ikigai

Business whitepaper

AI-Powered What-If Analysis

Scenario Planning for the Modern Enterprise

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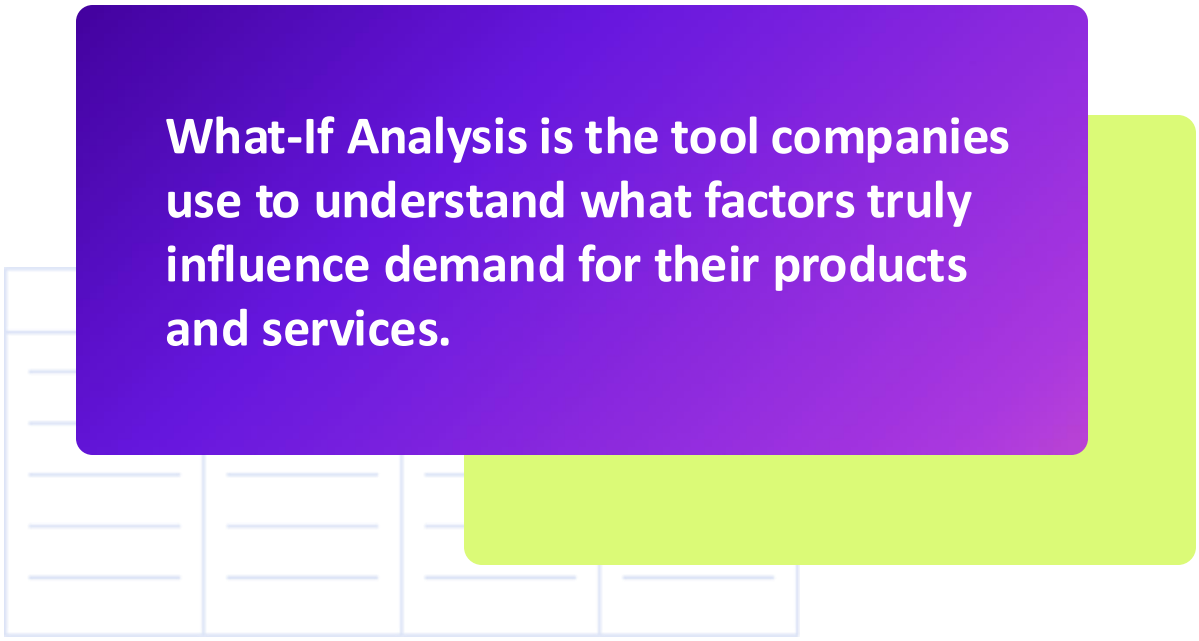
Why What-If Analysis Matters

What-If Analysis is a critical part of any forecasting and planning function. What-if Analysis enables companies to predict *what* will happen to their businesses *if* a given set of facts is true.

This type of analysis can be used to provide guidance in the face of substantial uncertainty. Consider the following questions a company may have about their operations:

- Due to tariffs, a business's input costs are expected to go up by 10% on average. In order to preserve their gross margin, they are considering raising prices by 10%. How are these price increases likely to change demand?
- A business's sales are highly weather dependent. What is likely to happen to sales if there is an unusually warm summer or cold winter?
- A business is considering running a 20% promotion on a subset of SKUs, but wants to make sure they're only doing this on products where the promotion is likely to actually increase demand. Which products do they choose to run the promotion on?

What-If Analysis can help answer all of these questions. In short, What-If Analysis is the tool companies use to understand what factors truly influence demand for their products and services.



Why Traditional Approaches Fall Short

Many businesses already do some version of What-If Analysis. But these existing processes often fail to account for the complexities of the real world, where multiple factors are fluctuating at the same time and identifying which factors are truly responsible for changes in demand is technically complex.

Challenges with traditional approaches to What-If Analysis

Can't disentangle confounding factors

Many factors affect demand. Say a business knows that its sales rise in December, which is also when they tend to run promotions. Traditional approaches lack tools to help the business figure out what's really driving the spike in demand – the proximity to holidays, the discounts, or something else.

Limited data integration to inform analyses

Many businesses are impacted by factors outside of their control (e.g., weather, consumer price index, etc.). Effective What-If Analysis should allow a business to look into a wide range of potential factors that many influence demand, but most tools have no native way of integrating this external data.

Difficult to create new analyses & update existing ones

Building individual analyses is time consuming and difficult. Given limited team bandwidth, companies run fewer analyses than they might prefer to, leaving potentially optimal strategies on the table. By the time analyses are built, they're often already out of date, and updating analyses with new data is a major undertaking.

Inaccurate baseline demand forecasts

The foundation of any What-If Analysis is a high-quality demand forecast. But many organizations rely on forecasts with high error rates and minimal flexibility. Without a good 'base case' demand forecast, analyzing potential variance with What-If Analysis provides limited additional value.

How Ikigai Enables AI-Powered What-If Analysis

A. Integrate all of your internal & external data into a single source of truth platform
Merge, clean, and process your enterprise data and relevant external data in a low-code / no-code SaaS platform

B. Build best-in class probabilistic forecasts to establish your 'base case'
Utilize Ikigai's proven, proprietary technology to create best-in-class demand forecasts that can be harnessed for subsequent What-If Analysis exercises

C. Adjust inputs into your forecasts and see how they impact demand
Adjust pricing, promotions, marketing spend, weather, and other input data to see how demand is likely to change in response

D. Compare scenarios to make decisions
Compare modeled scenarios to understand the full range of risks and opportunities for your business

Ikigai supports your What-If Analysis at every step, from data collection to scenario visualization

A. Integrate All of Your Data Into A Single Source of Truth Platform

The challenge: AI models only work well when they have good data to learn from. Subpar data results in inaccurate forecasts and misleading What-If Analysis output.

But getting the right data to your AI models is no easy feat. For many businesses, data is spread across multiple disparate sources. Stitching data together for analysis is time consuming and difficult.

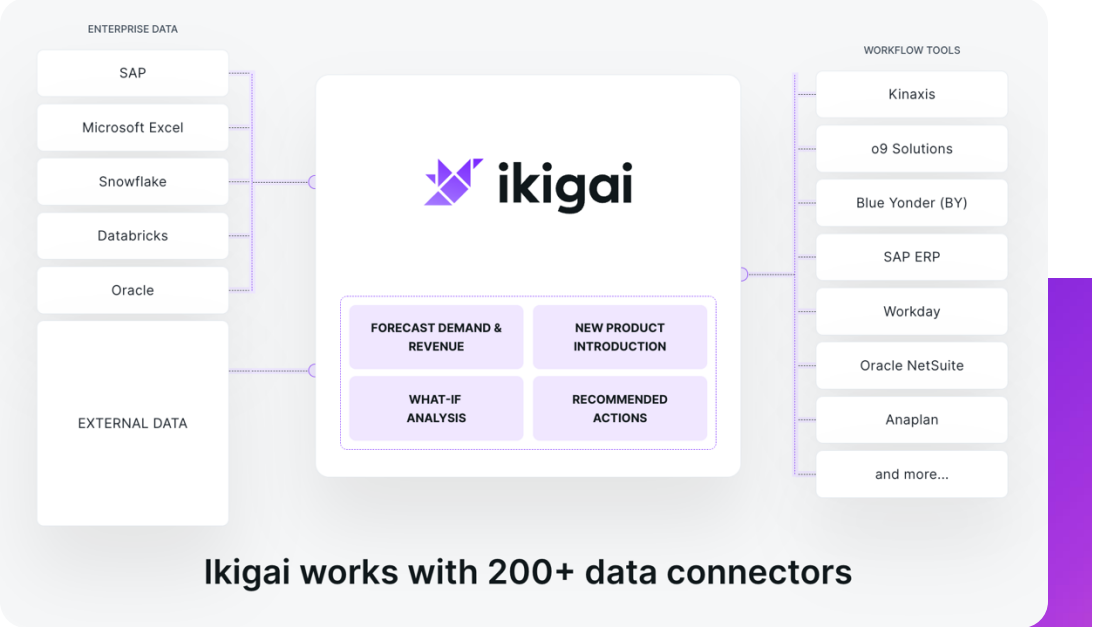
How Ikigai solves this challenge: Ikigai solves this with an end-to-end AI platform designed with the enterprise in mind, including:

- **Access to 200+ data connectors**, enabling you to bring data from all of your enterprise data tools into a single, simple platform.
- **Ability to bring in external data** including weather, consumer price index, and more. Ikigai makes it easy to merge these external sources with your enterprise data using built-in data processing tools.
- **Live connections to your data** so that as your underlying data changes, your forecasts and plans automatically update. No more repeating analyses and copying spreadsheets.
- **Clear documentation of all sources and analytical steps** to make the whole process auditable and legible to other stakeholders.

Examples of data you can bring into Ikigai

Enterprise data
- Historical sales
- Pricing
- Promotions
- Marketing spend

External data
- Weather
- Consumer price index
- Competitive / market data



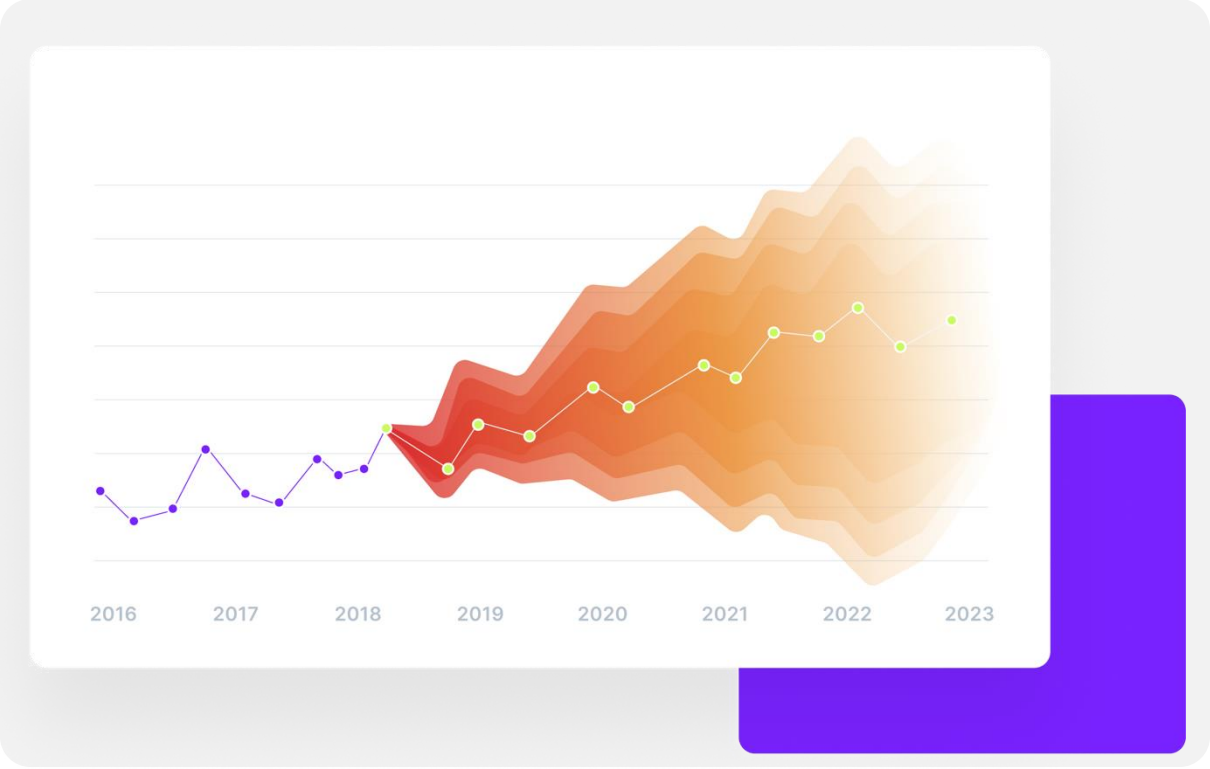
B. Build Best-in-Class Probabilistic Forecasts to Establish Your 'Base Case'

Why you need a good 'base case' demand forecast: Each scenario you create with What-If Analysis is relative to a 'base case.' Therefore, a good What-If Analysis tool needs to start with a high-quality 'base case' forecast.

How Ikigai excels at creating 'base case' demand forecasts: Building highly accurate 'base case' demand forecasts is the foundation of Ikigai's technology.

- **Based on MIT-developed research,** Ikigai efficiently encodes and processes all of your time series data (e.g., historical sales, pricing, etc.) and models future trends.
- **Ikigai excels at handling sparse and messy data** due to Ikigai's patented Large Graphical Models and proprietary Time2Vec technology, which enable businesses to discover hidden patterns in their data and produce forecasts even in the face of incomplete data.
- **Ikigai's forecasts are probabilistic by default**. That means that instead of just showing you a single outcome (which obscures the uncertainty inherent in all predictive analytics), Ikigai shows a range of likely outcomes so that you can make business decisions with as much visibility as possible.

Once you have your 'base case' you can begin to create scenarios using Ikigai's What-If Analysis solution.



C. Adjust inputs into your forecasts and see how they impact demand

How this works: Once Ikigai produces your baseline demand forecast, you can begin to build scenarios using Ikigai's What-If Analysis solution.

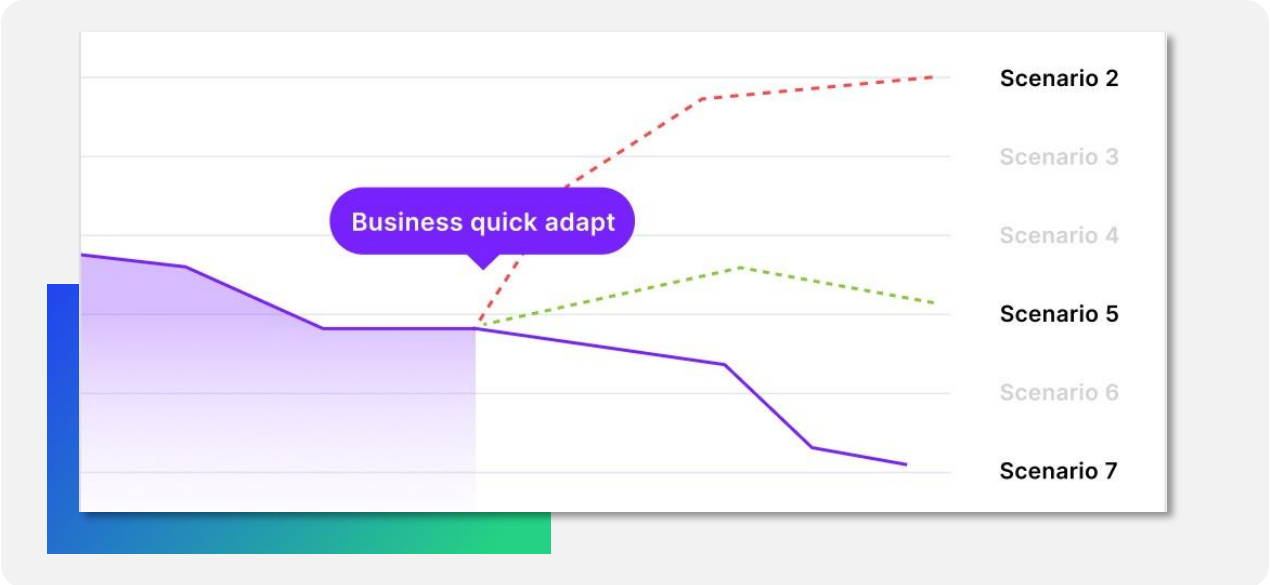
The idea behind building scenarios is simple: every demand forecast is based on a series of input factors. Historical demand is the most critical input. More sophisticated forecasts like Ikigai's can also take into account a wide range of other factors, such as pricing, promotions, holidays, weather, and just about any other time series dataset. Ikigai's What-If Analysis allows you to change the inputs to a demand forecast and produce new versions of the forecast based on these new inputs. You can even adjust multiple factors at once to understand how they work together to influence expected demand. All results are shown at the most granular level, so you can see how individual SKUs and locations are impacted in each scenario.

Examples of inputs you can adjust in What-If Analysis

Enterprise data
- Historical sales
- Pricing
- Promotions
- Marketing spend

External data
- Weather
- Consumer price index
- Competitive / market data

Example of how a business could utilize What-If Analysis: Say you are dealing with a 10% overstock of a certain item and you want to understand how to create extra demand for that item to clear your warehouse. You know a promotion is likely to increase sales, but you don't know what the optimal promotion level is to hit your demand targets while minimizing lost revenue. Using Ikigai's What-If Analysis, you can test the expected sales impact of multiple promotions levels and find the best promotion level to meet your objectives.



D. Compare scenarios to make decisions

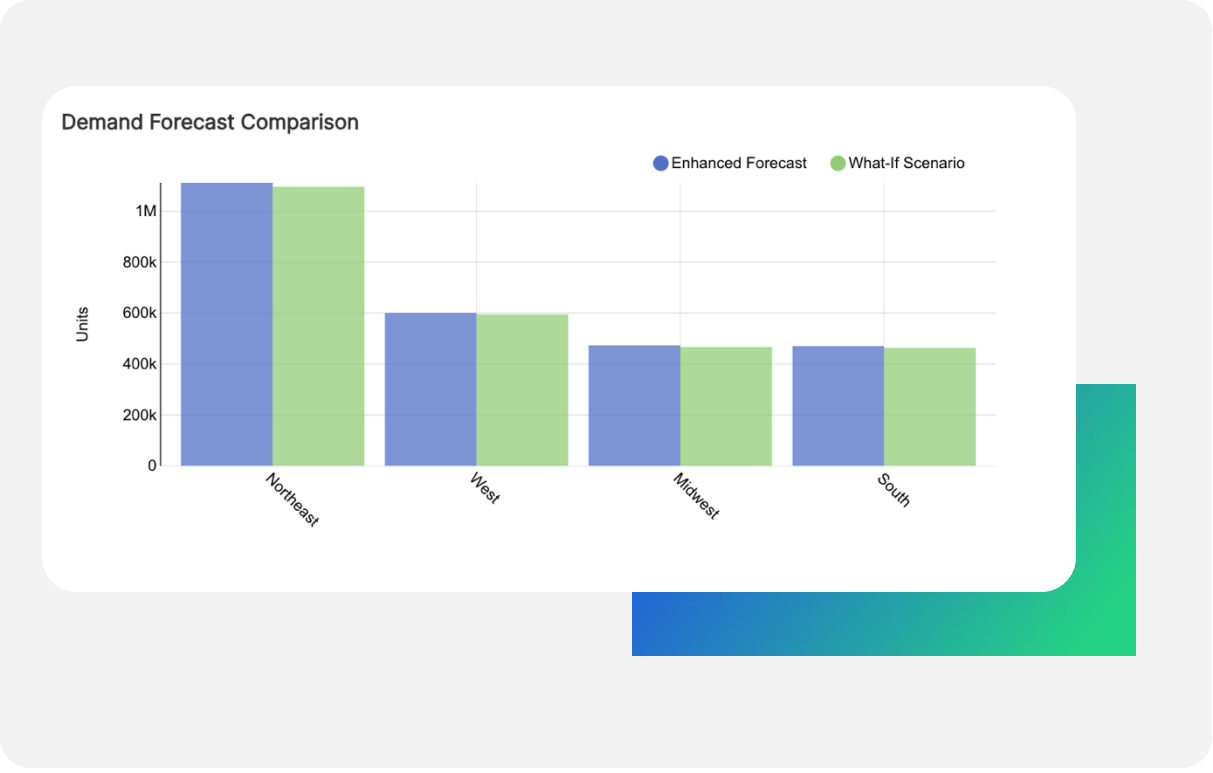
Once you've created your scenarios, you'll likely want to compare and contrast them to see the full range of potential outcomes for your business. Ikigai has built-in tools to allow you to do just that.

Explore scenarios with powerful visualizations: Ikigai's built-in visualization engine allows for a wide range of chart types, granular filtering, and convenient data aggregations. Because Ikigai is a cloud-hosted SaaS application, you can run complex visualizations on massive massive datasets that could overwhelm desktop analysis tools like Excel.

Share insights with executive-level dashboarding: Ikigai's platform includes customizable dashboards, so you can create the views that are most helpful to facilitate conversations within your team, present out to executive stakeholders, or simply keep track of all of the different analyses you've been running.

Export insights to your preferred business intelligence tool: Ikigai gives you the option to export data to Excel or another software application and analyze scenarios there.

Explore scenarios using Ikigai's generative AI agent: Query your scenarios using Ikigai's AI agent to understand what drives demand and which scenarios result in optimized business outcomes.

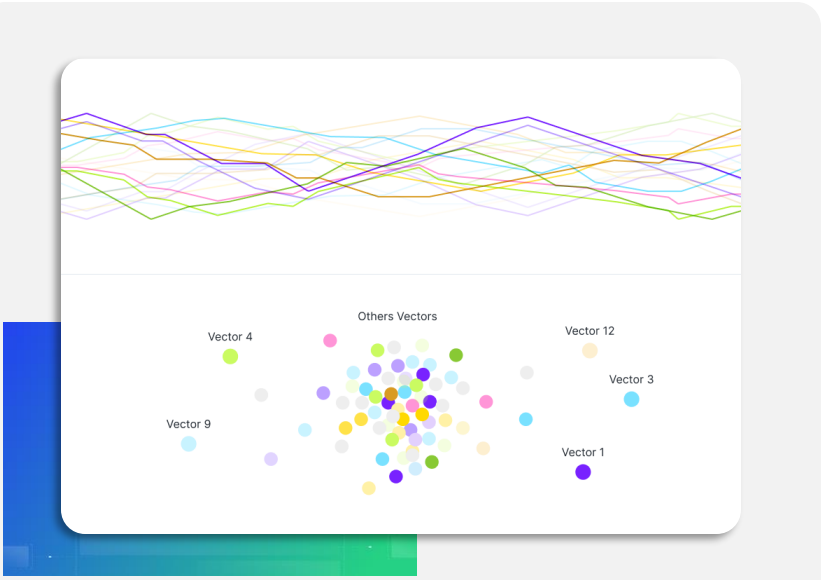


Ikigai's What-If Analysis is Powered by Proprietary Technology

Many companies promise more accurate forecasts & What-If Analysis outputs, but without better technology, it's hard to get better predictions. Ikigai's approach, based on years of research rigorously developed at MIT, involves proprietary technology to deliver probabilistic forecasting and What-If Analysis that is far ahead of the competition.

Time2Vec

Ikigai's proprietary method of modeling time series data called Time2Vec reveals similarities between time series (e.g., sales of SKU 1 and sales of SKU 2). This helps Ikigai's models learn hidden patterns in the data and develop more accurate forecasts. The more data you feed into Time2Vec, the more patterns it can learn.



Large Graphical Model

Ikigai's patented Large Graphical Model uses multidimensional graphs to represent the relationships between sets of random variables such as sales data, inventory levels, budgets, and customer trends. Designed for tabular and time series data, LGMs are highly effective at harmonizing multiple data sources and forecasting critical business trends.

The Power of Ikigai's What-If Analysis: A Public Data Example (1/2)

The goal: Use Ikigai to determine how price changes are likely to affect demand for different types of food sold in the United States

Ikigai capabilities utilized: Demand Forecasting & What-If Analysis

The results: Automatically generated demand forecast for 90 categories of food under 5 different pricing scenarios. More results on the next page…

Overview: One of the most common requests we hear from customers is to help them understand the price elasticity of demand for their products. In other words, if they raise prices X%, what happens to demand? If they lower prices by Y%, what happens to demand?

To illustrate the capabilities of Ikigai's What-If Analysis, we wanted to show how Ikigai's platform could quickly and easily answer these questions for a product category that we're all personally familiar with: food.

How Ikigai answers the question: We took a public dataset – a USDA food price dataset, which measure monthly quantities and prices of food sold across the United States – and applied Ikigai's Demand Forecasting and What-If Analysis solutions.

Ikigai's models quickly generated probabilistic demand forecasts for all 90 food categories in the data, and then showed how demand is likely to change under 5 different pricing scenarios (ranging from 10% increase in food price to 10% decrease in food price).

Results continued on the next page…

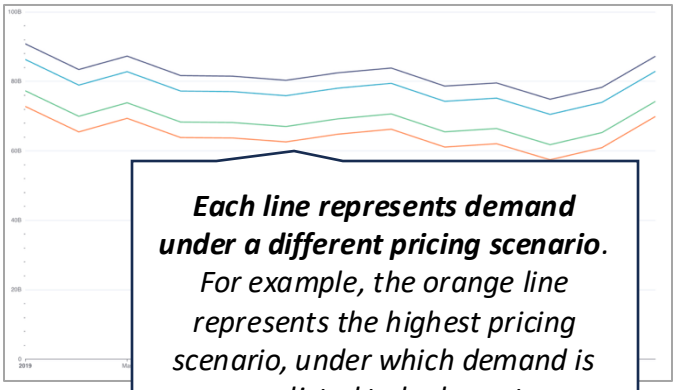
The Power of Ikigai's What-If Analysis: A Public Data Example (2/2)

What we found: Unsurprisingly, some categories of food are much more sensitive to price changes than others. The Ikigai platform allowed us to to quickly and easily generate What-If Analyses for every food group included in the USDA data set, but for the sake of concision, we're going to highlight the results for just two in this whitepaper: (A) whole-grain cereal and (B) baby food. We found that:

A. Whole-grain cereal has relatively high price elasticity of demand: as price increases, we see demand fall, and as price decreases we see demand rise *(see chart A below).*

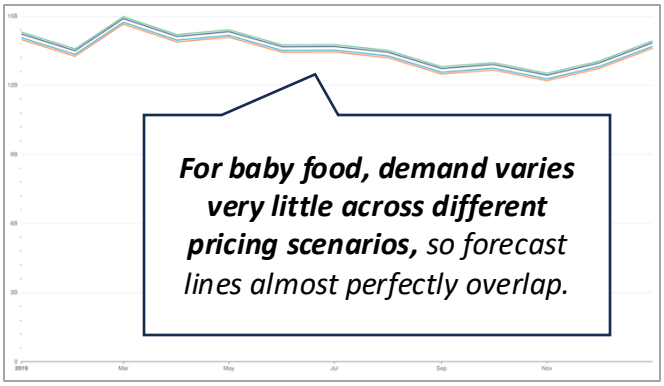
B. Baby food has minimal price elasticity of demand: as price rises or falls for baby food, we see minimal changes in total quantity demanded *(see chart B below).*

A. Monthly demand for whole grain cereal under range of pricing scenarios



Each line represents demand under a different pricing scenario*. For example, the orange line represents the highest pricing scenario, under which demand is predicted to be lowest.*

B. Monthly demand for baby food under range of pricing pricing



For baby food, demand varies very little across different pricing scenarios, *so forecast lines almost perfectly overlap.*

While we showed a food-specific example here, you could use this solution to do What-If Analysis for any kind of good or service your business may sell.

Business implication of this analysis: Focus promotions on goods that Ikigai shows to have relatively high price elasticity. These are the goods for which promotions are more likely to drive increased demand.

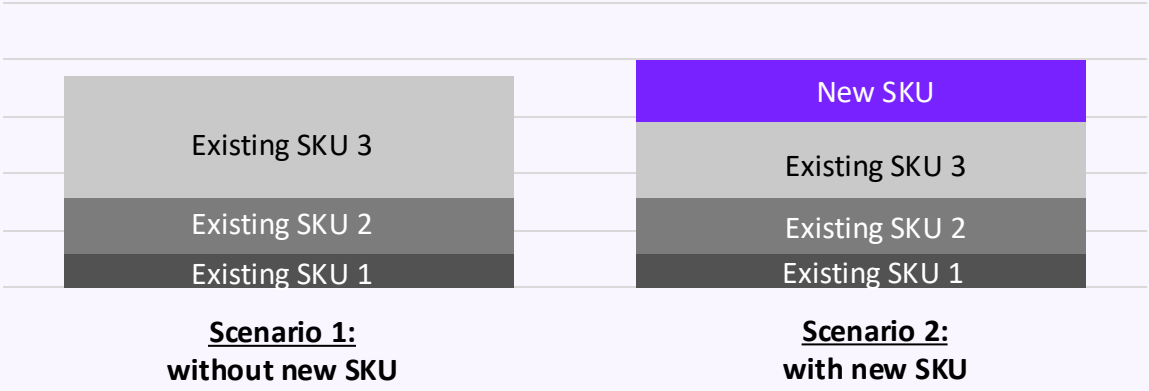
The Power of Ikigai's What-If Analysis: A Real Customer Example

The challenge: Ikigai worked with a ~$1B retailer that also manufactured many of their own products. The retailer was considering introducing a new SKU within a product family that already had 3 SKUs. The business was confident that there would be demand for their new SKU, but they didn't know whether the new SKU would create net new demand, or if it would just cannibalize sales from their 3 existing SKUs.

The approach: The retailer used Ikigai's What-If Analysis solution to model future sales under two scenarios. In scenario 1, Ikigai forecasted demand given the status quo (without the introduction of the new SKU). In scenario 2, Ikigai forecasted demand with the introduction of the new SKU.

The results: Ikigai's models predicted that the introduction of the new SKU would have a net positive impact on the business's bottom line, boosting sales of the business's own branded products by ~7% overall. Sales of the new SKU would partially cannibalize sales of existing SKUs, but there was enough differentiation between the new SKU and existing SKU to also induce net new demand.

Projected sales by SKU with & without introduction of new SKU



The goal: Determine whether introduction of a new SKU would result in sufficient increase in overall sales to justify investment.

Key takeaway: Ikigai determined that introduction of new SKU would partially cannibalize existing SKUs, but still result in a 7% overall sales uplift.

2 Questions to See if Your Organization is Ready for AI-Powered What-If Analysis

If you're curious if your organization could benefit from AI-powered What-If Analysis, we recommend asking the following 2 questions.

1. Do I have questions that AI-Powered What-If Analysis can answer?

That could include any of the following (and much, much more…):

- How should I expect demand to change if I increase my prices?
- How should I expect demand to change if I run a promotion?
- How should I expect demand to change based on the amount I invest in marketing a specific product or line of business?
- How should I expect the introduction of a new product to affect sales of existing products in my business?
- How should I expect demand to change as various macroeconomic factors change (e.g., the consumer price index rises or falls)?
- How do other external factors (e.g., the weather) affect my business?

2. Do I have the right data to answer these questions?

Many companies assume they need perfect data to run high-quality analyses, but thankfully that's no longer true. Ikigai's Large Graphical Models are designed to handle sparse and messy data.

As long as you have some relevant historical data (e.g., sales, production quantity, pricing, promotions, marketing spend, etc.) that you can feed into the What-If Analysis solution, you can start to drive insights for your business.

If you answered yes to these questions, let's chat at:
https://www.ikigailabs.io/contact-us

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