

Marketing Mix Modeling

Brian Teasley – www.teasley.net

What is Marketing Mix Modeling?

A Marketing Mix model is the result of an analysis of sales data and the media mix that purportedly drove it. I.e., an analysis is conducted of past sales data and media spend amounts (and other data) in different channels (Print, radio, TV, etc.). If relationships exist between sales and the amounts spent on the media, then the analysis yields a model that is used to predict sales based on different media spend amounts and different media “mixes”.

In slightly more technical terms, marketing mix modeling is the application of regression analysis (or other statistical technique like CHAID) where the dependant variable is usually sales and the independent variables include amounts spent on various media channels.

Marketing Mix Modeling, Research, Marketing Optimization

With this understanding of a “Marketing Mix” model, it should be obvious that the technique is valid. It is just the application of an old tool to a new set of data consisting of information about sales and marketing. However it is important to know that “Marketing Mix” models are not by themselves the answer to every marketer’s financial decision-making question.

“Marketing Mix Modeling” is a subset of the overall “Marketing Optimization” problem, which is encompassed by the over-arching question, “If I am a marketing manager and I have \$1,000,000 to spend – where and how should I spend it?”

The idea of an algorithmic solution to this question is quite appealing. However, research into this question shows that a “push button” answer to the question is not possible.

Because of this, the overall “Marketing Optimization” problem morphs into a series of related questions. These questions include, “How much money do I spend on each of the available marketing channels?” and “How do I optimize within each of those channels?”. Other optimization questions that are not usually encountered in a pure analytical approach include “How do I coordinate my marketing messages and strategies **across** channels to improve the results?”

Marketing Mix Modeling works at the macro-level, helping to answer the “How much should I spend on each channel?” question. The analysis takes available historical data, usually on sales and supporting advertising (in each channel), and uses it to predict what future sales will result from different “marketing mixes”. A marketer can see the

theoretical “optimal” result, and use a constructed simulator to gauge the potential results of different marketing “mixes”.

Design and Approach to Marketing Mix Modeling

The approach to building a marketing mix model is dictated by the available data. In an optimal theoretical world a perfect marketing test design would be constructed (likely using Experimental Design techniques such as fractional factorial or Taguchi test designs), then the marketing test would be run, data would be collected over time and the results would be analyzed. The results would then show the pure impact of each tested element (channel, message, offer, etc.) in a market that has not changed.

However, reality is far different from the optimal theoretical world. In the case of building a model using pre-existing historical data, the amount and types of available data will determine how much analysis can actually be executed. If a marketer plans on collecting all the data in some type of pre-designed test or research study, the types and amount of data that can be collected will influence the approach and design.

In general any good research project will begin with the identification of the problem that is being solved or the question that is trying to be answered. Usually a marketing mix analysis is trying to solve a question regarding sales. E.g., “How do sales react to different combinations of radio and television ads?” or more to the point, “What is the optimal combination of spending on radio, television, and print channels?” The questions could also focus on market share rather than sales, or “brand perception” rather than either of those two.

Once the objective of the analysis is determined, it is imperative that all analytical actions taken relate to or help enable the answering of that determined question. Available data should be explored and examined to see what extent of analysis is possible. Is data available on a weekly basis? Monthly? Quarterly? (The answer, of course, will depend on many things, including everything from the channel from which the data comes to the availability of I.T. resources to help amass the data). This data audit will help ensure that efforts to conduct a specific portion of the analysis will actually be possible and will help the research achieve its’ objectives.

The data audit approach will yield an understanding of the data that will allow the analyst to determine to what extent the objective can be achieved. It will help the analyst understand what variables are available and how many data points are available. That type of information helps the analyst frame the complexity of any models that will be developed as part of the analysis.

Plans for the actual analysis are developed after the objectives are determined and an understanding of the data has been achieved. A combination of test design techniques and modeling techniques are deployed to allow statistical analysis of the data. This yields information relating sales (or another tracked variable) to the available variables

regarding the marketing mix. The modeling techniques can include multiple regression analysis, logistic regression analysis, neural net analysis, genetic algorithm analysis, or other techniques.

The results of the analysis are a series of models that can be used as tools to help marketing managers decide how to most effectively spend their marketing budgets. It is important to understand that the results will not yield a single “optimal” answer to the broad “What should my marketing mix be?” question. Instead the tools will give managers a much clearer understanding of the implications of potential solutions that are being considered. This will in turn help them with the decisions that need to be made.

Marketing Mix Modeling Data Issues and Other Analysis

Media spending and sales information are required for media mix analysis. Data on advertising effectiveness, pricing, sponsorships, events, and competition can be incorporated in the analysis and models if they are available.

An independent advertising effectiveness analysis should be conducted if an objective is to test effectiveness of different advertisements. A marketing mix analysis will yield results that answer questions about the effectiveness of advertising in specific channels, and potentially about books or other mediums within channels. But a separate analysis is more appropriate to determine differences between elements (offers, creative approaches, etc.) or different advertisements within a channel.

Pricing changes can obviously also have an effect on sales and need to be considered when conducting an analysis of sales results. If possible, such data should be included in a marketing mix analysis. While discount information might be readily available in a consumer package goods (CPG) application of marketing mix modeling, this data might be more difficult to obtain in other industries.

Competition in a market will also affect sales and should be factored into an analysis if appropriate and possible. Availability of useable data may be a factor in the incorporation of competitive information.

It is possible that some of the data from these areas (advertising effectiveness, pricing, competition, events, etc.) may be sporadically available. I.e., For a variety of reasons it is only collected for certain areas or regions and/or only at certain times of the year. Some data may literally be lying in a box on sheets of paper submitted at an event.

Analysis of this “sporadic” data should be conducted at the “micro” level in order to extract what information is available in the data. E.g., a separate smaller level analysis might be conducted around sales in a regional market coinciding with a specific event or sponsorship. The analysis would give insights into the effect of this event – which would have implications on other or future events. This type of information is then collected

whenever possible (when and where data allows) and used in the overall marketing mix decision making process. This information augments the main “marketing mix” models, which as mentioned earlier are just other tools to be used by the marketing manager.

Marketing Mix Model Variables

The answer to the question, “Which variables should be included in the models?” is based on a mix of data availability, practicality, statistical analysis, and common sense.

Once the data audit has been completed and the data has been acquired, the statistical analysis is executed. The statistical techniques used can include any combination of multiple regression, neural net, genetic algorithm or other approaches to model building. The statistical analysis will determine what variables should be considered for inclusion in the models from a purely analytical standpoint.

When choosing between the statistical methods the best approach is to explore the results of different techniques and see what information is yielded from each of them. It is important to keep in mind that the objective of a marketing mix analysis is to develop a tool (or set of tools) to help a marketing manager answer a question. Because of this, the more practical learning that takes place the better the result will be.

In addition to the issue of statistical significance determining inclusion of certain variables in models, practical issues (including cost of data, local market knowledge and sometimes “common sense”) also need to be considered.

Variables such as “word of mouth” advertising, “PR/news coverage” are of interest to marketers. It should be noted that often many of these things are, to a certain extent, out of the control of the marketing manager. Since the objective of the analysis is to assist the marketing manager in deciding on decisions regarding variables over which he does have control, these indirect variables should be considered with this in mind.

However, if a Public Relations campaign is something a manager is considering executing (press kits, releases, phone calls, PR handlers, etc.) then an analysis of past campaigns can be executed. If the enough data is available then the affect of these types of variables on sales can be deduced.

Validation Research on Marketing Mix Models

If enough data is available, a hold out sample(s) can be set aside to test and validate any developed models. In the event that data is sparse, such an approach may not be used. However, if a choice is required, it is more important to use data to get the best model estimates possible rather than withholding data to validate what would be a weaker model.

Is Marketing Mix Modeling Right for You?

Marketing mix modeling is appropriate for industries where there is an abundance of available data on sales and media spending. Retail, CPG, Telecommunications and Entertainment are all good examples of industries that can measure both results and their advertisement spending levels. This by no means is an exhaustive list. Excellent case studies exist for pharmaceutical applications as well as convenience stores. There are other industries that are also appropriate for this type of analysis.

If you would questions on this topic or would like to discuss how to use this tool to optimize your marketing spend across channels, please contact Brian Teasley at: bteasley@teasley.net or call 646.414.1100