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# Marketing Mix Modeling

By Jerry W. Thomas, Decision Analyst

**B**usiness magazines and websites are abuzz with news about the value of marketing mix modeling as a way to help companies maximize returns on their marketing investments (ROMI). Despite the currency of this topic in the media, the concepts and tools of marketing mix modeling date back at least 30 to 40 years. The topic is of growing interest partly because of the corporate world's interest in growing topline revenue. The last couple of decades have witnessed unparalleled cost cutting and staff reductions among the Fortune 500 in the U.S. The opportunities for further cost reductions are diminishing in number and scale, so the pressure for long-term financial performance from public markets can only be met by renewed emphasis on new products and revenue growth. A second reason for the growing interest in marketing mix modeling is the proliferation of new media (i.e., new ways to spend the marketing budget), including the Internet, online communities, search engines, event marketing, sports marketing, viral marketing, cell phones, and text messaging, etc. No one knows how to accurately measure the potential value of these many new ways to spend one's marketing dollars. To grow revenue and profits, corporate executives need to understand the types of marketing investments that are most likely to produce viable, long-term revenue growth. That is, what combination of marketing and advertising investments will generate the greatest sales growth and/or maximize profits?

Eureka! Marketing mix modeling might provide some answers to these challenging problems.

**W**hat exactly is marketing mix modeling? The term is widely used and applied indiscriminately to a broad range of marketing models used to evaluate different components of marketing plans, such as advertising, promotion, packaging, media weight levels, sales force numbers, etc. These models can be of many types, but multiple regression is the workhorse of most marketing mix modeling. Regression is based on a number of inputs (or independent variables) and how these relate to an outcome (or dependent variable) such as sales or profits or both. Once the model is built and validated, the input variables (advertising, promotion, etc.) can be manipulated to determine the net effect on a company's sales or profits. If the president of a company knows that sales will go up \$10 million for every \$1 million he spends on a particular advertising campaign, he can quickly determine if additional advertising investment makes economic sense. But, in a broader sense, a deep understanding of the variables that drive sales and profits upwards is essential to determining an optimal strategy for the corporation. So, marketing mix modeling can assist in making specific marketing decisions and tradeoffs, but it can also create a broad platform of knowledge to guide strategic planning.

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From a conceptual perspective, there are two main strategies to pursue in marketing mix modeling. One is longitudinal; the other is cross-sectional or side-by-side analysis. In longitudinal analyses, the corporation looks at sales and profits over a number of time periods (months, quarters, years), compared to the marketing inputs in each of those time periods. In the cross-sectional approach, the corporation's various sales territories each receive different marketing inputs at the same time, or these inputs are systematically varied across the sales territories, and are compared to the sales and profit outcomes. Both methods are sound, and both have their place. Often, some combination of the two methods is the most efficient.

Regardless of method, marketing mix modeling can be successful only if accurate and highly specific data are available upon which the modeling can be based. The greatest barrier to successful modeling is always a lack of relevant, specific, accurate data. So, the first step in any modeling effort is designing the data warehouse that will support the modeling. The next step is collecting and cleaning all of the historical data and entering it into the data warehouse, and then cleaning and entering new data on a continuing basis. Clean, accurate, highly specific data is absolutely essential to successful modeling. The data must be specific to individual brands and product lines, not the company as a whole. Attempting to model at the corporate (or aggregate) level rarely works because what's going on in one part of the company is canceling out or confounding what is going on elsewhere in the company. Here are some types of data to consider when developing the data warehouse:

- **Economic data.** Employment and unemployment, discretionary income, inflation rates, gross domestic product, interest rates, energy costs, etc. An understanding of the effects of general economic variables is vital to building sound models.
- **Industry data.** What are the trends in the specific industry? Is the market for the product or service growing? What is the rate of growth? Is international

trade affecting the industry? Are important geographic differences evident within the industry?

- **Product category data.** What are the trends in the specific product category? For example, is the refrigerated soy milk category growing? At what rate? How does this growth vary by geographic region? What are the trends by brand?
- **Product lines and SKUs (Stock Keeping Units).** What is the history of each major brand within the category? What new products or new SKUs have been introduced, and when, for each major brand? What is the history of private label brands and SKUs in the category?
- **Pricing data.** A history of average prices for each SKU in the category is essential. Pricing is almost always an important variable.
- **Distribution levels.** What is the history of distribution levels for each product and SKU? What is the quality of that distribution? Average number of shelf facings per SKU?
- **Retail depletions.** It's essential to have a clean measure of sales to end-users, undistorted by fluctuations in inventories. Factory shipments are worthless for modeling purposes, in most instances. Retail take-away (or retail depletions) in dollars and in units (ounces, pounds, cases, etc.) is the most common measure of sales to consumers. The goal is to accurately measure sales to ultimate users (the people the marketing efforts are focused upon).
- **Advertising measures.** Money spent on media advertising is seldom useful by itself. The media advertising must be translated into television GRP (gross rating point) equivalents, or some other common "currency." That is, the print advertising, the radio advertising, the online advertising, etc. must all be converted into common units of measure (typically, television GRP equivalents). The money spent by specific media type

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(adjusted for comparative effectiveness) is another way of weighting media inputs as variables. All of this is apt to prove worthless, however, if copy-testing scores are not included for each of the ads. A media plan of 100 GRPs per week might have no effect if a weak commercial is run, but might have great effect if a terrific commercial is aired. Likewise, the exact media schedule is important, and the length of time each commercial is on the air must be considered because of wear-out effects.

- **Consumer promotion.** Consumer (or end-user) promotions come in many forms, but the primary characteristic of these promotions (as compared to advertising) is the immediacy of the effects. Promotions are designed to have powerful, short-term effects on sales. Temporary price reductions, cents-off coupons, and buy one/get one free are examples of common consumer promotions. These promotions must be understood, measured, and incorporated into the models. If not fully comprehended, the promotion effects could easily overwhelm the modeling effort.
- **Trade promotion.** These promotions usually take the form of discounts or allowances given to the trade in order to stage in-store promotions of some type (temporary price reductions, end-aisle displays, in-store signage, local advertising, and so on). Trade promotions must be fully understood and included within the models because of the sales fluctuations they cause. When the manufacturer offers one dollar off the price of each case for 30-days (a typical trade promotion), the retailer is very likely to take actions to increase sales of that brand.
- **Sales force effects.** Every company and industry are different, but the nature and strength of a company's sales force (and how it is organized, managed, and compensated) can create variables for the marketing models. Sales organizations tend to be very expensive, so it's generally worthwhile to try to include sales force variables within the models.

- **Service effects.** If services are an important part of the customer's experience in buying and/or using a product, then this variable must be measured and incorporated into the models. For example, if a new product must be installed by a service technician, then the interaction between customer and technician can be a major variable, and must be tracked with some type of customer satisfaction survey.

Depending on the industry and product category, other variables might come into play as well. Every company and every brand are unique, and identifying all of the relevant variables, figuring out how to measure them, and getting those variables into the data warehouse are the most difficult parts of establishing a successful modeling program. Most importantly, the data warehouse must be carefully maintained over time and constantly updated, because marketing modeling cannot be a one-time thing. The models must be calibrated and reweighted on a regular basis, at least once a year. Many companies hire one or more full-time employees devoted to tracking down relevant data, cleaning it, coding it, and getting it into the data warehouse. Often, the analytical firm guiding the modeling will place employees on-site to help insure that the data warehouse is properly maintained.

Remember, that the modeling must be specific to an individual brand (or narrow line of business), because what works for one brand or one company might not work for the next brand or the next company. As a company learns what drives its individual brands, commonalities are often found that make it easier, and less costly, to build marketing models for its other brands.

Here are some additional rules of thumb to guide the modeling work:

- **Beware of threshold effects.** Often a marketing input (print advertising, for instance) never reaches a measurable threshold and, therefore, does not show up as important in the models. But if the print advertising's budget had been slightly greater, perhaps it would have

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shown up as a meaningful variable (i.e., it would have reached the threshold of effectiveness).

- **Be sensitive to “lagged” effects.** Some marketing inputs have immediate effects, while the effects of other inputs are “lagged” (that is, occur over time or occur at a later point in time). For example, media advertising tends to have short-term effects on sales, as well as longer-term effects on sales.
- **Keep it simple (at least in the beginning).** Focus the modeling efforts on a limited number of major marketing variables (the big budget items). Don’t clutter up the models with a large number of trivial variables that complicate and confound the modeling work. Once the major variables are truly understood, then smaller variables can be explored.
- **Be realistic.** It may take several years of diligent effort before the marketing mix modeling begins to pay off. There are no instant cures or short-term solutions. It is hard work, trial and error, and a long-term search for marketing truth.
- **Seek top management commitment.** Involve the senior leadership of the corporation in the modeling effort, especially at the initial planning stages. Their understanding of the nitty-gritty details of the industry, the company, and the brands will help ensure the success of the modeling effort, and will encourage

the acceptance, dissemination, and use of the results.

Who should do the modeling work? Some large companies have internal modeling departments, but most companies will outsource the modeling and analytical work. The modelers, ideally, should have an in-depth understanding of marketing and marketing research, so that they really understand the complexities of the marketing variables they are trying to simulate. True, the model builders need statistical and mathematical skills, but without the marketing knowledge and marketing research experience, the modeling effort is not likely to be very successful.

Lastly, the issue of cost and ROME (return on modeling effort) must be considered. To set up and operate a comprehensive marketing mix modeling program can cost hundreds of thousands of dollars a year, or even millions per year for a large, multi-brand company. Does your organization have the stomach for that kind of ongoing investment? Will your company really use the results? Will senior management heed the findings? Will the learning be disseminated throughout the organization to improve strategic planning? Every company must ask itself these hard questions, but if the answers are positive, and the company is willing to pursue objective, scientific truth about its marketing efforts, then marketing mix modeling can lead to sustained, long-term sales growth and to improved profitability.



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