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DISCIPLINE: **MS CE**

Question # 1

Define and explain the risk log/register in your own words. Develop a risk log/register for the construction project (you have worked in or you are working). Details of each project must be unique and should be provided accurately to the best of your knowledge. Risk register is attached at the end of the paper (Table 1). Use notes for specifying headings.

Solution:

Risk Log/Register:

Risk Log/Register is a document that contains the information about identified risks, results of Risk Analysis (impact, probability, effects), as well as Risk Response Plans. A Risk Register can be used to monitor and control risks during the whole project life cycle.

Explanation: A risk register is a tool in risk management and project management. It is used to identify potential risks in a project or an organization, sometimes to fulfill regulatory compliance but mostly to stay on top of potential issues that can derail intended outcomes. An ideal risk register includes all information about each identified risk, such as the nature of that risk, level of risk, who owns it and what are the mitigation measures in place to respond to it.

The risk register identifies each unique risk; describes that risk; describes the impact the risk would have on the project (and the company, workers etc.) and then scores that risk on two major dimensions:

- An assessment of the likelihood that that risk will eventuate
- An assessment of the seriousness of that risk should it eventuate

Together, these risk factors combine to create a risk assessment score, which then forms an argument as to which risks should be prioritized in terms of speed to action and resources used.

The risk log may also contain the information on actions to avoid, mitigate or transfer risks, the secondary risks arising and possible contingency plans. The risk log will be capable of being updated and will provide an audit trail. Moreover, it is also possible to use the risk log as a tool to prompt risk owners to take corrective actions.

Steps to be followed for preparing a risk register:

There are a number of tasks to be followed in order to develop a risk register.

- 1) Risk Identification
- 2) Risk Analysis
- 3) Highlight warnings and identify risk resolutions
- 4) Allocating Responsibility

Developing a risk log/register for a construction project:

Since I have no field exposure, I will take a hypothetical construction project and develop a risk register for that project.

Preparing hypothetical Risk Register for Bus Rapid Transit Peshawar

Step 1: Risk Identification:

The following risks were identified for Bus Rapid Transit Peshawar;

- a) Unrealistic project completion time period
- b) Defective design
- c) Defective workmanship and material
- d) Lack of planning of alternative routes for the traffic
- e) Inadequate soil investigation:
- f) Inadequate site management

Step 2: Risk Analysis:

In this step we will analyze each risk and allocate each risk its respective severity ratings. We will be using H = high, L = low, M = moderate, S = substantial.

Since the risks are already identified we will just assign to them their respective ratings. Such as:

- a) Unrealistic project completion time period Risk Analysis = S (substantial).
- b) Defective design Risk Analysis = M (moderate)
- c) Defective workmanship and material Risk Analysis = S (substantial)
- d) Lack of planning of alternative routes for the traffic Risk Analysis = L (Low)
- e) Inadequate soil investigation Risk Analysis = H (High)
- f) Inadequate site management Risk Analysis = M (Moderate)

Step 3: Identify risk resolutions:

In this step we will develop mitigating measure to be adopted for each identified risk.

- a) Unrealistic project completion date:
Mitigation: Focus on setting a realistic project duration time period. Project completion duration will be fixed by planners and designers, instead of politicians.
- b) Defective design:
Mitigation: Designers should know ground realities of the site. Moreover, designers will have the final say about the design or any modifications in the design. Designers have to be free from political influence.
- c) Defective workmanship and material:

Mitigation: There will be Strict supervision of labor, Training and education of workers, Proper communication among parties involved, and Proper manpower management.

d) Lack of planning of alternative routes for the traffic:

Mitigation: Proper plans for alternatives routes will be prepare at the earliest. While preparing the plans local input will also be taken into account.

e) Inadequate soil investigation:

Mitigation: The project will not start without proper soil investigation. As a matter of fact, not even the designing of the project will start without soil investigation data.

f) Inadequate site management:

Mitigation: Inadequate site management is a risk that has to be taken care of as the project progress through various construction phases.

Step 4: Allocating Responsibility:

In this phase each risk's responsibility will be fixed. The party responsible for mitigating the risk will be clearly identified.

Continued...

Now it is time to develop a risk register for the above mentioned data.

Suppose the project will start on 1st January 2018.

ID	Date raised	Risk description	Risk			Without controls			Controls	Action
			H	M	L	Cost impact	Time impact	Other		
1		Unrealistic project completion date	Y			Substantial	Delayed for more than a year	PDA reputation at stake	Focus on setting a realistic project duration time period. Project completion duration will be fixed by planners and designers, instead of politicians.	Will be updated as the project progresses
1		Defective design		y		Extra Cost of improving the design	Will delay the starting of the project	Irresponsible use of resources	Designers should know ground realities of the site. Moreover, designers will have the final say about the design or any modifications in the design.	

									Designers have to be free from political influence
3		Defective workmanship and material	y			Will affect the quality of work	Less effect on time	Entire BRT project quality at stake	There will be Strict supervision of labor, Training and education of workers, Proper communication among parties involved, and Proper manpower management.
4		Lack of planning of alternative routes for the traffic			y	No significant effect	May affect the speed of construction		Proper plans for alternative routes will be prepared at the earliest. While preparing the plans local input will also be taken into account.
5		Inadequate soil investigation:	y			Will delay the project, which in turn will leave	Delay the starting as well as the design process of		The project will not start

						project vulnerable to inflation	the project		without proper soil investigation. As a matter of fact, not even the designing of the project will start without soil investigation data.	
6		Inadequate site management			y	No Significant effect	Will affect time as each phase		Inadequate site management is a risk that has to be taken care of as the project progress through various construction phases.	

Question # 2 Discuss how Cost-benefit analysis is effective for a project? Support your arguments with real example.

Answer:

Cost-benefit analysis:

Cost-benefit analysis is a tool used in project management that is devised to help a decision maker to make an informative and justifiable decision. At its core, cost benefit analysis weighs the sum of the benefits, such as financial gain, of an action against the negatives, or costs, of that action. The technique is often used when trying to decide a course of action. In most of the projects both, cost and benefit, are expressed in monetary units. The purpose of cost benefit analysis in project management is to have a systemic approach to figure out the pluses and minuses of various paths through a project, including transactions, tasks, business requirements and investments.

Why Cost-benefit analysis is effective for a project:

Performing a cost benefit analysis of a project at the start of a project offers not only various options to meet the project's aims but also the best approach to achieve a project's goals while saving on investment.

There are two main purposes in using Cost-benefit analysis:

- 1) To determine if the project is sound, justifiable and feasible by figuring out if its benefits outweigh costs.
- 2) To offer a baseline for comparing projects by determining which project's benefits are greater than its costs.

Inputs for Cost Benefit Analysis:

It is simple to execute in a sense that it only requires two inputs i.e

- a) Costs to be incurred in the course of the project and
- b) Benefits that is expected to be achieved after the execution of the project.

Cost Benefit Analysis Steps to be followed:

Cost benefit analysis is comparatively simple to execute, and can be helpful when considering a new course of action or strategy. It includes the following steps:

- 1) Compile lists
- 2) Give the costs and benefits a monetary value
- 3) Set up the equation and compare

Cost-Benefit Analysis Example:

Consider the example that provides the results from a cost-benefit analysis of an intervention to reduce trans fats in the food supply chain.

First we need to assign monetary values to costs and benefits

1) Monetary Valuation:

The analysis estimates that the following benefits are worth Rs. 140 billion.

- Direct medical cost averted
- Valuation of quality of life gained due to non-fatal heart attacks averted.
- Valuation of life years gained due to fatal heart attacks averted

Now, the analysis estimates that costs to the industry and consumers are Rs. 20 billion.

2) Calculation of Net Benefits:

Rs. 140 billion in benefits

-Rs. 20 billion in costs

Rs. 120 billion in net benefits

This cost-benefit analysis demonstrates that the intervention could generate Rs. 120 billion in net economic benefits.

Question 3

- (a) What is Normal Probability distribution?
- (b) Suppose that the data concerning the first-year salaries of employees is normally distributed with the population mean $\mu = 60000$ PKR and the population standard deviation $\sigma = 15000$ PKR. Find the probability of a randomly selected employees earning less than 45000 PKR annually. Hint: To answer this question, you have to find the portion of the area under the normal curve from 45 all the way to the left. Find Z-Score table at the end of the paper (Table 2)

Solution:

Part a)

Normal Probability distribution:

Normal probability distribution is a probability distribution that is symmetric about the mean, showing that data near the mean are more frequent in occurrence than data far from the mean.

Discovery: The normal probability distribution was discovered by Abraham De Moivre in 1733 as a way of approximating the binomial probability distribution when the number of trials in a given experiment is very large.

Explanation: The normal distribution is a probability distribution. As with any probability distribution, the proportion of the area that falls under the curve between two points on a probability distribution plot indicates the probability that a value will fall within that interval.

Features of a normal probability distribution:

Normal distributions have the following features:

- symmetric bell shape
- mean and median are equal; both located at the center of the distribution
- $\approx 68\%$ of the data falls within 1 standard deviation of the mean
- $\approx 95\%$ of the data falls within 2 standard deviations of the mean
- $\approx 99.7\%$ of the data falls within 3 standard deviations of the mean

Part B)

Solution:

Given Data:

Population mean = $\mu = 60000$ PKR

Population Standard Deviation = $\sigma = 15000$ PKR

Required:

Probability of employees earning less than 45000 PKR annually =?

Solution:

Since we have mean μ and standard deviation σ ,

We will have to calculate the Z-score.

The formula for calculating Z-score is:

$$Z = \frac{X - \mu}{\sigma}$$

X represents the raw value of the measurement of interest, in our case

X = 45000, we also have $\mu = 60000$ PKR and $\sigma = 15000$ PKR

Putting values in the above formula, we get;

$$Z = (45000 - 60000) / 15000$$

We get

$$Z = -1.00$$

Which means the probability of employee earning less than 45000 is -1. Now, using the given table we will find the cumulative distribution function of a standard normal distribution.

Using the table, we get;

The table value indicates that the **area under the curve is 15.86%**.
