

**IQRA NATIONAL UNIVERSITY OF IT AND EMERGING SCIENCES PESHAWAR**



**SUBJECT NAME: RISK AND DISASTER MANAGEMENT**

**TOPIC NAME: FINAL TERM PAPER**

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**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.

**Answer:****Risk Log/Register:****Definition:**

“A Risk Register is a tool for documenting risks, and actions to manage each risk. The Risk Register is essential to the successful management of risk. As risks are identified they are logged on the register and actions are taken to respond to the risk”. The backbone of a solid risk management plan is called a risk register.

OR

“A risk register an itemized listing of the risks that could derail the project. For example, nature of the risk, reference and owner, mitigation measures. It can be displayed as a scatterplot or as a table, a supplier delivering their product late”.

**A typical risk register contains:**

- A risk category to group similar risks
- The risk breakdown structure identification number
- A brief description or name of the risk to make the risk easy to discuss
- The impact (or consequence) if event actually occurs rated on an integer scale
- The probability or likelihood of its occurrence rated on an integer scale
- The Risk Score (or Risk Rating) is the multiplication of Probability and Impact and is often used to rank the risks.
- Common mitigation steps (e.g. within IT projects) are Identify, Analyze, Plan Response, Monitor and Control.

### **Explanation of Risk Register:**

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. The 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.

Having a list to track risk, whether by a simple spreadsheet or as part of a more robust project management software solution, is a good idea to tackle in any project plan. There is risk inherent in everything, and that goes double for managing a project with lots of moving parts.

You'll never be able to anticipate everything that could go astray in a project, but by doing the due diligence, you're able to have a plan in place to respond quickly before risks become real problems and sidetrack the whole project.

### **Develop a Risk Log/Register for the Construction Project:**

We can download a risk tracker, which is a good start, but it's only the beginning of taking control of risk in our project. When we create or import one into our project management software, we've opened up the project risk from being a standalone document to a living one shared among the team.

We can do what we would have done with a simple spreadsheet, such as list all the risks inherent in a particular project, with status and level of priority. But more than just that we can now share the information quickly and easily with our team.

Like everything else in our project, risk can change, but a static spreadsheet means editing, saving and then importing the revised document into our PM software. That's a lot of work, and we already have a lot of work.

### **Example:**

The largest projects in the world, from the summer Olympics to big petrochemical projects, have one major thing in common at the project management level a relentless focus on risk. What happens if there is a riot? Or a catastrophic explosion? What if protestors disrupt the project, or regulatory agencies reject it?

These large megaprojects must allocate a small but important part of their budget to studying risk events and ensuring the adequate response plans are in place in advance of their potential disruption.

If it makes sense on large projects, doesn't a proportional amount of risk analysis make sense on any size project?

### Detailed of Risk Register Example

Here is an example risk register:

Risk Register					
ID	Risk	Probability	Impact	Contingency	Risk Response Plan
1	Rain Delay	20%	5 days	1 day	Read weather forecast daily. Inform supervisor of poor forecast the previous day
2	Poor Quality Welding	10%	501,720/Rs.	50,172/Rs.	Inspect welding prior to end of day

### How to Create a Risk Register

There are three steps to creating a strong risk register:

1. Risk Identification
2. Risk Analysis
3. Risk Response Plans

### Risk Identification

A strong risk identification process is central to good project risk management.

There are many techniques that can be used to develop a listing of risks, but here are the most important:

## **Brainstorming**

Whether alone or in a group, brainstorming involves focusing on quantity over quality. Just write everything you can think of on paper, and then come back and narrow down the list later.

## **Subject matter experts**

There is no substitute to having experts in subject matter advising you of the risks involved with the work. Often they are in other departments but their advice is second-to-none.

## **Checklists**

Although we have a generic checklist, it is best to eventually develop a specific one for your organization or type of project. And many more like that.

## **Risk Analysis**

There are two types of risk analysis:

- a) Qualitative Analysis
- b) Quantitative Analysis

### **a). Qualitative Analysis**

This involves assigning each risk in the register a probability and impact score.

Risk has two components:

Risk = Probability x Impact

Probability. The statistical chance that the risk event will occur.

Impact. The consequences of the risk event.

### **b). Quantitative Analysis**

Once each risk event is given a Probability and Impact score, it is analyzed and compared to the other risks to determine a prioritization. Quantitative analysis involves the use of analytical tools to determine the effect of the risk on the project.

## Risk Response Plans

The third and final step in the production of a risk register is the creation of response plans.

There are four ways to respond to each risk event within the risk register:

- **Avoid.** Eliminate the threat or protect the project from its impact. For example,
- Change the scope of the project.
- Extend the schedule to eliminate a risk to timely project completion.
- Change project objectives.
- Clarify requirements to eliminate ambiguities and misunderstandings.
- Gain expertise to remove technical risks.

**Transfer.** This involves moving the impact of the risk to a third party. Direct methods might be through the use of insurance, warranties, or performance bonds. Indirect methods such as unit price contracts instead of lump sum (or vice versa depending on which side of the contract you're on), legal opinions, and so forth.

**Mitigation.** Reduce the probability or impact of the risk. This is not always possible and often comes with a price that must be balanced against the value of performing the mitigating action.

ID	Date raised	Risk description	Risk			Without controls			Controls	Residual risk	Action
			H	M	L	Cost impact	Time impact	Other			
1	4/25/2018	Rain Delay		M			5 Days	1 Day	Local Administration involvement	Mitigated	Correspondence
2	5/15/2018	Poor Quality Welding			L	501,720 PKR	15 Days	50,172 PKR	Local Administration involvement	Mitigated	Correspondence

**Question 2:**

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

**Answer:****Cost Benefit Analysis (CBA):**

Cost benefit analysis in project management is one more tool in toolbox. This one has been devised to evaluate the cost versus the benefits in your project proposal. It begins with a list, as so many processes do.

There's a list of every project expense and what the benefits will be after successfully executing the project. From that you can calculate the return on investment (ROI), internal rate of return (IRR), net present value (NPV) and the payback period.

The difference between the cost and the benefits will determine whether action is warranted or not. In most cases, if the cost is 50 percent of the benefits and the payback period is not more than a year, then the action is worth taking.

**The Purpose of Cost Benefit Analysis**

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. Cost benefit analysis gives you options, and it offers the best approach to achieve your goal while saving on investment.

**There are two main purposes in using CBA:**

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

**Effectiveness of a cost benefit analysis for a project:**

When conducting a cost-benefit analysis, make sure to factor in these three important things.

### **1. Analyze all cost types**

**Direct costs:** Direct costs can be easily linked back to an initiative such as the labor involved in the process, materials used in production, and other expenses to complete the work.

**Indirect costs:** Most projects have indirect business-related costs that may not seem obvious but are still additional costs that increase with each new project. For example, electricity, rent, utilities, and other overhead costs.

**Intangible costs:** Project costs are not always monetary, and the intangible costs need to be analyzed as well. Examples of intangible costs are the cost of manufacturing delays, process or strategy changes, and even cultural changes.

Alternative costs: Deciding whether to buy it or build is a way to examine alternative costs and involves evaluating whether buying something is a more- or less-expensive option.

### **2. Analyze potential risks and impacts**

Even when the project's benefits outweigh the costs, it is essential to identify, analyze, and weigh any risks. Before starting a project, recognize that with new projects come new risks. Risk factors can affect the entire business, not just the project being considered, creating a long-lasting issue.

### **3. Evaluate the cost-benefit analysis**

After identifying and analyzing each cost, benefit, risk, and goal, it is important to evaluate the project as a whole to determine how it affects the business in general. This will help you decide if the benefits outweigh the costs and if the return on investment (ROI) over the relevant period of time is worthwhile.

Factoring in all of the cost types, risks, and completing a thorough cost-benefit evaluation can save your business a significant amount of money, resources, and discomfort in the short- and long-term.



## Example

Custom Graphic Works has been operating for just over a year, and sales are exceeding targets. Currently, two designers are working full-time, and the owner is considering increasing capacity to meet demand. (This would involve leasing more space and hiring two new designers.)

He decides to complete a Cost-Benefit Analysis to explore his choices.

## Assumptions

- Currently, the owner of the company has more work than he can cope with, and he is outsourcing to other design firms at a cost of 8,350 PKR an hour. The company outsources an average of 100 hours of work each month.
- He estimates that revenue will increase by 50 percent with increased capacity.
- Per-person production will increase by 10 percent with more working space.
- The analysis horizon is one year: that is, he expects benefits to accrue within the year.

## Costs

Category	Details	Cost in First Year
Lease.	750 square feet available next door at 3,006 PKR per square foot	2,254,500 PKR
Leasehold improvements.	Knock out walls and reconfigure office space	2,505,000 PKR
Hire two more designers.	Salary, including benefits	12,525,000 PKR
	Recruitment costs	1,878,750 PKR
	Orientation and training	501,000 PKR
Two additional workstations.	Furniture and hardware	1,002,000 PKR
	Software licenses	167,000 PKR

Construction downtime.	Two weeks at approximately 1,252,500 PKR revenue per week	2,505,000 PKR
Total		23,338,250 PKR

### Benefits

Benefit	Benefit Within 12 Months
50 percent revenue increase.	<b>32,565,000 PKR</b>
Paying in-house designers PKR 2,505 an hour, versus PKR 8,350 an hour outsourcing (100 hours per month, on average: savings equals PKR 584,500 a month.)	<b>7,014,000 PKR</b>
10 percent improved productivity per designer (1,252,500 PKR + 626,250 PKR= 1,878,750 PKR revenue per week with a 10 percent increase = 187,875 PKR/week.)	<b>9,769,500 PKR</b>
Improved customer service and retention as a result of 100 percent in-house design.	<b>167,000 PKR</b>
<b>Total</b>	<b>51,018,500 PKR</b>

He calculates the payback time as shown below:

$23,338,250 \text{ PKR} / 51,018,500 \text{ PKR} = 0.46$  of a year, or approximately 5.5 months.

### 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)

**Answer:**

**a). Normal Probability Distribution:** “Normal distribution, also known as the Gaussian 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”. In graph form, normal distribution will appear as a bell curve.

A normal distribution is defined as

$$y = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

$\mu$  = Mean

$\sigma$  = Standard Deviation

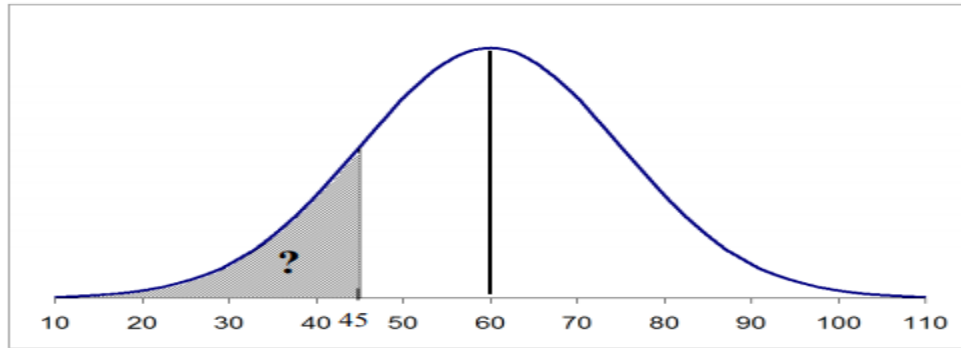
$\pi \approx 3.14159 \dots$

$e \approx 2.71828 \dots$

Important things about the normal distribution

- There are infinitely many variations of the normal distribution differentiated by  $\mu$  and  $\sigma^2$
- The highest point of a normal is at the mean which is also the median.
- The normal distribution is symmetric. (i.e. around the mean,  $\mu$ ).
- Exactly half of the values are to the left of center and exactly half the values are to the right
- A normal distribution is the proper term for a probability bell curve.
- In a normal distribution the mean is zero and the standard deviation is 1.

**b). Solution:**



To find this area, you can apply complex mathematical formulas, or you can use the Z table, in which statisticians have already applied those formulas for you. Because they could not develop tables for every possible combination of the mean and the standard deviation, statisticians developed one standardized and simplified normal distribution with the mean of 0 and the standard deviation of 1.

All other distributions with different  $\mu$  and  $\sigma$  can be converted into a standardized normal distribution using the transformation formula:

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

Think about this transformation as of a ruler: for example, if you know your height in inches, you can use a formula to convert it into centimeters.

Using the transformation formula, find the value of Z and then find the number that corresponds to that Z in the body of Z-table:

$$Z = \frac{45 - 60}{15} = -1.$$

The table value that corresponds to  $-1$  is 0.1587. This number indicates the area under the curve from 45 all the way to the left. It also indicates that the probability of randomly selecting a Baruch graduate who makes less than 45000 PKR a year is 15.87%.