*, which means the challenge presented by a barrier reef to a sailor. *Or* risk as the chance of hazard, bad consequence, loss, and so on, or risk can be defined as the chance of a negative outcome. **Risk Management**: The process whereby decisions are made to accept a known or assessed risk and/or the implementation of actions to reduce the consequences or probability of occurrence. **Purpose of Risk Management**: The objectives of project risk management are to increase the probability and impact of positive events and decrease the probability and impact of negative events in the project.

Probability of Occurrence

The following table defines the probability of occurrence.

Table 1 – Risk Likelihood	Description	Probability	Score
91% through 99%	Almost Certain	> 0.90	5
61% through 90%	“Probably” will occur	0.61-0.90	4
41% through 60%	“Likely” to occur	0.41-0.60	3
11% through 40%	“Unlikely” to occur	0.11-0.40	2
1% through 10%	“Very unlikely” to occur	< 0.05	1

Risk Score

The risk score is a value calculated that is the product of probability of occurrence and impact. We use the score to compare risks as part of the risk prioritization process. Table 3 is the matrix used to develop the risk score. The values range from 1 (very low exposure) to 25 (very high exposure). Although there are no specific break points in the risk exposure ranking, those risks with an exposure value of less than 10 are considered low risks, those risks with an exposure value between 11 and 19 are considered moderate risks, and those risks with an exposure value of 20 or more are generally considered high risks. The definitions of Low, Moderate, and High are as follows:

Low Risk: Has little or no potential for increase in cost, disruption of schedule, or degradation of performance. Actions within the scope of the planned project and normal management attention should result in controlling acceptable risk. No

response plans will be made for these risks. The project will monitor for them and manage them as they come up.

Moderate Risk: May cause some increase in cost, disruption of schedule, or degradation of performance. Special action and management attention may be required to control acceptable risk. The project will do some response planning for these risks.

High Risk: Likely to cause significant increase in cost, disruption of schedule, or degradation of performance. Significant additional action and high priority management attention will be required to control acceptable risk. The project will do in-depth response plans for these risks.

RISK IDENTIFICATION AND ANALYSIS

This section describes the risk management process and provides an overview of the risk management approach.

Identification

Brainstorming is an efficient method that uses social interaction for the risk identification process. Using this technique, stakeholders will be divided into group of 5-8 people. Each group will be brought in, given a brief overview of the project, then, using the brainstorming technique, they will be asked to identify any opportunities, they see. We will then ask them to identify any risks. We will ask the groups to then perform an affinity diagram to categorize the risks and identify any missing risks/opportunities. In addition to the above, the core project team will perform a risk breakdown structure (RBS). This involves stepping through the Work Breakdown Structure (WBS) task by task and identifying risks & opportunities associated with the task. In addition to this technique we will also refer to the checklist of some common risks given in the Loosemore book “Risk Management in Construction” while discussing about risk in the assigned project

Semi-Quantitative Risk Analysis

In this approach semi-quantitative analysis, the values attributed to different categories of likelihood and consequences reflect the relative magnitude of consequences and likelihood rather than absolute values. In this case the project team will determine the impact and probability scores for each risk to calculate the risk score.

Risk Log/Register: A risk register is a document used as a risk management tool

and to fulfill regulatory compliance acting as a repository for all risks identified.

Risk Log is used to facilitate recording, storing and sorting of risks under various headings.

Development of Risk Register: Developing a risk register for a integrated projects for which risk ownership is shared among different corporates entities presents several challenges. The different companies involved may have different corporate risk management procedures and guidelines. Information about risk, in particular financial and economic risk, can be business sensitive, so the participating companies may not be willing to share such information unless it is part of the contractual agreement. Lets have an example I have a construction Project and the

Dear Sir; due to lack of time I only gives a sample for example

Project:	Rahman New Road											
Site Location:	Kabul											
Date of Site Visit:	2/20/2020											
Originator:	Rahmatwali											
Checker:	Sardawali											
Introduction:	This risk assessment is prepared for the site visit of Rahman road located in the Kabul City											
Ri	Risk Nam	Cause	Risk	Impact (s)	Prob	Impact	PI Sco	Mitigation measures	Probab	Impac	PI Sco	
1	Slips, trips, falls	Wet surfaces, absence of stepping, railing, poor visibility, structural elements dislodging, loss of balance while on or	Slips, trips, fall when working on bridge or in the river bed	Personal injury; Delay in carrying out future inspections	5	1	5	Avoid getting close to edges; avoid shortcuts access riverbed; team members act as flaggers to prevent cars getting close to inspector; ask locals to provide a ladder, better step watching	1	2	2	
2	Disposed needles or sharp objects	Unremoved construction debris, garbage dumping near foundations, drug addicts	Bodily injury and contraction of disease due to contaminated	Injury; disease such as titanus, fever, hepatitis; disability;	2	5	10	Wear safety work boots and hand gloves. Do not try to attempt to move sharp objects.	4	2	8	
3	Working at	Addressed in Sayyad										
4	Falling objects	Material dislodging off of structure's soffit; malicious	Objects impacting inspectors'	Injury; diability; death	4	5	20	Stay away from areas where objects can fall down. Wear hard hats	5	2	10	
5	Road traffic accident	Careless driving by RAMS driver; careless pedestrian or other road user jumping	Vehicle collision with another vehide,	Injury, death	2	5	10	Wear seat belts; travel during day light hours; keep head lights on; slow down in towns and villages, trained driver	1	5	5	
6	Buried services / Electricutio	Damaged electric lines short circuiting	Electricution	Burns, death	1	1	1	Use safety shoes and gloves. Consider all exposed cables as live and do not touch them	1	5	5	
7	Improvised Explosive Device or mines	Unexploded ordnance detonating	Inspectors or other elements setting off booby traps or improvised	Injuries, death	5	3	15	Area of site considered more secure. Vigilance on inspector's side to avoid touching misplaced objects and to immediately evacuate site and to inform authorities	1	5	5	
8	Being caught in fire fight	Opposition forces ambushing government forces; local fueds; armed robbery	Getting hit by bullets fired by conflicting groups or individuals	Injuries, death	3	5	15	Assembly point defined and communicated to the team members. Be alert at all times during the insoection. Inform the RAMS/PMO staff of the site visit and let them know about the	3	4	12	

Answer for Q2: At first lets say what is cost benefits analysis: A cost benefit analysis is a process by which organizations can analyze decisions, systems or projects, or determine a value for intangibles. The model is built by identifying the benefits of an action as well as the associated costs, and subtracting the costs from benefits. When completed, a cost benefit analysis will yield concrete results that can be used to develop reasonable conclusions around the feasibility and/or advisability of a decision or situation.

Origins of Cost benefits analysis: First time it has been used by a French engineer, Jules Dupuit, who was also a self-taught economist. In the mid-19th century, Dupuit used basic concepts of what later became known as cost benefit analysis in determining tolls for a bridge project on which he was working. Dupuit outlined the principles of his evaluation process in an article written in 1848, and the process was further refined and popularized in the late 1800s by British economist Alfred Marshall, author of the landmark text, *Principles of Economics* (1890).

Why we use Cost benefits analysis; All organizations rely on cost benefit analysis to support decision making because it provides an agnostic, evidence-based view of the issue being evaluated—without the influences of opinion, politics, or bias. By providing an unclouded view of the consequences of a decision, cost benefit analysis is an invaluable tool in developing business strategy, evaluating a new hire, or making resource allocation or purchase decisions. cost benefit analysis is the foundation of the decision-making process across a wide variety of disciplines. In business, government, finance, and even the nonprofit world, cost benefit analysis offers unique and valuable insight when:

- Developing benchmarks for comparing projects
- Deciding whether to pursue a proposed project
- Evaluating new hires
- Weighing investment opportunities
- Measuring social benefits
- Appraising the desirability of suggested policies
- Assessing change initiatives
- Quantifying effects on stakeholders and participants

Cost Benefits analysis Advantages;

Benefits of cost benefits analysis: A cost-benefit analysis is a popular tool with the following advantages-

- A cost-benefit analysis simplifies the complex decisions in a project.
- The analysis gives clarity to unpredictable situations. The listing of costs and benefits helps the analyst to identify and later evaluate each cost and benefit.
- It helps to figure out whether the benefits outweigh the cost and is it financially strong and stable to pursue it.
- It is easy to compare projects of every type in spite of being dissimilar.
- The cost-benefit analysis removes any emotional element and helps to overcome biases.
- It takes into account a broad spectrum of benefits and costs and converts them into currency to simplify matters.
- Suitable for all projects small or large.
- The cost-benefit analysis helps to make a rational decision by looking at the figures expressed in the same units.

Steps for cost benefits analysis:

#1. Determine the costs and benefits that should be recognized

It is important to determine the costs and benefits associated with your project and make a list.

#2. Identify and categorize both costs and benefits

You must identify the costs and benefits as direct, indirect, intangible, tangible and real, etc. Include unexpected costs and benefits that you can think of as well as cost and benefits that are likely to occur over time.

#3. Assigning a monetary value to the costs

Costs are easy to estimate and includes human effort as well as physical effort besides all the costs that you can think of. Make sure that you include the costs that will continue even after the completion of a project, for example, increased overhead costs, training, and additional staff.

Give a monetary value in the same unit to all the costs.

#4. Assigning a monetary value to the benefits

It is a bit difficult to predict and anticipate the benefits. Sometimes it includes soft or intangible benefits, and it is important to give a monetary value to every impact. Try to list all the benefits you can think of and make sure to assign a monetary value to them give a monetary value in the same unit to all the benefits.

#5. Discount costs and benefits to get the present value

This step helps to bring future benefits and costs to present value.

#6. Compare costs and benefits

Determine the total cost and total benefits and compare the value of cost to the value of total benefits to knowing which factor outweighs the other.

#7. Perform sensitivity analysis

It allows checking the accuracy factor of your assumptions and estimates. You can easily do so by making changes in social-discount rate utilized by either decreasing or increasing it.

If the result is positive, then it is considered worthy of continuation, and if the outcome is negative, then you can determine the point where the balancing point is zero.

#8. Making a recommendation

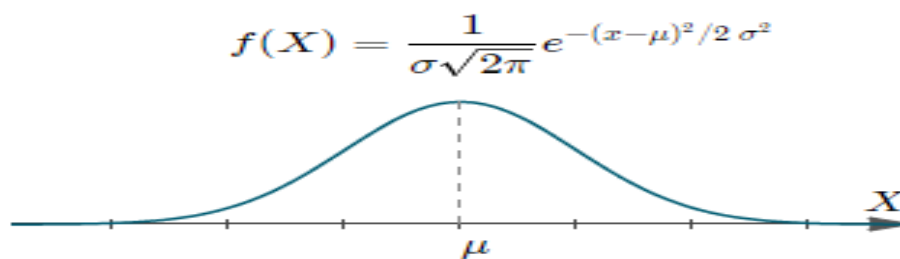
Once you have compared all the costs and benefits, it becomes easy to decide and adopt the recommended course of action.

Example for cost benefits analysis:

Cost Benefit Analysis: Customer Service System				
Costs				
Category	Item	Quantity	Price	Total
Hardware & services	User workstations	7	\$2,000	\$14,000
	Server system	2	\$4,000	\$8,000
	Secure networked printers	2	\$1,750	\$3,500
	Cable installation	1	\$6,200	\$12,400
	Software licenses	1	\$22,000	\$44,000
	System training	System overview	10	\$625
	Software	10	\$625	\$6,250
	Tools	15	\$875	\$13,125
TOTAL COSTS				\$107,525
Benefits				
More effective promotion campaigns				\$58,000
Improved lead conversion				\$42,000
Better customer retention and loyalty				\$28,000
Enhanced productivity				\$35,000
Workflow efficiencies				\$28,000
Higher quality database				\$45,000
TOTAL BENEFITS				\$236,000

Answer Question#3: 1, Normal Probability distribution; The Normal Probability Distribution is very common in the field of statistics. Whenever you measure things like people's height, weight, salary, opinions or votes, the graph of the results is very often a normal curve. This will be the most important distribution in this class. You need to get very comfortable with dealing with the tables that describe probabilities associated with each distribution.

A random variable X whose distribution has the shape of a normal curve is called a normal random variable.



A normal curve.

The Normal pdf: $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{\frac{-(x-\mu)^2}{2\sigma^2}}$ where

μ = mean

σ^2 = variance

$\pi=3.14159$ =ratio of the circumference to diameter

$e = 2.71829$

Important things about at the normal distribution

- (1) There are infinitely many variations of the normal distribution differentiated by μ and σ^2 .
- (2) The highest point of a normal is at the mean which is also the median.
- (3) The normal distribution is symmetric. This implies that

$$F(x) = 1 - F(-x)$$

Answer#3 part b

