

PAPER Risk and Disaster management

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Submitted To: Engr Yaseen Mahmood

Submitted By: Musaddiq Nawaz

ID : 14036

IQRA NATIONAL UNIVERSITY PESHAWAR

Q.1:**Risk register:**

Risk register is a management tool that is used to record risks and related actions to manage each risk. It is an integral part of risk management strategy.

A risk register enables you to arrange all of your risks in one place. It assigns ownership by prioritizing the risks and provide time to take immediate and proper action. Without proper risk register, it would be very difficult to identify, locate and manage those risks.

The table below gives a risk register related to Rapid Bus Service (BRT).

ID	Date raised	Risk description	Risk			Without controls			Controls	Residual risk	Action
			H	M	L	Cost impact	Time impact	Other			
01	26. 06. 2020	There is a risk that the project may not be completed in time.				It has increased cost of the project by about 200%, directly and indirectly.	The time delay is 50 months.	Environmental pollution, Psychological impact.	The project should be completed without any further delay.	There has been panicked changes in the design.	There should be extra measures to maintain the risks.
02		Defective design				This risk has increased the cost. It also indirectly caused time delay.	Due to defective designs, there have been frequent changes in the design.	Environmental pollution, irregularities in design.	The irregularities in the design should be emitted with expertise.	Irregularities in design.	There should be frequent sign boards to alarm passers-by.
03		Defective material				Poor quality material added cost.	Time delays due reconstruction	Environmental pollution	There should be proper material inspection	Defected material	The defected material should be reinforced
04		Pollution				Cost increased due to environmental protection measurements	Time delay due to poor work environment	Poor working environment	Extra construction activities should be avoided	Bad air quality	Green trees be planted around the project.
05		Inadequate sitemanagement				Cost increased due to poor site management	Time delays due to frequent reconstruction	It became the notorious BRT	Site management /supervision be improved	It has effects on every activity	Qualified supervisors.

Q.02:**Cost Benefit Analysis (CBA):**

It is a process/technique of evaluation of total cost and benefits of a project. It provides a complete overview of the net cost vs benefit scenario. It is one of the first steps of a project management plan.

Cost Benefit Analysis is Effective:

Cost Benefit Analysis is effective because;

1. It shows if the project is feasible by providing comparison between cost and benefit.
2. It provides the best among many options where benefits outweigh the cost.

There are 10 steps involved that ensure the effectivity of a project.

- i. Project goals and objectives
- ii. Different options/alternatives
- iii. List of stakeholders
- iv. Metric system
- v. Determine cost/benefit
- vi. Opt a common currency
- vii. Find out the discount rate
- viii. Net present value
- ix. Sensitive analysis
- x. Make decision

These steps provide an overview of the systematic nature of CBA. It is a systematic approach to figure out the merits and demerits of various steps in the project including transactions, various tasks, business requirements and investments. Finally, after opting among many options/alternatives, CBA provides the final decisions based on figures. It serves as a basis to compare different alternatives and assists in making informed decisions. It is a decision-making tool.

Example:**Project 1:**

Housing units: 300

Sold units: 200

Rented units: 100 for 10 years

Rental prices per unit per year: 400,000

Rented 100 units will be sold after 20 years= 7,000,000

Construction cost per unit: 10,000,000

Sale price of each unit: 12,000,000

Sales personal cost: 30,000,000

Project financing cost: 300,000,000

Project duration: 3 years

Project 2:

Housing units: 400

Sold units: 350

Rented units: 50 for 15 years

Rental prices per unit per year: 450,000

Rented 50 units will be sold after 15 years= 8,000,000

Construction cost per unit:9,000,000

Sale price of each unit:13,500,000

Sales personal cost: 25000000

Project financing cost:250000000

Project duration: 2 years

Comparison of the project parameters:

Parameters	Project 1	Project 2
Housing units	300	400
Sold units	200	350
Rented units	100	50
Rental price per unit per year	400,000	450,000
Rented 50 units will be sold after 20/15 years (per unit)	7,000,000	8,000,000
Construction cost per unit	10,000,000	9,000,000
Sale price per unit	12,000,000	13,500,000
Sales personnel cost per year	30,000,000	25,000,000
Project financing cost per year	300,000,000	250,000,000
Project duration (years)	3	2

Cost calculations:

Project costs	Project 1	Project 2
Construction cost	3,000,000,000	3,600,000,000
Sales personnel cost	90,000,000	50,000,000
Financing cost	900,000,000	500,000,000
Total	4,890,000,000	4,150,000,000

Benefits:

Project Benefits	Project 1	Project 2
Incomes from sales	2,400,000,000	4,725,000,000
Income from sales after rental period	700,000,000	400,000,000
Income from rentals	1,400,000,000	337,500,000
Total	4,500,000,000	5,462,500,000

Cost and Benefit comparison:

Comparison	Project 1	Project 2
Benefits	4,500,000,000	5,462,500,000
Cost	4,890,000,000	4,150,000,000
profit	-390,000,000	1,312,500,000

The above calculations suggest that Project 2 is the best suited alternative.

There are many parameters considered in the above example. Without CBA, it would have been very difficult to evaluate the cost and benefit of the project. CBA gives us a vivid illustration of the best alternative to choose at the planning stage.

Q. 03:

(A)

Normal probability distribution:

In normal probability distribution, data near the mean occurs frequently compared to the data far from the mean. The graph is a bell curve. The mean is zero and standard deviation is 1.

It is also known as gaussian distribution.

Given data :

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

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

$x \leq 45,000 \rightarrow 3$

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.

$$Z = (x - \mu) / \sigma \rightarrow 1$$

Put value in equ 1

$$Z = (45000 - 60,000) / 15,000$$

$$= -1.00$$

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
-3.7	.00011	.00010	.00010	.00010	.00009	.00009	.00008	.00008	.00008	.00008
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