***Question 2.***

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

***Answer: Definition of 'Cost Benefit Analysis***

***Definition***

A procedure for estimating all costs involved and possible profits to be derived from a business opportunity or proposal

***Description:***It takes into account both quantitative and qualitative factors for analysis of the value for money for a particular project or investment opportunity. Benefits to costs ratio and other indicators are used to conduct such analyses

The objective is to ascertain the soundness of any investment opportunity and provide a basis for making comparisons with other such proposals. All positives and negatives of the project are first quantified in monetary terms and then adjusted for their time-value to obtain correct estimates for conduct of cost-benefit analysis. Most economists also account for opportunity costs of the investment in the project to get the costs involved.

Cost-benefit analysis (CBA) is a technique used to compare the total costs of a programmed /project with its benefits, using a common metric (most commonly monetary units). This enables the calculation of the net cost or benefit associated with the programmed.

As a technique, it is used most often at the start of a programmed or project when different options or courses of action are being appraised and compared, as an option for choosing the best approach. It can also be used, however, to evaluate the overall impact of a programmed in quantifiable and monetized terms.

CBA adds up the total costs of a programmed or activity and compares it against its total benefits. The technique assumes that a monetary value can be placed on all the costs and benefits of a programmed, including tangible and intangible returns to other people and organizations in addition to those immediately impacted. As such, a major advantage of cost-benefit analysis lies in forcing people to explicitly and systematically consider the various factors which should influence strategic choice.

Decisions are made through CBA by comparing the *net present value* (NPV) of the programmed or project’s costs with the net present value of its benefits. Decisions are based on whether there is a net benefit or cost to the approach, i.e. total benefits less total costs. Costs and benefits that occur in the future have less weight attached to them in a cost-benefit analysis. To account for this, it is necessary to ‘discount’ or reduce the value of future costs or benefits to place them on a par with costs and benefits incurred today. The ‘discount rate’ will vary depending on the sector or industry, but public sector activity generally uses a discount rate of 5-6%. The sum of the discounted benefits of an option minus the sum of the discounted costs, all discounted to the same base date, is the ‘net present value’ of the option.

***EXAMPLE***

Good Health’ is a startup hospital that has been in operation for close to two years now. The manager, however, plans to expand its operations in the third working year. The hospital management decides to run a cost-benefit analysis to determine whether or not the decision is beneficial or feasible.

The management analyzes a time horizon of one year and estimates that the total revenue collected will amount to $200,000. However, this will be possible if 2 more physicians are hired and more hospital equipment worth $100,000 bought. The salary of the physicians will be $ 70,000, and the cost of hiring and training will be $5,000.

Therefore, when calculating the CBA, we first get the total costs by adding all the costs.

In this case, it will be salaries + equipment+ cost of hiring and training

= 100,000+ 70,000+ 5,000

= $ 175,000

Additionally, there is the cost of expanding consultation rooms which stands at $10,000.

On the other hand, the benefits that will come after the implementation of the plan will be $200,000. Therefore, using the benefit-cost ration, we get 175,000/200,000= 0.875. Given that the value is positive and that the total benefits are greater than the costs, the CBA indicates that the decision to expand the hospital’s operation is feasible and beneficial to the company.

***Question No. 01***

***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 Register***

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. OR

A Risk Register, also referred to as a Risk Log, is a master document which is created during the early stages of your project. It is a tool that plays an important part in your Risk Management Plan, helping you to track issues and address problems as they arise.

There are many different tools that can act as risk registers from comprehensive software suites to simple spreadsheets. The effectiveness of these tools depends on their implementation and the organization’s culture.

* 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](https://en.wikipedia.org/wiki/Integer) scale
* The [probability](https://en.wikipedia.org/wiki/Probability) or [likelihood](https://en.wikipedia.org/wiki/Likelihood) of its occurrence rated on an [integer](https://en.wikipedia.org/wiki/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.
* The risk register is called "qualitative if the probabilities are estimated by ranking them, as "high" to "low" impact. It is called "quantitative" both the impact and the probability is put into numbers, e.g. a risk might have a "$1m" impact and a "50%" probability.
* Contingent response - the actions to be taken should the risk event actually occur.
* Contingency - the budget allocated to the contingent response
* Trigger - an event that itself results in the risk event occurring (for example the risk event might be "flooding" and "heavy rainfall" the trig.

***SUMMARY:***

Risk Management of any project can be summarized as

1) Project organization structure including the number of parties and contractual, relationship b/w them.

2) The project management team including experience and availability of key personnel (consultants and contractors).

3) Management authority and approval required for work to proceed.

4) Ground condition included special factor such as extent of contaminated ground.

5) Requirement of diversion if any.

6) Temporary work for construction / dismantling.

7) Delivery period of material and equipment.

8) Precaution measure to protect staff.

9)Contractor specialty in given job.

10)Special measurement for disposal of waste soil etc.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***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]** |
| R1  |  01/01/2016 |  Design issue  |   | Y  |   |  30 days |   |   |  Technical staff is deputed for effective coordination between field staff and design staff of consultants |  Construction activities will remain stop if design issues may not solved | Start the selection of the project which is ready for construction |
|  R2 |  05/1/2016 |  Utilities shifting  |   |  Y |   |  30 days |   |   |  PRIP staff will coordinate between concerned departments for utilities shifting at the earliest  |  Construction activities will remain stop I till the shifting of utilities  |  Start the section of project which requires no shifting utilities |
|  R3 | 5/5/2016 |  Vehicular activities due to construction activities |   |   |  Y |   |   |   |  Contractor will be responsible for maintaining traffic management plan and all safety measures |   |   |
| R4  | 1/8/2016 | Heavy noise and dust to construction activities |  |  |  |  |  |  | Contractor will be responsible for submitting environmental migitation plan and will closely follow it |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

**Question 3.**

1. ***What is Normal Probability distribution?***
2. Suppose that the data concerning the first-year salaries of employees is normally distributed with the population mean µ = 60000 PKR and the population standard deviation σ = 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:**

 **Normal Probability distribution**

The normal distribution is a probability function that describes how the values of a variable are distributed. It is a symmetric distribution where most of the observations cluster around the central peak and the probabilities for values further away from the mean taper off equally in both directions.

**Answer:**

**Given data:**

**mean µ = 60000 PKR-------------------------------------------------(1)**

**standard deviation σ = 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:***

The natural log of normally distributed with the population mean µ = 60000 PKR is 11.002 and standard deviation σ = 15000 PKR is 9.6158 What is the probability of a randomly selected employees earning less than 45000 PKR annually This is a tougher one. First let find out what the natural log of 15,000. Its 9.6158. Next we need the standard deviation of log income. Its 9.6158.

Now we can form a z score.

Z= (x-u)/ -------------------(1)

Put value in equ 1

Z=(10.714-11.002)/9.615

=-.03

What is P(Z=-.03)

From table 2 we have ( .51197)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Z** | **.00** | **.01** | **.02** | **.03** | **.04** | **.05** | **.06** | **.07** | **.08** | **.09** |
| **0.0** | .50000 | .50399 | .50798 | .51197 | .51595 | .51994 | .52392 | .52790 | .53188 | .53586 |
| **0.1** | .53983 | .54380 | .54776 | .55172 | .55567 | .55962 | .56356 | .56749 | .57142 | .57535 |
| **0.2** | .57926 | .58317 | .58706 | .59095 | .59483 | .59871 | .60257 | .60642 | .61026 | .61409 |
| **0.3** | .61791 | .62172 | .62552 | .62930 | .63307 | .63683 | .64058 | .64431 | .64803 | .65173 |
| **0.4** | .65542 | .65910 | .66276 | .66640 | .67003 | .67364 | .67724 | .68082 | .68439 | .68793 |
| **0.5** | .69146 | .69497 | .69847 | .70194 | .70540 | .70884 | .71226 | .71566 | .71904 | .72240 |
| **0.6** | .72575 | .72907 | .73237 | .73565 | .73891 | .74215 | .74537 | .74857 | .75175 | .75490 |
| **0.7** | .75804 | .76115 | .76424 | .76730 | .77035 | .77337 | .77637 | .77935 | .78230 | .78524 |
| **0.8** | .78814 | .79103 | .79389 | .79673 | .79955 | .80234 | .80511 | .80785 | .81057 | .81327 |
| **0.9** | .81594 | .81859 | .82121 | .82381 | .82639 | .82894 | .83147 | .83398 | .83646 | .83891 |
| **1.0** | .84134 | .84375 | .84614 | .84849 | .85083 | .85314 | .85543 | .85769 | .85993 | .86214 |
| **1.1** | .86433 | .86650 | .86864 | .87076 | .87286 | .87493 | .87698 | .87900 | .88100 | .88298 |
| **1.2** | .88493 | .88686 | .88877 | .89065 | .89251 | .89435 | .89617 | .89796 | .89973 | .90147 |
| **1.3** | .90320 | .90490 | .90658 | .90824 | .90988 | .91149 | .91309 | .91466 | .91621 | .91774 |
| **1.4** | .91924 | .92073 | .92220 | .92364 | .92507 | .92647 | .92785 | .92922 | .93056 | .93189 |
| **1.5** | .93319 | .93448 | .93574 | .93699 | .93822 | .93943 | .94062 | .94179 | .94295 | .94408 |
| **1.6** | .94520 | .94630 | .94738 | .94845 | .94950 | .95053 | .95154 | .95254 | .95352 | .95449 |
| **1.7** | .95543 | .95637 | .95728 | .95818 | .95907 | .95994 | .96080 | .96164 | .96246 | .96327 |
| **1.8** | .96407 | .96485 | .96562 | .96638 | .96712 | .96784 | .96856 | .96926 | .96995 | .97062 |
| **1.9** | .97128 | .97193 | .97257 | .97320 | .97381 | .97441 | .97500 | .97558 | .97615 | .97670 |
| **2.0** | .97725 | .97778 | .97831 | .97882 | .97932 | .97982 | .98030 | .98077 | .98124 | .98169 |
| **2.1** | .98214 | .98257 | .98300 | .98341 | .98382 | .98422 | .98461 | .98500 | .98537 | .98574 |
| **2.2** | .98610 | .98645 | .98679 | .98713 | .98745 | .98778 | .98809 | .98840 | .98870 | .98899 |
| **2.3** | .98928 | .98956 | .98983 | .99010 | .99036 | .99061 | .99086 | .99111 | .99134 | .99158 |
| **2.4** | .99180 | .99202 | .99224 | .99245 | .99266 | .99286 | .99305 | .99324 | .99343 | .99361 |
| **2.5** | .99379 | .99396 | .99413 | .99430 | .99446 | .99461 | .99477 | .99492 | .99506 | .99520 |
| **2.6** | .99534 | .99547 | .99560 | .99573 | .99585 | .99598 | .99609 | .99621 | .99632 | .99643 |
| **2.7** | .99653 | .99664 | .99674 | .99683 | .99693 | .99702 | .99711 | .99720 | .99728 | .99736 |
| **2.8** | .99744 | .99752 | .99760 | .99767 | .99774 | .99781 | .99788 | .99795 | .99801 | .99807 |
| **2.9** | .99813 | .99819 | .99825 | .99831 | .99836 | .99841 | .99846 | .99851 | .99856 | .99861 |
| **3.0** | .99865 | .99869 | .99874 | .99878 | .99882 | .99886 | .99889 | .99893 | .99896 | .99900 |
| **3.1** | .99903 | .99906 | .99910 | .99913 | .99916 | .99918 | .99921 | .99924 | .99926 | .99929 |
| **3.2** | .99931 | .99934 | .99936 | .99938 | .99940 | .99942 | .99944 | .99946 | .99948 | .99950 |
| **3.3** | .99952 | .99953 | .99955 | .99957 | .99958 | .99960 | .99961 | .99962 | .99964 | .99965 |
| **3.4** | .99966 | .99968 | .99969 | .99970 | .99971 | .99972 | .99973 | .99974 | .99975 | .99976 |
| **3.5** | .99977 | .99978 | .99978 | .99979 | .99980 | .99981 | .99981 | .99982 | .99983 | .99983 |
| **3.6** | .99984 | .99985 | .99985 | .99986 | .99986 | .99987 | .99987 | .99988 | .99988 | .99989 |
| **3.7** | .99989 | .99990 | .99990 | .99990 | .99991 | .99991 | .99992 | .99992 | .99992 | .99992 |
| **3.8** | .99993 | .99993 | .99993 | .99994 | .99994 | .99994 | .99994 | .99995 | .99995 | .99995 |
| **3.9** | .99995 | .99995 | .99996 | .99996 | .99996 | .99996 | .99996 | .99996 | .99997 | .99997 |

***THIS IS JUST***

***1-P(Z<.03) = 1-F(.03)= 1- .51197=.48803***

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*The End\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***