



SUBJECT: RISK AND DISASTER MANAGEMENT

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**APRIL 24, 2020 SUBMITTED TO: SIR ENGR. YASEEN MAMOOD SBLECTURES IN IQRA
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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
Risk Log/register

- Risk register is a record of information about identified risks, sometimes called risk log. A Risk Register, also referred to as a Risk Log, is a master document which is created during the early stages of a certain project. It is a tool that plays an important part in Risk Management Plan, thus helping to track issues and address problems as they arise.
- The Risk Register is a document that contains information about identified project risks, analysis of risk severity and evaluations of the possible solutions to be applied. Presenting this in a spreadsheet is often the easiest way to manage things, so that key information can be found and applied quickly and easily.
- The Risk Register will generally be shared between project stakeholders, allowing those involved in the project to be kept aware of issues and providing a means of tracking the response to issues. It can be used to flag new project risks and to make suggestions on what course of action to take to resolve any issues.
- All corporate and organizational projects face risk at one time or another. Having a Risk Register in place simply provides a better means of responding to problems as they arise. The Risk Register is there to help with the decision-making process and enables managers and project stakeholders to handle risk in the most appropriate way. A risk needn't be a threat to your project, it is simply an issue that can arise during the project; if effectively managed, it shouldn't prevent your project from attaining its goals and objectives.
- The risk register addresses risk management in four key steps:
 - (1) Identifying the risk,
 - (2) Evaluating the severity of any identified risks,
 - (3) Applying possible solutions to those risks and
 - (4) Monitoring and analyzing the effectiveness of any subsequent steps taken.

Risk Register, you can be proactive about managing certain projects and handling any risks associated with them. Any issues that are likely to impact upon the success of a project and the speedy completion of the project is categorized as risk. Implementing strategies to handle this, such as a risk register, will help to prevent risk from becoming an issue that may cause significant delays or even lead to the project failing.

Here data presented in tabular form is of **MINI MICRO HYDRO POWER 365 projects** in which proper Risk Log was not maintained and risks were not identified prior to its execution that's why these risks were without control and control actions were unable to be taken to control/reduce the risks

[Text in red and enclosed in [] is explanatory and should be deleted]

ID	Date raised	Risk description	Risk			Without controls			Controls	Residual risk	Action
			H	M	L	Cost impact	Time impact	Other			
[No.]	[Date mm/dd/yyyy]	[There is a risk that.... If this happens.]	[tick or enter Y]	[tick or enter Y]	[tick or enter Y]	[The cost if the risk occurs e.g. x man days]	[The time impact if the risk occurs e.g. x days delay]	[Anything else that would happen e.g. lost reputation]	[Actions that will be taken to reduce the impact of the risk]	[Any risks that remain once the controls are in place]	[Document any actions to be taken to implement controls or manage residual risks]
	07/15/2014	Delay and difficulties in obtaining	yes			20millions	One year delay	Disturb design process	Eairlir diagnosis of the situation	10 lacs pkr invest	Meeting preceding design process

		opinions and permits									
		Conflict among designing team members			years	1million	3 months delay	No sufficient experience of team member	Training to member	Some engineers get retirement	Arrange training for design engineers
		Staff don't have sufficient knowledge about the subject of design		medium	1 million	6 months	A large of mistakes occur in implementation	Some time arrange visit to design engineers to sit	Design engineers are few and not possible to reach every site on time	If it was not possible for design engineer to reach on time to site, site engineer must follow the instructions of design engineers	

What is Cost Benefit Analysis?

Cost benefit analysis is a process used primarily by businesses that 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, and often incorporates dollar amounts for intangible benefits as well as [opportunity cost](#) into its calculations.

Although CBA can be used for short-term decisions, it is most often used when a company or individual has a long-term decision.

CBA is an easy tool to determine which potential decision would make the most financial sense for the business or individual. The process also takes indirect benefits or costs into consideration, like customer satisfaction or even employee morale. And opportunity cost often plays a big role when deciding between several options. When listing potential costs and benefits, companies or analysts will often factor in things like labor costs, social benefits and other factors that may not be immediately obvious.

Still, CBA is similar to [net present value \(or NPV\)](#), which is often used by investors.

So, what's the difference between CBA and NPV?

Cost Benefit Analysis vs. Net Present Value

When performing a cost benefit analysis, or CBA, it is generally helpful to weigh the [total benefits and total costs of a future project at their present value](#) - which is where net present value comes in. Given that CBAs are often done with a long-term view in mind, the value of money often changes due to inflation and other factors, making it helpful to factor in the net present value of the figures you are analyzing when conducting a CBA.

Net present value, as the name suggests, is a method used to determine the benefits of undertaking an investment by calculating the future benefits or costs in terms of their present value. If the net present value is positive for the calculation (meaning the benefits outweigh the costs), the action or decision will generally be a good investment. If negative, the opposite is likely true.

In CBA, net present value is used to calculate net present costs and net present benefits.

How to Calculate Cost Benefit Analysis

For standard CBA, the formula, the benefit/cost ratio, is fairly simple:

Benefit/cost, simplified as b/c.

While there are slightly [more complex formulas](#), the benefit-cost ratio is essentially just taking into account all of the direct or indirect costs and benefits and seeing if one outweighs the other. Additionally, running a CBA often takes into account opportunity cost and is frequently used to compare different options by calculating their benefit-cost ratios.

The formula reflects the sum of all the benefits divided by the sum of all the costs, with consideration for the duration of the decision or action (or, analysis horizon).

Cost Benefit Analysis Steps

Cost benefit analysis is fairly simple to execute, and can be helpful when considering a new course of action or strategy.

Step 1: Compile lists

The first thing to do when running a cost benefit analysis is to compile a comprehensive list of all the costs and benefits associated with the potential action or decision.

Consider not only the obvious costs (like the cost of installation for new software, or for the software itself) but also possible intangible costs like the opportunity cost of picking one software over another, or over another option like hiring a new employee.

Additionally, consider all the possible benefits of the course of action or decision - how much might it add to your revenue? What other benefits may be inherent in the action that would make

it outweigh the costs? For example, would a new software improve efficiency or capabilities that could promote new business or make current operations run smoother? Be sure to also consider intangible benefits as well as obvious, fiscal ones.

Step 2: Give the costs and benefits a monetary value

Once you have two comprehensive lists of costs and benefits for the action, assign monetary values to each individual cost or benefit.

For some, the values will be obvious - like the cost of installing the software might be \$500. However, it is also important to try to assign monetary values to direct or indirect and tangible and intangible costs or benefits if possible. For example, installing a new software may render an employee's computer inaccessible for a couple hours, costing that employee working time or productivity and therefore money generated for the company.

Once you assign monetary values for each cost and benefit, add all the costs and benefits respectively and set up the equation.

Step 3: Set up the equation and compare

Take the sum of the benefits (the sum of all the monetary values assigned to the benefits of the action) and the sum of the costs (all the monetary values of the costs of the action) and plug them into the b/c equation.

The equation should be a numerical equation, and if the numerical benefits (the sum of the fiscal values for the benefits of the action) outweigh the costs, it is advisable to proceed with the decision. If not, the company or individual should re-examine the potential action and make adjustments accordingly.

This equation can also be set up for multiple different options or projects and can help companies compare options side by side.

But, what are some actual examples of CBA?

Cost Benefit Analysis Examples

Example 1

[In our first example](#), a financial technology startup is expanding and adding two new programmers. The CEO of the company decides to run a cost benefit analysis to determine whether the decision will be beneficial to the company - and to what degree.

The company is analyzing a time horizon of one year, and estimates that revenue would increase some 50% if the two programmers were hired.

On the cost side of the equation, the CEO must examine the cost of the two programmer's salaries - estimated at \$75,000. Additionally, there is the cost of recruitment, which might be around \$3,000. Training could add an additional \$4,000.

Additionally, there is the cost of new work areas and computers, totaling \$5,000, and the cost of additional licensing for software and the like, around \$2,000.

The total direct and indirect costs would total around \$89,000.

When calculating benefits, the CEO would examine the benefit of additional revenue within a 12 month period, estimated around \$100,000. Additionally, the increase in product quality resulting from the new programmers (and therefore presumed customer satisfaction) would increase by 10%, adding an estimated \$10,000 in value to the company.

In total, the benefits would be \$110,000. Using the benefit-cost ratio equation, that would be $BCR = \$110,000/\$89,000$, or 1.24. Given that the value is positive (and the total benefits are greater than the total costs), the cost benefit analysis indicates the decision to hire two additional programmers would be a beneficial move for the company.

Example 2

Still, another [example like that of ProjectCubicle](#) is that of a real estate developer considering several different investment options.

The assumptions for the investments are that option 1 would build 300 houses, renting 50 of them for 10 years at \$3,000 per year. The 50 rented units would be sold after 10 years for \$60,000.

Construction costs for option 1 would be \$80,000 per house, which would sell for \$100,000 each. The cost of a sales office would be \$1,000,000 and the salaries of sales staff would be \$200,000 each year. The project would last 2 years, with a financing cost of \$2,000,000 per year.

For option 2, the construction company could build 200 houses, renting 25 of them for 5 years at \$3,500 per year. The 25 units could be sold after 5 years for \$70,000.

Construction costs for option 2 would be \$70,000 per house, and the rest of the homes would sell for \$110,000 each. The cost of a sales office would be \$2,000,000 and sales staff salaries would be \$150,000 each year. The project would last 1 year, with a financing cost of \$1,500,000 per year.

For option 1, costs would include:

Construction cost = \$24,000,000

Sales office cost = \$1,000,000

Cost of sales staff = \$400,000

Financing cost = \$4,000,000

Total costs would therefore be \$29,400,000.

For option 1, benefits would include:

Income from rentals = \$1,500,000

Income from sales = \$25,000,000

Income from sales after rental = \$3,000,000

Total benefits would therefore be \$29,500,000. Using the cost benefit analysis formula b/c, the ratio would be $29,500,000/29,400,000$, or 1.0. Since the equation is possible, the benefits for option 1 outweigh the costs. However, since the developer is trying to decide between two projects, the same analysis needs to be performed for option 2.

For option 2, costs would include:

Construction cost = \$14,000,000

Sales office cost = \$2,000,000

Cost of sales staff = \$150,000

Financing cost = \$1,500,000

Total costs would therefore be \$17,650,000.

For option 2, benefits would include:

Income from rentals = \$437,500

Income from sales = \$19,250,000

Income from sales after rental = \$1,750,000

So, the total benefits for option 2 would be \$21,437,500. The b/c ratio for option 2 would therefore be $21,437,500/17,650,000$, or 1.2.

Comparing both options together, it is clear that option 2 has a higher benefit-to-cost ratio (and costs less to execute) and would therefore be the most fiscally resourceful option for the developer to pick.

To help facilitate performing a CBA, there are [several templates available online](#).

Advantages and Disadvantages of Cost Benefit Analysis

Cost benefit analysis can be a helpful tool for businesses or individuals to undertake when considering a new course of action.

Running a CBA for a potential decision can help visualize the implications and impact of that course of action, and is often very helpful for smaller or medium-sized decisions that are more immediate in scope of time.

However, there are some disadvantages to practicing a CBA in certain circumstances. For bigger decisions with a longer time horizon, CBAs can sometimes fail to take into account other factors that might not be significant in the short term but would impact the long term, like inflation, interest rates and other larger, more long-term factors. For these calculations, net present value or [internal rate of return](#) are often better methods to use.

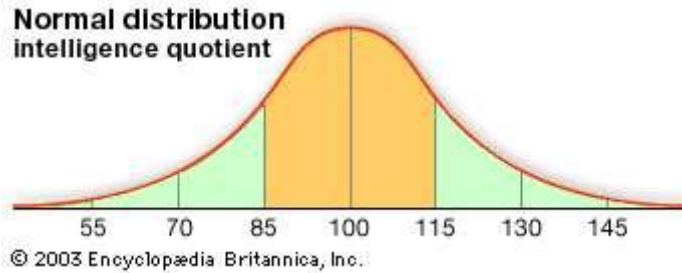
Additionally, performing a CBA can often put projects or decisions in a purely numerical point of view, which may fail to take into account unforeseen events or circumstances that might affect the action.

Question NO#3

Normal probability distribution

It is the most important probability distribution in statistics because it fits many natural phenomena. For example heights, blood pressure, measurement error, and IQ scores follow the normal distribution. It is also known as the Gaussian distribution and the bell curve.

The graph of the normal distribution is characterized by two parameters: the [mean](#), or average, which is the [maximum](#) of the graph and about which the graph is always symmetric; and the [standard deviation](#), which determines the amount of dispersion away from the mean. A small standard deviation (compared with the mean) produces a steep graph, whereas a large standard deviation (again compared with the mean) produces a flat graph. *See the figure.*



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

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

(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)

Ans:

Given data :

mean $\mu = 60000$ PKR-----1

standard deviation $\sigma = 15000$ PKR-----2

$x < 45,000$ -----3

Required:

The portion of the area under the normal curve from 45 all the way to the left?

Z-Score table at the end of the paper (Table 2)?

SOLUTION:

normally distributed with the population mean $\mu = 60000$ PKR and standard deviation $\sigma = 15000$ PKR What is **the probability of a randomly selected employees earning less than 45000 PKR annually** This is a tougher one. Now we can form a z score.

$$Z = \frac{(x-u)}{\sigma} \text{-----} 1$$

Put value in equ 1

$$Z = \frac{(45000-60,000)}{15,000}$$

$$=-1.00$$

What is $P(Z=-1.00)$

$$P(X < 45,000) = P(Z < -1.00) = .15866 = 16\%$$

From table 2 we have (**.15866**)

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.9	.00005	.00005	.00004	.00004	.00004	.00004	.00004	.00004	.00003	.00003
-3.8	.00007	.00007	.00007	.00006	.00006	.00006	.00006	.00005	.00005	.00005
-3.7	.00011	.00010	.00010	.00010	.00009	.00009	.00008	.00008	.00008	.00008
-3.6	.00016	.00015	.00015	.00014	.00014	.00013	.00013	.00012	.00012	.00011
-3.5	.00023	.00022	.00022	.00021	.00020	.00019	.00019	.00018	.00017	.00017
-3.4	.00034	.00032	.00031	.00030	.00029	.00028	.00027	.00026	.00025	.00024
-3.3	.00048	.00047	.00045	.00043	.00042	.00040	.00039	.00038	.00036	.00035
-3.2	.00069	.00066	.00064	.00062	.00060	.00058	.00056	.00054	.00052	.00050
-3.1	.00097	.00094	.00090	.00087	.00084	.00082	.00079	.00076	.00074	.00071
-3.0	.00135	.00131	.00126	.00122	.00118	.00114	.00111	.00107	.00104	.00100
-2.9	.00187	.00181	.00175	.00169	.00164	.00159	.00154	.00149	.00144	.00139
-2.8	.00256	.00248	.00240	.00233	.00226	.00219	.00212	.00205	.00199	.00193
-2.7	.00347	.00336	.00326	.00317	.00307	.00298	.00289	.00280	.00272	.00264
-2.6	.00466	.00453	.00440	.00427	.00415	.00402	.00391	.00379	.00368	.00357
-2.5	.00621	.00604	.00587	.00570	.00554	.00539	.00523	.00508	.00494	.00480
-2.4	.00820	.00798	.00776	.00755	.00734	.00714	.00695	.00676	.00657	.00639
-2.3	.01072	.01044	.01017	.00990	.00964	.00939	.00914	.00889	.00866	.00842
-2.2	.01390	.01355	.01321	.01287	.01255	.01222	.01191	.01160	.01130	.01101
-2.1	.01786	.01743	.01700	.01659	.01618	.01578	.01539	.01500	.01463	.01426
-2.0	.02275	.02222	.02169	.02118	.02068	.02018	.01970	.01923	.01876	.01831
-1.9	.02872	.02807	.02743	.02680	.02619	.02559	.02500	.02442	.02385	.02330
-1.8	.03593	.03515	.03438	.03362	.03288	.03216	.03144	.03074	.03005	.02938
-1.7	.04457	.04363	.04272	.04182	.04093	.04006	.03920	.03836	.03754	.03673
-1.6	.05480	.05370	.05262	.05155	.05050	.04947	.04846	.04746	.04648	.04551
-1.5	.06681	.06552	.06426	.06301	.06178	.06057	.05938	.05821	.05705	.05592
-1.4	.08076	.07927	.07780	.07636	.07493	.07353	.07215	.07078	.06944	.06811
-1.3	.09680	.09510	.09342	.09176	.09012	.08851	.08691	.08534	.08379	.08226
-1.2	.11507	.11314	.11123	.10935	.10749	.10565	.10383	.10204	.10027	.09853
-1.1	.13567	.13350	.13136	.12924	.12714	.12507	.12302	.12100	.11900	.11702
-1.0	.15866	.15625	.15386	.15151	.14917	.14686	.14457	.14231	.14007	.13786
-0.9	.18406	.18141	.17879	.17619	.17361	.17106	.16853	.16602	.16354	.16109
-0.8	.21186	.20897	.20611	.20327	.20045	.19766	.19489	.19215	.18943	.18673
-0.7	.24196	.23885	.23576	.23270	.22965	.22663	.22363	.22065	.21770	.21476
-0.6	.27425	.27093	.26763	.26435	.26109	.25785	.25463	.25143	.24825	.24510
-0.5	.30854	.30503	.30153	.29806	.29460	.29116	.28774	.28434	.28096	.27760
-0.4	.34458	.34090	.33724	.33360	.32997	.32636	.32276	.31918	.31561	.31207
-0.3	.38209	.37828	.37448	.37070	.36693	.36317	.35942	.35569	.35197	.34827
-0.2	.42074	.41683	.41294	.40905	.40517	.40129	.39743	.39358	.38974	.38591
-0.1	.46017	.45620	.45224	.44828	.44433	.44038	.43644	.43251	.42858	.42465
-0.0	.50000	.49601	.49202	.48803	.48405	.48006	.47608	.47210	.46812	.46414
Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.9	.00005	.00005	.00004	.00004	.00004	.00004	.00004	.00004	.00003	.00003

-3.8	.00007	.00007	.00007	.00006	.00006	.00006	.00006	.00005	.00005	.00005
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-1.4	.08076	.07927	.07780	.07636	.07493	.07353	.07215	.07078	.06944	.06811
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