How to Build a Marketing Mix Model
How to Quantify and Optimize Your Future Marketing Spend

BY WILLIAM CAO, CHIEF ANALYTICS OFFICER
Introduction

CMOs often struggle to quantify their marketing activity, yet increasingly, their CEOs expect it. Although it is relatively easy to quantify activity within individual channels, such as direct mail or television advertising, it is more difficult to attribute the impact of marketing activity across different channels. In this white paper, we’ll introduce the concept of marketing mix modeling (MMM) for future attribution and show you how to structure one for your own marketing organization.

What’s a Marketing Mix Model?

A marketing mix model quantifies the sales impact of your marketing activities. It’s more than an attribution model; based on your past marketing spend and sales, a marketing mix model can help you optimize your future spend and maximize your return on investment (ROI).

Is a Marketing Mix Model a Type of Attribution Model?

No, an attribution model looks backwards, analyzing the data you already have. A marketing mix model attempts to tell you how to allocate your future spend and therein lies its power.
How to Create a Marketing Mix Model

You would typically begin with data collection, followed by model building, forecast optimization and recommendations for implementation. The following chart shows the typical process.

| Data Collection | • Identify data sources  
|                 | • Collect historical data to build a database |
| Model Building  | • Explore the collected data  
|                 | • Build the MMM using collected data to identify the drivers |
| Forecast Optimization | • Calculate optimal marketing spend allocation for markets and channels based on different scenarios |
| Recommendation Implementation | • Make recommendations based on these models and estimates |

**MMM Framework:**

**INPUT DATA**

We collect input data by media type. It’s typically the targeted rating points (TRP) over time vs. actual dollars. Below are the graphic representations of the model for each media type. Different media have different influences.
MODEL

We build the actual model by selecting the appropriate model type based on the data and estimating the parameters in that model.

\[ Y_t = a + f(TV_t, TV_{t-1}, Radio_t, Radio_{t-1}, DM_t, Display_{t-1}, Display_{t-1}) + \varepsilon_t \]

OPTIMIZATION

Usually the sales response to media spending is an S-shaped response curve. You don’t realize the impact of the media spend until it reaches a minimum threshold. Once it reaches a higher threshold, the response flattens out, indicating a marginal return that would become negative with any incremental spending.

This model is known as a Nonlinear Regression Model.

This graph shows the gaps and opportunities for optimizing marketing spend.
Breaking Down the Framework

The model attempts to identify the correct functional form of the response curve using historical data to fit the identified functional form for estimating parameters.

Once the model is built, the second step is optimization. This is a simulation exercise to identify the global maximum based on your marketing budget. It should answer questions such as the following:

• How much should I invest in each channel?

• How should I allocate my marketing dollars across regions?

• How much should I spend on marketing to achieve the desired revenue and profit?

• If I have additional marketing dollars to spend, where should I spend them? What would be the estimated impact across all media types and what would be the optimal spend?

WHAT KIND OF IMPROVEMENT SHOULD YOU EXPECT?

You should expect significant improvement. According to Doug Brooks, senior vice president, analytics and modeling services of Information Resources Inc., and author of *Success and Failures in Marketing Mix Modeling*, you should expect up to 40% improvement in your marketing ROI within 12 months.

CHALLENGES

First among the challenges is collecting the appropriate data to build the model. Other challenges include:

• Explaining or predicting 100% of sales activities

• Securing the right mix of resources to obtain buy-in

• Building an actionable model
WHAT TYPE OF DATA SHOULD YOU COLLECT?

Your marketing mix model can be successful only if you have accurate and specific data available with which to build it. In addition to media spend and sales, other categories of data must be collected to improve the model's accuracy and performance. A typical list of data categories you'll need:

- Market-level media measure (GRP/TRP in addition to spend)
- Your organization’s marketing events and sponsorships
- New accounts/sales by product line
- Pricing data by product
- Economic data, to measure macroeconomic forces for each region or market
- Industry data, including competitors’ spending
- Brand equity data, including advertising awareness, brand affinity, etc.
Conclusion

Marketing mix modeling is a powerful weapon to add to your analytics arsenal. Although it can be cumbersome to collect the initial data, the savings you can realize will make it well worth the effort. For more information or to begin a discussion about whether a marketing mix model is appropriate for your organization, contact William Cao at wcao@catalystinc.com or call 585.453.8300.

Key Takeaways

1. Marketing mix modeling is based on your historical marketing data and performance. The model won’t be accurate if you don’t have accurate historical data.
2. The more granular your data, the more accurate your model.
3. The model will not justify your marketing spend today. But it will help you better understand your marketing ROI and help you optimize future marketing spend.

ABOUT THE AUTHOR

William currently provides data and analytic leadership to Catalyst clients. He has led analytics teams for Associated Bank, BMO Harris Bank and M&I Bank as well as Sprint, H&R Block and Dell. He holds an MBA from the University of Chicago Booth School of Business, an MS in statistics from Kansas State University and an MS in applied mathematics from Southeast University. He has also taught graduate level courses in business analytics at Marquette University.