08: Introduction to what-if analysis

Overview

In Microsoft Excel, what-if analysis is a powerful tool that allows you to explore different results based on changes you make to your data. It's a way to ask "what if" scenarios and see how your formulas react.

The following features in Microsoft Excel can be used in what-if analysis.

Scenario Manager: This lets you create different sets of scenarios for one or more cells. You can then easily switch between scenarios and see how the results in your formulas change.

Goal Seek: In Goal Seek, you can specify a desired outcome (goal) in a cell and then tell Excel which cell's value to adjust to achieve that goal. It helps find specific values that lead to a particular goal.

Data Table: This creates a table that shows the results of formulas based on one or two input values changing across a range. It's useful for visualizing how different combinations of input values affect your formulas.

Solver: Solver in Excel is another powerful tool for what-if analysis. It helps you find the optimal solution (maximum or minimum value) for a specific outcome you're looking for in your spreadsheet. Solver can adjust values in your spreadsheet to achieve the best possible outcome based on your criteria. It considers formulas in your spreadsheet to determine the optimal solution under a set of constraints (limitations). This feature can be used to make data-driven decisions and resource optimization.

By using these tools, you can gain valuable insights into how sensitive your calculations are to changes and make better data-driven decisions.

Introduction to what-if analysis

Activity 08.1

PART A

Nadun is a student who studies at the University of Sri Jayewardenepura. He is expecting to save money for a professional course. He is expecting to save Rs. 15,000 each month for one year at an annual rate of 12.5% in a reputable bank.

i. How much he will be able to save at the end of one year?
ii. After contacting his professional course institution, he found out that he needs to pay Rs. 200,000 for the course. By using the goal seek option, find how much he needs to invest every month for one year.

PART B

Nadun expects to invest Rs.15,000 every month for one year. The following table shows the different interest rates which are given by different commercial banks.

A	B	C	D	E	F	G	H
11%	11.5%	12%	12.5%	13%	13.5%	14%	14.5%

Develop a table to show the possible amount of money that Nadun can save at the end of the one year. Consider the payment period varies from one year to one month step.

PART C

Nadun finds information about three reputed commercial banks where he can invest his money. The following information illustrates the bank details.

Bank	**Rate (Annual)**
X bank	15%
Y bank	12.5%
Z bank	10%

Use scenario manager to find the total amount of money that he can save at the end of the 01 year if he is going to invest Rs. 15,000 every month.

Activity 08.2:

The Rotary club is planning to organize a concert for their welfare society. They are considering several venues to hold the concert. Create scenarios as suitable to illustrate the profit or loss of the event. You need to write relevant functions in highlighted areas.

	Hotel Safari	**Golden Araliya**	**Hotel Taprobane**	**Grand Hotel**	**Hotel Sarah**
Seating Capacity	500	450	300	800	650
Cost					
Venue rental (Rs.)	80000	65000	50000	100000	70000
Lighting (Rs.)	35000	25000	15000	60000	45000
Ticketing (Rs.)	50000	45000	30000	80000	65000
Security (Rs.)	28400	25500	18000	30000	40000
Insurance (Rs.)	15000	10000	5000	25000	20000
Total costs					
Revenue					
Price per ticket (Rs.)	550	400	250	1000	650

Food & beverage (Rs. per 1 person)	450	350	300	600	500
Ticket sales					
Income from Food & beverage					
Total revenue					
Profit or loss					

Activity 08.3

A company makes four products, product A, B, C and D, using 4 limited material and labor. The profit, labour time, and materials required to produce each product are given below. Assume that the demand for each product is unlimited.

Product	Unit Profit (Rs)	Labor Hours per unit	Material 1 (grams per unit)	Material 2 (grams per unit)	Machine Hours
A	450	50	5	500	500
B	1150	50	15	400	750
C	800	100	10	300	250
D	400	50	15	200	500

Maximum availability of the resources are:

Resources	Labor Hours	Material 1	Material 2	Machine Hours
Availability	5800 hrs	730g	29200g	60500 hrs

Using the Solver Add-in, you are required to:

I. Determine the appropriate product mix that would maximize the company profits, assuming that the company can produce fractions of products.
II. Determine the appropriate product mix that would earn Rs. 30,000 profits, assuming that the company can produce fractions of products

Activity 08.4:

"Suhada Garments" is an apparel company. They are considering two warehouse companies (Fastlogistics and Xpress shipping) to transport their stock of garments produced to four foreign customers. The numerical information regarding this transportation model is given below.

In this case, each warehouse has a limited supply, and each customer has a certain demand for garments (units).

Cost per Shipping	(Rs. Per Product)			
	Vault Clothing	**Free Style**	**Taylor Clothing**	**Aqua Wear**
Fastlogistics	LKR 500.00	LKR 650.00	LKR 300.00	LKR 700.00
Xpress shipping	LKR 450.00	LKR 550.00	LKR 800.00	LKR 675.00

Warehouse	**Availability**
Fastlogistics	100000
Xpress shipping	80000

	Customer			
	Vault Clothing	**Free Style**	**Taylor Clothing**	**Aqua Wear**
Demand (No. of Units)	20000	15000	10000	25000

Determine the optimal quantity of goods (units) to transport to each customer from each warehouse that would minimize the shipping cost.

Self-Learning Activity

Activity 08.5:

Part A

A company borrows Rs. 2,000,000 on 10-year mortgage from Y bank at an annual interest rate of 14.5%. The loan will be repaid in equal monthly installments made at the end of each month.

i. Determine the monthly payments for each month of the loan period
ii. Assuming that the company is capable only to pay Rs. 20,000 per month, determine the maximum amount that the company can borrow. (**Using Goal Seek**)
iii. Create scenarios for following situations to illustrates the monthly payment (Using **Scenario Manager**)

Scenario 1 – if a company borrows money at a rate of 9.25% from X bank
Scenario 2 – if a company borrows money at a rate of 14.50% from Y bank
Scenario 3 – if a company borrows money at a rate of 17.25% from Z bank
Scenario 4 – if a company borrows money with short-term payment period i.e. 5 years from Y bank
Scenario 5 – if a company borrow money with midterm payment period i.e. 10 years from Y bank
Scenario 6 – if a company borrow money with long-term payment period i.e. 15 years from Y bank

iv. Create a summary sheet for above scenarios

Part B

Budgeted information for a weekly production is available in the following table. There is a possibility of increasing or decrease the unit price by 5% and 10%. Perform a S**ensitivity Analysis to** determine the after-tax profit for all possible situations.

Revenue				120,000.00
Operating expenses	Units	Rate		
Power	500	25	12,500.00	
labour expenses	200	125	25,000.00	37,500.00
Operating Profit				82,500.00
Tax	12.50%			10,312.50
Profit after tax				72,187.50

Self-Learning Activity

Activity 08.6

A company makes three products, product A, B and C using 3 limited material and labour. The profit, labour time, and materials required to produce each product are given below. Assume that the demand for each product is unlimited.

Product	**Unit Profit (Rs.)**	**Labour hours per unit**	**Material 1 (grams per unit)**	**Material 2 (grams per unit)**	**Machine hrs**
A	500	0.5	250	450	125
B	250	0.75	175	125	250
C	350	1	300	50	200

Maximum availability of the resources are:

Resources	Labour hours	Material 1	Material 2	**Machine hrs**
Availability	250 Hrs	10000 g	12500 g	750 Hrs

Using the Solver Add-in, you are required to:

.Determine the appropriate product mix that would maximize the company profits, assuming that the company can produce fractions of products.

.Determine the appropriate product mix that would earn Rs. 10,000 profits, assuming that the company can produce fractions of products.