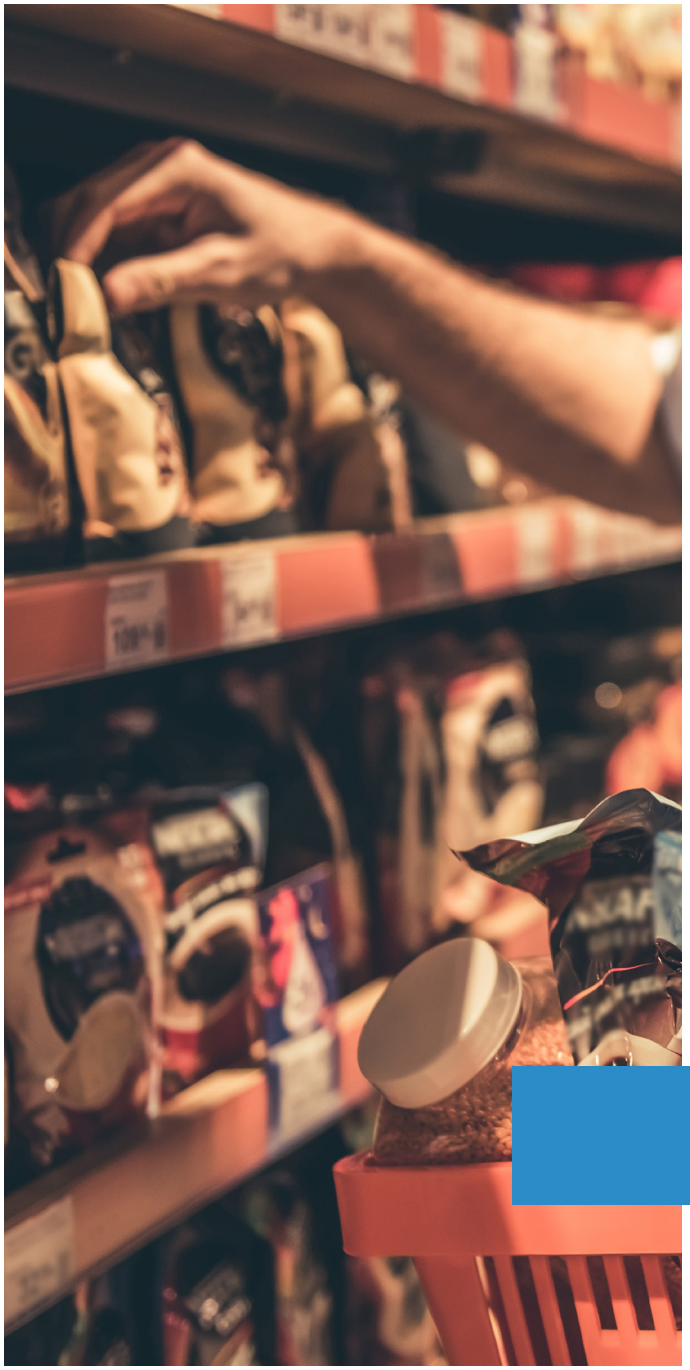
MetrixLab
a Macromill Group company

An advanced solution to product-line optimization challenges

Based on Shapley Value analysis



The Challenge

Many brands compete in categories with numerous product offerings. Consequently, they invest in market research to determine the success of their new product offerings and variants. They also use it to identify the optimal mix of products in a category. Historically, brands have used a variety of research techniques to evaluate such things – from TURF analysis to Discrete Choice Models. But each of these techniques has strengths and weaknesses.

In this paper, we introduce MetrixLab's two-tier product-line optimization solution. This enables brands like yours to:

- optimize the range of products they offer to consumers
- determine the potential sales success of new products/variants and their impact on existing products in the line
- understand which variant (e.g. flavor) is likely to be most popular, and therefore which to launch
- identify the strongest rotation of offerings to help retailers to increase their sales
- understand the appeal of new variants and how they will fit into the line
- determine the number of new consumers who might be attracted to the product line because of the new product offering/variant

We also share the findings of a Tier II study as well as share highlights of branded use cases.

Introducing our two-tier product-line optimization solution

The cornerstone of our product-line optimization solution is Shapley Value analysis. This solution, which is based on game theory, was developed by Lloyd Shapley in the 1950s. The approach involves assigning a value to each potential product in a product line. This is done by evaluating the overall strength of all possible product offerings that contain the product, minus those same product offerings without the test product. This process produces a similar result to that which can be achieved via TURF analysis.

It was originally devised as a way of allocating profits to players who had each contributed to these in varying amounts. This approach provides a way of calculating the proportional or relative value of products offerings/variants in a product line. Using it, it's possible to establish the value of existing products in a line before a new product is added. It is then possible to determine the value of all products in the line with the new product included. In turn, the impact of the new product in the line can be revealed.

By applying Shapley Value analysis to product-line optimization problems, a further useful property of this approach has emerged. Imagine for a moment what might be described as typical shopping behavior. That is, consumers enter a store and browse the available product offerings/variants. They determine which products/variants are relevant to them and then make a purchase. In this case, the Shapley Value of each product offering/variant will be equal to its share of sales in its category.

The power of Shapley Value analysis is encapsulated in our two-tier product-line optimization solution.

Tier I – Optimization of product offerings/variants

When determining product assortment, you need to know which new product offerings/variants will work best with your existing product line.

In our Tier I study, respondents are exposed to both existing and new product offerings/variants. They are then asked to rate these based on their intent to buy them. Those given a 'high intent to buy' rating by respondents are considered to be relevant to them.

In this way, it's possible to determine each respondent's 'relevant set' of product offerings/variants. It's also possible to weight the results on how frequently respondents purchase a category.

Tier II – Product-line optimization volumetrics

You'll also want to understand the potential sales volume share of any new product offering/variant. Furthermore, you'll want to determine its likely impact on your existing products' share of sales volume.

In our Tier II study, respondents' purchasing decisions are examined in a realistic context. This typically involves showing the respondents a shelf containing all current and competitive products in the category that have reasonable distribution. Respondents are asked to indicate which of the products displayed they've purchased in the past X days (X depends on the category). Based on this data, the existing products' share of sales volume within the category can be calculated.

Respondents are presented with all new product offering/variant concepts and asked to give each of them a purchase interest rating. Next, they're presented with their original relevant product set, plus the new product offerings/variants they rated 'definitely would buy'. They are then asked to rank this extended relevant set in order of preference. Those new product offerings/variants ranked higher than all products in their original relevant set are included in their new relevant set. Based on this data, the relative sales rate of each product in the new relevant set is calculated. This information can in turn be used to estimate the potential future share of sales volume of products in the category.

In this way, it's possible to judge whether a new product offering / variant's sales will cannibalize those of existing products in the category.

A Tier II Shapley Value study

In this study, we exposed respondents to the 15 products in a specific category. These included ten of our client's existing products and five of their competitors' existing products. In addition to these products, we included four of our client's new products that respondents had rated 'definitely would buy'.

Table 1 below shows what would happen if our client added a new product (new client product 4 (NCP4)) to the category.

The original share relates to the share of sales volume attributed to existing products. At this stage, no new items have been added to the product line.

The new relative share relates to the share of sales volume of all existing products plus the new product offering. When NCP4 is added to the product line, it attracts a 2.7% relative share of sales volume. In turn, the total reach of the entire category increases by 1%, to 83.4%.

The difference between the relative share and original share of sales volume of the existing products is also calculated. As is each product's share of draw. This relates to the amount of sales volume share that could be lost to existing products by adding NCP4 to the category. The share of draw is calculated by dividing the difference of the existing product by the relative share of the new product.

For example, the difference for existing client product 1 is -0.2%, which is divided by 2.7% to get a share of draw of -5.9%. Figure 1 below shows the share of draw for all products in descending order.

Table 1: Shapley Value simulation results – adding NCP4 to the existing product line.

Product Line	Relative Share	Original Share	Difference	Share of Draw
Existing Client Product 1	10.6%	10.8%	-0.2%	-5.9%
Existing Client Product 2	15.3%	15.5%	-0.3%	-10.2%
Existing Client Product 3	6.4%	6.4%	0.0%	-1.8%
Existing Client Product 4	0.7%	0.8%	-0.2%	-6.4%
Existing Client Product 5	2.3%	2.3%	0.0%	-0.4%
Existing Client Product 6	3.9%	4.0%	0.0%	-1.4%
Existing Client Product 7	3.8%	3.9%	0.0%	-1.1%
Existing Client Product 8	6.8%	7.2%	-0.3%	-12.2%
Existing Client Product 9	0.9%	1.0%	-0.1%	-5.6%
Existing Client Product 10	1.0%	1.0%	0.0%	-1.4%
Existing Competitor Product 1	7.8%	7.9%	-0.1%	-4.2%
Existing Competitor Product 2	6.2%	6.3%	-0.1%	-2.9%
Existing Competitor Product 3	7.2%	7.3%	-0.2%	-7.0%
Existing Competitor Product 4	0.9%	0.9%	0.0%	-0.7%
Existing Competitor Product 5	7.0%	7.0%	0.0%	-1.4%
New Client Product 4	**2.7%**			
Total Reach	**83.4%**	**82.4%**	**1.0%**	

Figure 1:

The share of draw enables you to identify those existing products from which your new product will source its share of sales volume.

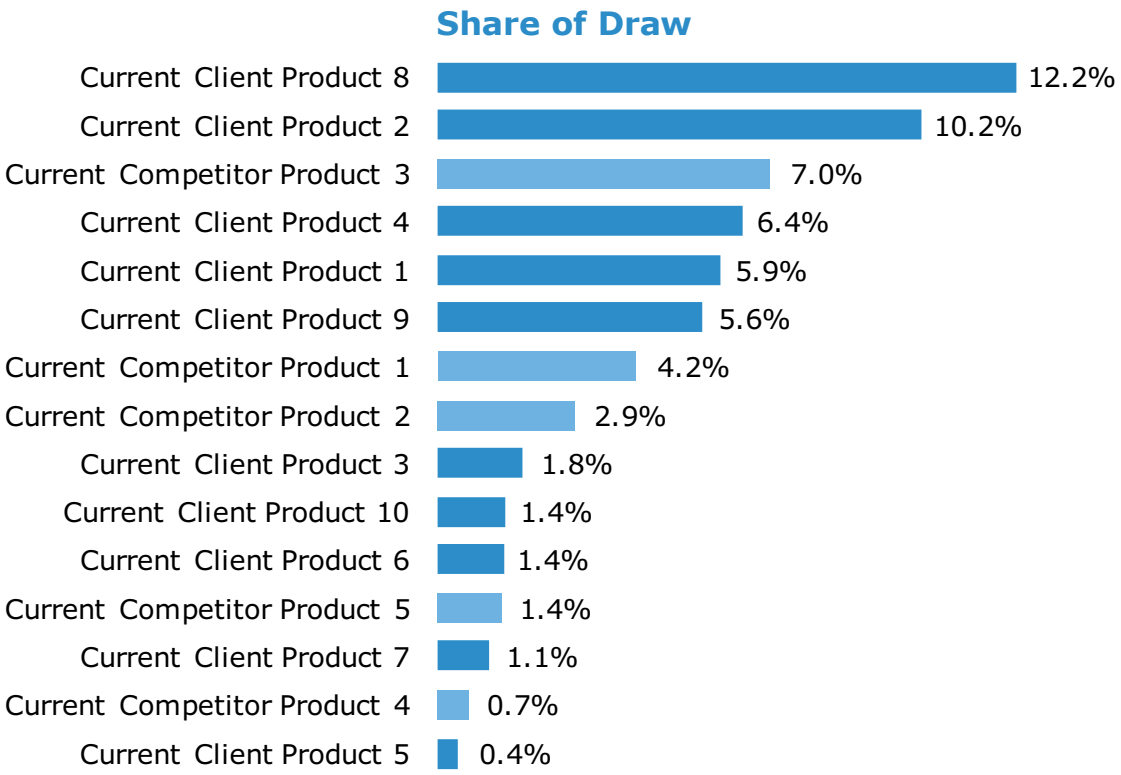
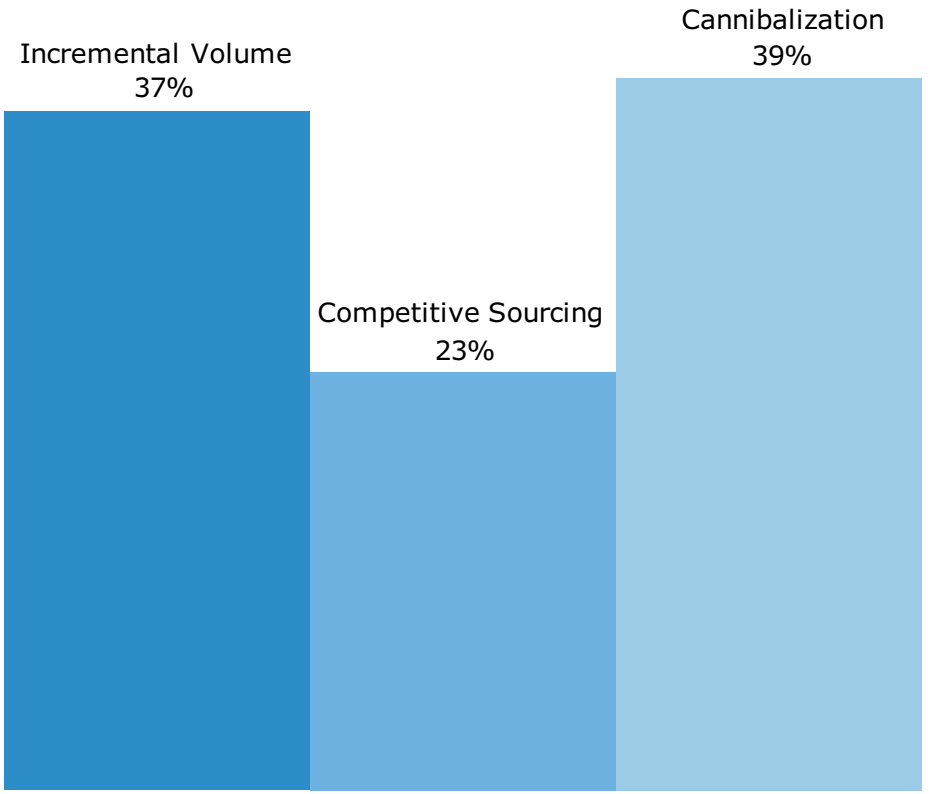


Figure 2:

Source of volume based on adding **NCP4** to the product line.



The source of the new product's share of sales volume can also be divided into:

- Incremental volume: the number of new consumers attracted to the category only because of the new product offering.
- Competitive sourcing: the number of consumers who will trade using existing products in the category for the new product offering.
- Cannibalization: the number of consumers who'll trade using the parent brand's existing products for the new product offering.

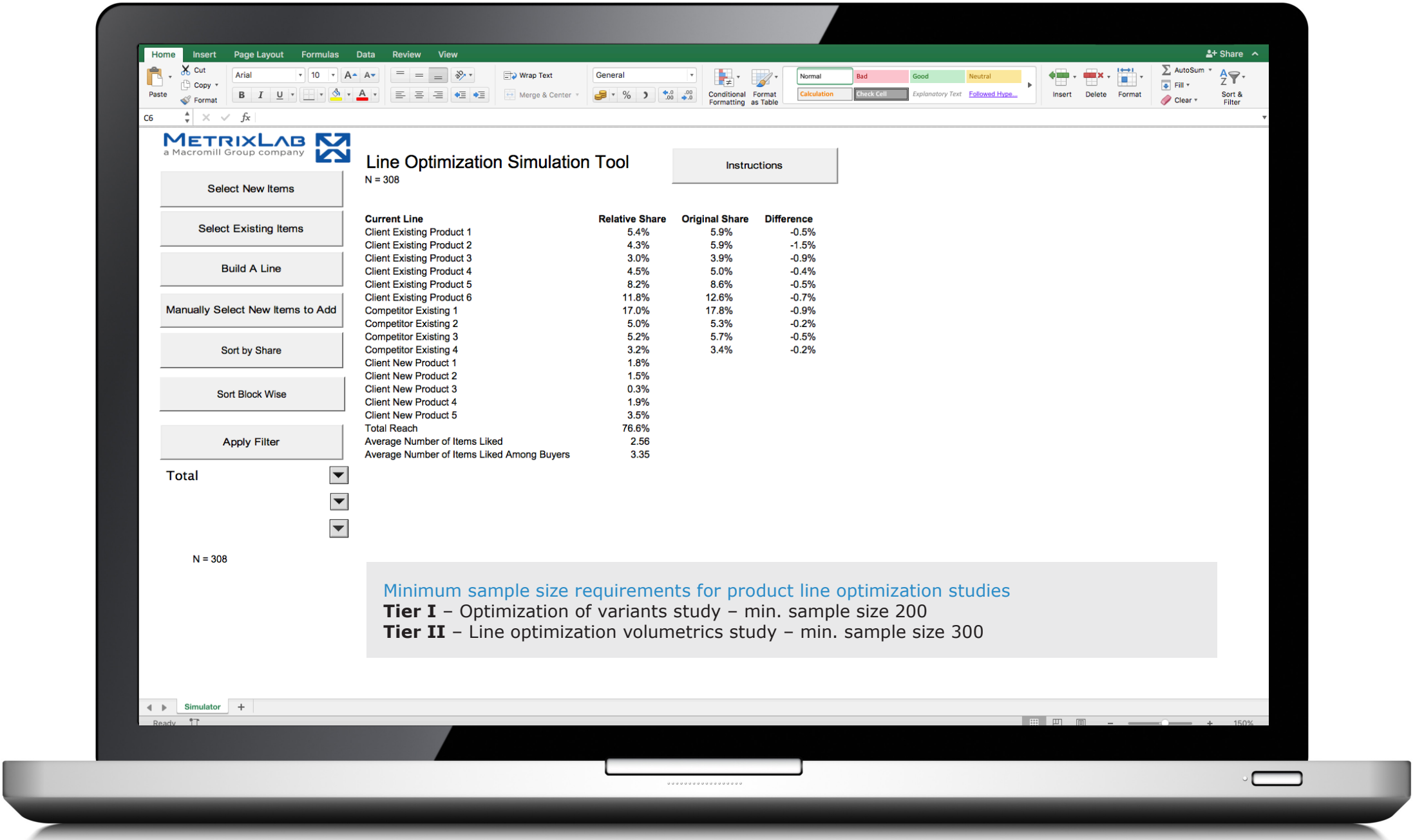
Conclusion

In today's hyper-competitive marketplace, you are challenged with identifying winning new product concepts.

With our two-tier product line optimization approach, you can more accurately predict the impact of a new product offering or variant. You can also predict its potential share of sales volume. What's more, perhaps even more critically, you can determine exactly where this share of sales volume will come from.

This approach is your crystal ball. It will provide you with the precise insights you need to optimize your product line.

Product-line optimization simulation tool – demo



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Learn more

To understand more about line optimization visit www.metrixlab.com or contact us at info@metrixlab.com.

About MetrixLab

MetrixLab provides consumer insights that drive smarter business decisions. As a truly digital global research agency, we pioneer new technologies and integrate multiple data sources to push the boundaries of research.

This enables our experts to provide high-quality insights at scale, at speed and for an unparalleled value. In just one decade, we've grown rapidly and now work with more than half of the world's top 100 brands.

Our expertise, passion and solutions enable our clients to succeed at product innovation, brand engagement and customer value in over 90 countries. MetrixLab is part of the Macromill Group.