

SENSITIVITY ANALYSIS & STRESS TESTING

Scale at Speed

Sensitivity Analysis

Identifies variables with the most impact on the dependent variable, predicting outcomes and understanding uncertainty and risk.

Used in financial modeling, engineering, and economics to test robustness, prioritize variables, and evaluate risk factors for strategic planning.

Stress Testing

Stress testing assesses the resilience of systems under extreme conditions, identifying breaking points and potential failures. It is often used in financial services to test economic shocks and is required by regulators to ensure stability.

Provides data for contingency planning, helping organizations prepare for worst-case scenarios and improve risk management. Applicable to IT systems, healthcare, supply chains, and more.

Risk Register

Centralized repository for project risks, documenting descriptions, impacts, mitigation strategies, owners, response plans, and status updates. Facilitates communication and management.

Prioritizes risks, supports continuous monitoring, provides historical data for future assessments, enhances transparency and accountability.

Water Stress

Potential Corporate Risks

- **Rising Costs:** Increased expenses for alternative water supplies and water-saving technologies.
- **Business Interruptions:** Disruptions in manufacturing and essential operations, causing downtime and losses.
- **Relocation:** Possible need to move operations to areas with reliable water, leading to logistical and financial challenges.
- **Reputation Damage:** Perception of heavy water users can harm brand image and stakeholder trust.

As water becomes scarcer, demand often exceeds supply, leading to longer waiting periods for water tankers (15-25 days in major cities), impacting operations and increasing costs.

Water Stress and Its Impact on Corporate Operations

Water stress, driven by rising temperatures, prolonged droughts, and groundwater over-extraction, poses a significant threat to corporate operations. India ranks 13th globally for water stress, with 11 of its 20 largest cities at extreme risk

Scope

1 Objective

To analyze the monthly water costs and the impact of water recycling and conservation measures on total water costs at Tech Mahindra, incorporating assumptions, risk appetite, and mitigation strategies.

2 Assumption

- Due to expansion in operations, there will be a 2% increase in workforce.
- There will be a surge in water price by 5% per Kiloliter.
- There will be an increase in temperature by 3%, annually.

3 Risk Appetite

For our water cost management scenario, risk appetite is categorized based on the percentage increase in total water costs:

- **High Risk:** Cost increases exceeding 2% of the total budget.
- **Medium Risk:** Cost increases between 1% and 1.5% of the total budget.
- **Low Risk:** Cost increases less than 1% of the total budget.

Mitigation Actions

1 Water Recycling and Reuse Systems

- **Assumption:** Implementing water recycling and reuse systems reduces water costs by **25%** annually.
- **Impact:** This initiative lowers the unit cost of water by enhancing efficiency and implementing sustainable practices.

2 Water Conservation Programs

- **Assumption:** Implementing water conservation programs reduces water usage by **20%** annually.
- **Impact:** These programs decrease overall water withdrawal, conserve resources and reduce associated costs.

	Employee Count	Water cost/kl-will incur approx.	Adj. Water Cost (Recycling)	Temperature	Adj. Water Withdrawal (Conservation)
Annual change rate	2%	5%	25%	3%	20%
Monthly Change rate	0.17%	0.42%	2.1%	0.42%	2%

Scenario 1

The annual change rates for our sensitivity analysis are 2% for employee headcount & 5% for water cost per kiloliter (kl), with a monthly risk appetite of 2%. We assume a 25% reduction in water costs through recycling and a 20% decrease in water withdrawal via conservation. Monthly, this equates to a 0.17% rise in employee headcount and a 0.42% increase in water cost per kl, crucial for accurate impact modeling & mitigation strategies.

Month	Employee Count	Water cost/kl- will incur approx. (₹)	Withdrawal (kl)	Total Water cost (₹)	% Increase	Risk Appetite	Adj. Water Cost (Recycling) (₹)	Adj. Water Withdrawal (Conservation)	Total Cost after Mitigation (₹)
Jan	15056	₹92.81	55,998.00	5,148,260.94			90.88	55064.7	5,004,146.08
Feb	15081	₹93.20	55,240.13	5,148,260.94	-1%	low	91.26	54319.4584	4,956,988.75
Mar	15106	₹93.59	55,332.19	5,178,328.22	1%	low	91.64	54409.99083	4,985,938.94
Apr	15131	₹ 93.98	55,424.41	5,208,571.09	1%	low	92.02	54500.67415	5,015,058.21
May	15157	₹94.37	55,516.79	5,238,990.59	1%	low	92.40	54591.50861	5,044,347.54
Jun	15182	₹94.76	55,609.32	5,269,587.75	1%	low	92.79	54682.49446	5,073,807.93
Jul	15207	₹ 95.16	55,702.00	5,300,363.61	1%	low	93.17	54773.63195	5,103,440.38
Aug	15233	₹ 95.55	55,794.84	5,331,319.21	1%	low	93.56	54864.92133	5,133,245.89
Sep	15258	₹ 95.95	55,887.83	5,362,455.59	1%	low	93.95	54956.36287	5,163,225.47
Oct	15283	₹ 96.35	55,980.97	5,393,773.82	1%	low	94.34	55047.95681	5,193,380.14
Nov	15309	₹ 96.75	56,074.27	5,425,274.96	1%	low	94.74	55139.7034	5,223,710.92
Dec	15334	₹ 97.15	56,167.73	5,456,960.07	1%	low	95.13	55231.60291	5,254,218.85

Scenario 2

Due to climate change, a 3% increase in average temperature could raise water demand and costs. With a 5% annual increase in water cost per kl, total water costs may rise by 5.85%, impacting operating costs by INR 0.13 million. Our 2% monthly risk appetite guides our cautious approach. Mitigation strategies include water recycling (reducing costs by 25%) and conservation efforts (decreasing water withdrawal by 20%), helping to offset potential cost increases.

Month	Temp (Past yr.)°C-2023	Temp (Predicted)°C	Ratio	Water cost/kl (₹)	Withdrawal (kl)	Total Water cost (₹)	% Increase	Risk Appetite	Adj. Water Cost (Recycling) (₹)
Jan	20.7	21.32	1.03	92.81	1764.21	163,738.79			90.88
Feb	22.8	23.48	1.03	93.20	2819.47	262,768.58	60%	high	91.26
Mar	25.4	26.16	1.03	93.59	3320.3	310,733.95	18%	high	91.64
Apr	26.6	27.4	1.03	93.98	2946.44	276,894.85	-11%	low	92.02
May	25.5	26.27	1.03	94.37	1744.36	164,610.88	-41%	low	92.40
Jun	23.2	23.9	1.03	94.76	1241.99	117,692.50	-29%	low	92.79
Jul	22.4	23.07	1.03	95.16	2447.4	232,884.44	98%	high	93.17
Aug	22.2	22.87	1.03	95.55	2086.47	199,366.89	-14%	low	93.56
Sep	22.4	23.07	1.03	95.95	1157.19	111,033.22	-44%	low	93.95
Oct	22	22.66	1.03	96.35	1960.85	188,928.36	70%	high	94.34
Nov	20.9	21.53	1.03	96.75	1413.13	136,722.48	-28%	low	94.74
Dec	20.1	20.7	1.03	97.15	1778.45	172,784.76	26%	high	95.13
Average Annual temp.	22.85	23.54							

Conclusion

Scenario 1

Increase in Employee Headcount and Water Cost per kl

A **2%** increase in employee headcount and a **5%** rise in water cost per kl could lead to total expenses of approximately INR **5.46** million by the end of FY 2023-2024. Mitigation strategies like recycling and conservation could reduce this to around INR **5.25** million. The risk appetite for this scenario is generally low.

Scenario 2

Increase in Temperature and Water Cost per kl

A **3%** rise in temperature, along with a **5%** increase in water cost per kl and a **2%** surge in employee headcount, could result in expenses of about INR **172,785** million by the end of FY 2023-24. Mitigation efforts may reduce this to approximately INR **166,365** million. The risk appetite varies from low to high, depending on the month.

Climate Stress

Climate sensitivity analysis measures ways in which a climate crisis would affect the financial system of an organization. At Tech Mahindra, we are cognizant of climate-related risks and how do they affect the firm's resilience and financial stability. Therefore, we are improving our approaches and policies to manage these risks by implementing scenario analysis planning and sensitivity analysis to manage our risks.

Risk of physical impacts of climate change

The physical risks, which are caused by weather-related events such as droughts, an increase in temperature, and a rise in sea levels, can be of two types, i.e. Acute physical and Chronic physical. The potential impact due to climate change risks will lead to diminished asset value, reduction in the value of infrastructure, and impact on the resources of an organization, which could potentially impact revenues.

Climate Sensitivity analysis

To assess the physical impact of climate change event, we perform climate sensitivity analysis in order to ascertain the impact on the resources of our organization, which could potentially affect our revenues.

In this analysis, we analyze the impact of employee absences due to temperature variations on revenue loss for Tech Mahindra during the fiscal year 2023-2024. The analysis examines two scenarios: the actual revenue loss based on observed temperatures and absences, and a revised scenario considering an increase in temperatures and corresponding absences. The goal is to understand how changes in temperature forecasts affect revenue loss and to assess the company's risk appetite in managing such fluctuations.

- **Dependent Variable:** Revenue Impact
- **Independent Variables:** Monthly Absenteeism, Max & Min Temperatures

Assumptions

- Facilities considered – Delhi (NCR) region
- The relation between every 1% increase in temperature (°C) with absenteeism data for the location.
- The relation between every 1% decrease in temperature (°C) with absenteeism data for the location.

Mitigation Actions

- **Strategy 1: Flexible Work Arrangements**
- **Assumption:** Flexible work arrangements can reduce absenteeism by 5% annually.
- **Strategy 2: Improve Building Insulation**
- **Assumption:** Improving building insulation can reduce the negative impact of extreme temperatures on absenteeism by 4% annually.

Risk Appetite

We consider a monthly revenue loss above **0.05%** as beyond our risk appetite

Revenues of Tech Mahindra from India (INR million)	51,996
Revenues from Delhi NCR region (INR million)	5,730.02
Employees working from facilities located at Delhi-NCR region	17,010

Scenario 1

The relation between every 1% increase in temperature (°C) with absenteeism data for the location.

Month	Forecast – Max. Temperature (°C)	Revenue Loss (%)	Risk Appetite	Adjusted Revenue Loss (%)
April 23	36.36	0.0456%	Medium	0.0452%
May 23	41.41	0.0260%	Low	0.0258%
June 23	40.40	0.0467%	Medium	0.0463%
July 23	35.35	0.0256%	Low	0.0254%
Aug 23	34.34	0.0482%	Medium	0.0478%
Sept 23	35.35	0.0247%	Low	0.0245%
Oct 23	34.34	0.0504%	High	0.0500%
Nov 23	28.28	0.0324%	Low	0.0322%
Dec 23	22.22	0.0504%	High	0.0500%
Jan 24	21.21	0.0495%	Medium	0.0491%
Feb 24	25.25	0.0483%	Medium	0.0479%
Mar 24	31.31	0.0492%	Medium	0.0488%
		0.4971%		0.4930%

Scenario 2

The relation between every 1% decrease in temperature (°C) with absenteeism data for the location.

Month	Forecast – Max. Temperature (°C)	Revenue Loss (%)	Risk Appetite	Adjusted Revenue Loss (%)
April 23	19.80	0.0447%	Medium	0.0443%
May 23	25.77	0.0255%	Low	0.0253%
June 23	26.74	0.0457%	Medium	0.0454%
July 23	25.74	0.0251%	Low	0.0249%
Aug 23	24.75	0.0473%	Medium	0.0469%
Sept 23	23.76	0.0242%	Low	0.0240%
Oct 23	19.80	0.0494%	Medium	0.0490%
Nov 23	12.87	0.0318%	Low	0.0315%
Dec 23	7.92	0.0494%	Medium	0.0490%
Jan 24	6.93	0.0485%	Medium	0.0481%
Feb 24	9.90	0.0474%	Medium	0.0470%
Mar 24	14.85	0.0482%	Medium	0.0478%
		0.4872%		0.4832%

Result and Conclusion

Results

These variables are used to evaluate the impact on revenue for our facilities located in the Delhi NCR region

- **Increase in Maximum Temperature:** An increase in the maximum temperature is projected to raise the revenue loss by **0.4971%**. After implementing mitigation measures, this loss is reduced to **0.4930%**, translating to an adjusted revenue loss of **\$377,201**.
- **Decrease in Minimum Temperature:** A decrease in the minimum temperature is expected to lead to a revenue loss increase of **0.4872%**. With mitigation efforts, this is reduced to **0.4832%**, adjusting the revenue loss from **\$372,833** to **\$369,732**. For the revised scenario with increased temperatures, the revenue loss is adjusted from **\$380,365** to **\$377,201**.

Conclusion

- Temperature variations significantly affect revenue loss due to employee absences. The revenue loss rises from **\$372,833** to **\$380,365** with higher temperatures. An increase in maximum temperature raises the loss by **0.4971%**, mitigated to **0.4930% (\$377,201)**.
- A decrease in minimum temperature increases the loss by **0.4872%**, mitigated to **0.4832% (\$369,732)**. These findings emphasize the need for effective management of temperature-related risks to mitigate financial impacts.

Forex Risk

- **Policy Framework:** Tech Mahindra's Forex Risk Management Policy, endorsed by the Board of Directors, aims to effectively manage foreign exchange exposures by prioritizing risk reduction over profit from currency fluctuations.
- **Objective:** The policy focuses on limiting forex risks to acceptable levels rather than seeking to profit from currency movements, ensuring financial stability and risk control.
- **Governance:** A Risk Management Committee, consisting of the CFO, Finance Controller, and the Function Head of Treasury, is responsible for regular monitoring and management of forex risk exposure.
- **Board Oversight:** The Board of Directors, through its Audit Committee, conducts quarterly reviews of the forex risk status to ensure adherence to the policy and proper risk management.
- **Ring Fencing Model:** Tech Mahindra's 'Ring Fencing Model' involves repatriating most international profits back to India, which minimizes currency exposure in subsidiary operations and supports effective risk management.

- **Currency Exposure and Rates:** Tech Mahindra's revenue exposure includes GBP 439, USD 2624.61, and EUR 1719.24. The spot rates are INR/GBP 107.45, INR/USD 83.73, and INR/EUR 90.73, while the contractual rates are INR/GBP 107.1, INR/USD 81.3, and INR/EUR 84.48.
- **Forward Rate Calculation :** $Forward Rate = Spot Rate \times (1 + Interest Rate Difference \times Time to Maturity)$ the forward rates were calculated as INR/GBP 108.5435, 84.5715 INR/USD, and INR/EUR 94.6691.
- **Value of Contracts and Gains:** The value of foreign currency exposures at contractual and forward rates was assessed. For example, GBP 439 at the contractual rate is valued at INR 47,001.9 and at the forward rate is INR 47,629.6, resulting in a gain of INR 627.7. The total gain across GBP, USD, and EUR exposures amounts to INR 26,797.5.

Overview

This Analysis provides a detailed analysis of Tech Mahindra's financial performance, focusing on the company's exposure to foreign exchange risks and the sensitivity of its operational costs. The analysis includes a comprehensive risk review process, scenario analysis, and mitigation strategies.

Scenario Definition: We created three scenarios to evaluate the impact of currency fluctuations on revenue and profit

Optimistic Scenario: INR appreciates by 5%.

Base Case Scenario: No change in INR value.

Pessimistic Scenario: INR depreciates by 5%.

Impact on Revenue and Profit					
Scenario	GBP (₹)	USD (₹)	EUR (₹)	Total Revenue Impact (₹)	Total Profit Impact (₹)
Optimistic	44666.055	202711.7534	137979.3254	385357.1338	35,635.87
Base Case	47016.9	213380.793	145241.3952	405639.0882	15,353.91
Pessimistic	49367.745	224049.8327	152503.465	425921.0426	4,928.04

Impact: In each scenario, we calculated the impact on the revenue and profit by adjusting the contractual rates accordingly. For example, in the optimistic scenario, the value of GBP 439 at a 5% appreciation would be $\text{INR } 47001.9 \times 0.95$, leading to a revenue impact of INR **44651.8**. This process was repeated for USD and EUR exposures across all scenarios

Operational Costs and Profit Margins Analysis

Cost Sensitivity Scenarios: We examined the sensitivity of operational costs by creating three scenarios

Increase by 10%

No Change

Decrease by 10%

Scenario	Cost of Services (₹)	SG&A (₹)
Increase 10%	71,615.5	14,248.3
No change	65,105	12,953
Decrease 10%	58,594.5	11,657.7

Assumption 1

Revenue From Operations	₹ 420,993.00
Cost of services	₹ 71,615.50
Gross Profit	₹ 349,377.50
SGA	₹14,248.30
EBIDTA	₹ 335,129.20
EBIDTA %	79.60%
Depreciation & Amortization	₹ 8,129.00
EBIT	₹ 327,000.20
EBIT %	77.67%

Other income	₹ 12,525.00
Foreign Exchange (loss)/ gain	₹ 8,586.41
Interest, Dividend & Misc. income	₹ 3,938.59
Interest expense	₹ 503.00
EARNING Before Tax	₹ 339,022.20
Provision for taxes	₹ 4,361.00
Profit After Tax	₹ 334,661.20
Minority Interest	₹ 167.00
Net Profit after tax (After Minority Interest)	₹ 334,828.20
Net PAT %	79.53%

Assumption 2

Revenue From Operations	₹ 420,993.00
Cost of services	₹ 65,105.00
Gross Profit	₹ 355,888.00
SGA	₹ 12,953.00
EBIDTA	₹ 342,935.00
EBIDTA %	81.46%
Depreciation & Amortization	₹ 8,129.00
EBIT	₹ 334,806.00
EBIT %	79.53%

Other income	₹ 12,525.00
Foreign Exchange (loss)/ gain	₹ 8,586.41
Interest, Dividend & Misc. income	₹ 3,938.59
Interest expense	₹ 503.00
EARNING Before Tax	₹ 346,828.00
Provision for taxes	₹ 4,361.00
Profit After Tax	₹ 342,467.00
Minority Interest	₹ 167.00
Net Profit after tax (After Minority Interest)	₹ 342,634.00
Net PAT %	81.39%

Assumption 3

Revenue From Operations	₹ 420,993.00
Cost of services	₹ 58,594.50
Gross Profit	₹ 362,398.50
SGA	₹ 11,657.70
EBIDTA	₹ 350,740.80
EBIDTA %	83.31%
Depreciation & Amortization	₹ 8,129.00
EBIT	₹ 342,611.80
EBIT %	81.38%

Other income	₹ 12,525.00
Foreign Exchange (loss)/ gain	₹ 8,586.41
Interest, Dividend & Misc. income	₹ 3,938.59
Interest expense	₹ 503.00
EARNING Before Tax	₹ 354,633.80
Provision for taxes	₹ 4,361.00
Profit After Tax	₹ 350,272.80
Minority Interest	₹ 167.00
Net Profit after tax (After Minority Interest)	₹ 350,439.80
Net PAT %	83.24%

Impact and Conclusion

Impact

We calculated the impact of these cost changes on key financial metrics such as EBITDA, EBIT, and Net Profit. For instance, an increase in the Cost of Services by **10%** results in new costs of **INR 71615.5**, affecting EBITDA and subsequently reducing EBIT and Net Profit.

Conclusion

This comprehensive analysis provides a clear understanding of Tech Mahindra's financial exposure to foreign exchange risks and operational costs. By performing sensitivity analysis and documenting mitigation strategies, the company can better manage these risks and maintain financial stability.



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