



GUROBI
OPTIMIZATION

The World's Fastest Solver

What-If Analysis: The Key to Unlocking the Opportunity in Uncertainty

Management Paper



What-If Analysis: The Key to Unlocking the Opportunity in Uncertainty



Nobody knows your business like you do. You have an understanding of the key drivers of your operations, an awareness of the challenges and opportunities present in your business landscape, and a clear idea of what you need to do to reach your business goals. But there's one thing you don't know: The future.

Nobody knows the future. It's a cliché, but it's true. There is no crystal ball through which you can see exactly what the future holds for your business. This is especially in today's business world, where volatility and uncertainty reign supreme.

Leveraging AI to Handle Uncertainty

Almost every company these days is grappling with the same question: How – given the overwhelming volatility and uncertainty in the business landscape – can we plan and prepare for the future?

To answer this question, a growing number of companies are looking to AI technological tools to help them utilize and understand their data and make decisions.

One popular AI technology is machine learning, which uses historical data to make inferences and predictions about what will happen in the future. But, as machine learning relies heavily on data from the past, the predictions and solutions it delivers are not accurate when real-world conditions change in an unexpected and unprecedented manner – as is the case today.

To proactively plan and prepare for the future amidst such volatility and uncertainty, companies need to be able to leverage real-time (along with historical) data as well as their

own business expertise and experience to find solutions to their business problems and make decisions. Mathematical optimization is an AI tool that empowers you to do exactly that.

One feature of mathematical optimization that is particularly useful in helping you to handle uncertainty and volatility is What-If Analysis (which is also known as Scenario Analysis).

What is “What-If Analysis”?

Simply put, What-If Analysis is a software feature that gives you the capability to create, explore, and analyze various possible scenarios – so that you can gauge their potential impact on your business situation, identify strategic risks and opportunities, and determine the best courses of action.



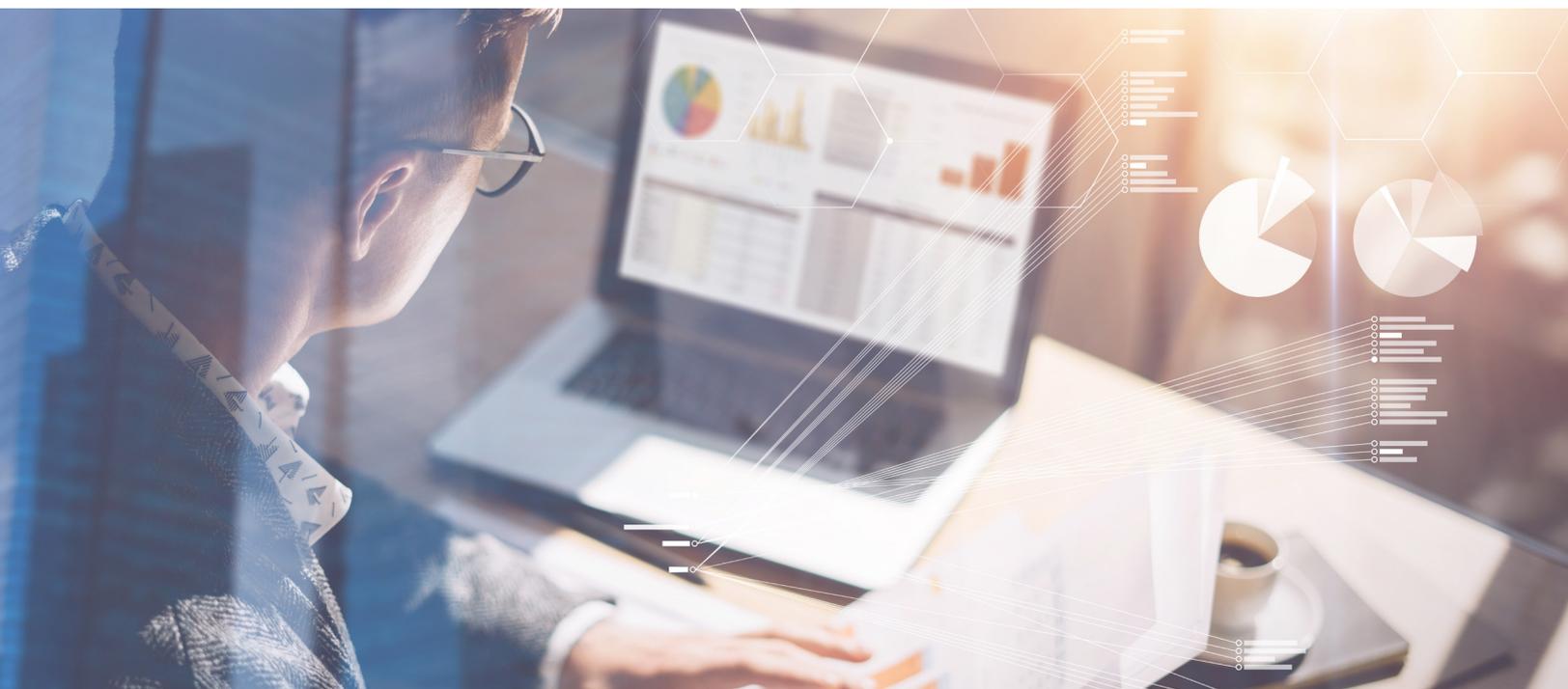
What-If Analysis: The Key to Unlocking the Opportunity in Uncertainty



With What-If Analysis, you can answer questions like:

- What if my company opened up a new shop, warehouse, or manufacturing facility? What would that mean to our service-level performance and profitability?
- What if our revenues tumble by 25%? Would we still be able to cover our operating expenses, retain our staff, and carry on with our expansion plans?
- What if one of our production machines broke down? Would we still be able to deliver on time, in full for our customers without exceeding our operating budget?
- What if we increased our workforce by 5%? How would that affect our output and costs?
- What if the price of a critical raw material that we need spikes by 50%? What toll would that take on our bottom line?
- What if – at the end of a product lifecycle – we have excess inventory of raw material due to a forecasting error? Should we return the inventory to a supplier, scrap the material, or build new products to be sold in a fire sale (at the risk of creating more inventory of finished goods)?
- What if we take on a major new customer, a new supplier, introduce a new product, or expand into a new market? How would that impact our resource utilization, revenue growth, and profitability?

What-If Analysis enables you to answer these and other questions by creating and comparing different capacity, strategic network design, pricing, capital investment, revenue, KPI prioritization, and many other scenarios and their potential outcomes – so that you can assess their impact on your KPIs and business goals.



What-If Analysis: The Key to Unlocking the Opportunity in Uncertainty

Conducting What-If Analysis with a Mathematical Optimization Tool

There are many technological tools out there – most notably Excel – that provide What-If Analysis functionality. Although the What-If Analysis feature that these tools offer can yield some interesting insights, just creating a simple scenario can be a time-consuming and labor-intensive affair. In addition, with such tools it is typically not possible to create and analyze scenarios that capture the complexity of your real-world business environment or to compute the optimal solution to these scenarios.

With mathematical optimization, you can automatically create, solve, and compare multiple, multi-dimensional what-if scenarios that encompass the complexity of your real-world business situation (including your unique business objectives, constraints, and decision variables).

Mathematical optimization technologies enable you to capture your business problems as mathematical models (which are essentially digital twins of your real-world business problem). When conducting scenario analysis on a mathematical optimization tool, you can:

- Generate scenarios by adding new input data (reflecting what you think may happen in best case and worst case and other possible scenarios) to your mathematical optimization tool, which essentially solves each scenario as mathematical optimization problem and gives you the optimal solution.
- Compare the effects of various scenarios on your many different business

objectives (such as revenue maximization, on-time delivery performance, cost minimization, and capacity utilization) and analyze the tradeoffs between these business objectives.

- Precisely estimate and evaluate the potential impact of various scenarios on your future business situation – so that you can figure out which strategic and tactical decisions to make and which actions to take.

Future-Proofing Your Business

By performing What-If Analysis with a mathematical optimization tool, you can proactively plan for the future and position your company to better handle the constant changes and significant challenges of today and tomorrow.

You may not know the future, but you do know your business. Mathematical optimization technologies enable you to combine your business expertise and intuition with a robust scenario analysis capability – so that you can explore different possibilities, identify risks, and unlock new opportunities in a world of uncertainty.



