ISOLATING THE EFFECTS OF MEDIA-BASED PUBLIC RELATIONS ON SALES: OPTIMIZATION THROUGH MARKETING MIX MODELING

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Preface: “Which Half”

“Half the money I spend on advertising is wasted. The trouble is, I don’t know which half,” goes the adage attributed both to John Wanamaker, the turn-of-the century U.S. retailer, and Lord Leverhulme, the British industrialist and founder of Lever Brothers. Though they referred to “advertising,” Wanamaker and Leverhulme might just as easily substituted the terms “public relations,” “promotions” or any other form of marketing communication. From the time they made their statements until relatively recently, it was impossible to determine how – or even if – each contributed to overall marketing success. Today’s marketers, with the benefit of advanced mathematical methods along with new technologies for data-collection, data-warehousing and data-mining, are unraveling marketing’s mysteries to answer fundamental questions about business performance and sales. The discipline through which these answers are derived is known as “marketing mix modeling,” a technique that uses advanced statistical analysis to provide quantitative answers to marketing questions.

This paper defines marketing mix modeling, shares approaches for incorporating public relations’ results into the model – primarily through media content analysis – and provides a recent case study. While marketing mix modeling has become more common and more reliable in the past decade, relatively few cases integrate public relations. Among those few cases which do integrate public relations results, even fewer are available for public dissemination. We are fortunate in this paper to share a case study which reveals both the company and the brand.

Before entering into our discussion of marketing mix modeling and public relations, the authors would like to put marketing mix modeling, as outlined in this paper, into the broader framework of public relations practice. First, we recognize that media relations is only one aspect of the professional scope of public relations. For the purposes of this paper, references to “public relations” refer to “media-centric public relations.” Second, while public relations often resides within marketing organizations, the authors acknowledge that public relations serves many purposes beyond marketing. Third, while the paper seeks to explore how marketing public relations activities drive sales specifically, the modeling techniques presented here apply just as well to other business outcomes including membership drives, sponsorships, donations, enrollment, employee loyalty, and many other important measures of organizational performance.
Consistent with results found in other published accounts of marketing mix modeling that feature The Miller Brewing Company, AT&T and Procter & Gamble,¹ as well as the results found in many confidential and proprietary studies examples, our featured case study confirms what we PR professionals believe in our hearts to be true: PR is a most powerful marketing agent. What is more, public relations consistently surpasses the return-on-investment and relative selling-power of other MARCOM activities within the marketing mix, including those which command much larger budgets.

We in public relations share a responsibility to explore, understand and leverage the explicit as well as the implicit impact of PR as we strive to improve the overall business performance of our employers and our clients. As we do so, we elevate the esteem of our profession. Surely, the body of marketing and public relations knowledge must continue to grow by welcoming new and refined approaches similar to those presented here. For now, we are pleased to share the latest thinking and real-world examples of this exciting development for demonstrating and generating meaningful and quantifiable business results through media-focused public relations

Introduction: Proving – and Improving – PR Value

The easiest and most direct way to examine the connection between public relations and sales occurs in isolated situations where public relations is the sole form of marketing communication. Simply stated, when no competing marketing communication activity exists except public relations, one may reasonably infer that PR drives incremental sales.

For example, when a well-known New Jersey food brand celebrated the fiftieth anniversary of its pioneering brand of frozen dinner entrees, it did so with just a modest media relations campaign but neither advertising nor promotions. Within the anniversary month, there was a 40 percent sales boost in the overall frozen entree category and an even greater increase for the anniversary-celebrating brand. Because the media relations activity was the only marketing communication employed to support this campaign, the brand felt comfortable attributing the incremental sales to

the PR campaign. The case was made using a simple cross-tabulation of stories generated and sales during the corresponding months. While this example does not quantify causation or correlation, the marketing investment decision-makers were comfortable with the assumption which -- for them -- demonstrated a positive relationship between PR and sales.

Scientifically proven approaches to proving PR effectiveness - especially quantifying the impact of PR expenditure on business outcomes - have always been a challenging proposition. While media relations represents only one aspect of public relations, developments in the past decade have enabled PR departments and agencies to measure the impact of media coverage on the business results of an enterprise. The challenge of measuring direct impact on business results is complex and cannot be answered so easily when multiple sales-driving elements occur simultaneously. While direct comparisons can be made between two variables (e.g., between clip volume and sales in our example above), such simple equations do not reflect the influence other controlled (advertising, promotions, websites, etc.), semi-controlled (publicity, sponsorships and word-of-mouth, etc.) and uncontrolled factors (news, competitive marketing, the weather, etc.) may have on sales nor the relative impact of each factor. In this context, the essential questions are: (1) “how does the interaction of different controlled, semi-controlled and uncontrolled factors, including PR, drive sales” and (2) “how can PR be leveraged optimally within the marketing mix to propel incremental sales?”

According to Veronis Suhler Stevenson (VSS), a leading private equity firm dedicated to the information, education and media industries which published the Communications Industry Forecast covering the years 2003-2013, PR programs traditionally attract much lower levels of overall investment when compared with other forms of marketing and communication (on average, a fraction of one percent of all market investment goes towards PR). And yet, the competitive nature of business today requires that every performance-optimization opportunity be fully explored. As a result, the VSS findings point towards increasing levels of interest in public relations, the case for which would be accelerated by PR’s ability prove its power in efficiently driving business outcomes, either directly or in conjunction with other elements.

A growing collection of statistically validated evidence, one example of which is included here, makes for a credible and compelling proposition highlighting the value of media-focused public relations in a marketing communication environment. And yet, despite the urgent need for organizations to optimize their marketing resources across the entire portfolio – including
advertising, sales, promotion, digital, public relations and more – relatively few PR-focused marketing mix modeling cases are publicly available for further study. This paper examines marketing mix modeling and PR’s representation in such measurement. At the same time, this paper seeks to introduce, represent and add information to the body of knowledge which clearly demonstrates the business case for public relations within an organization’s marketing portfolio.

**Presenting Marketing Mix Modeling**

Since the late 1990s, in cases of simultaneous and parallel marketing communication campaigns, leading marketers have adopted marketing mix modeling to understand and fully leverage the effect of individual and integrated marketplace activities on business results, including sales and profitability. While the analytical technique is most commonly applied to those marketing activities with the highest levels of expenditure, such as television advertising, trade marketing and price promotions, the technique applies very well to public relations tactics such as media relations, event sponsorships and social media.

Marketing mix modeling is a technique that draws market-shaping data from disparate sources, applies advanced statistical analysis and provides insights into the efficiency and effectiveness of ongoing marketing programs. Using traditional variables including sales, advertising Gross Rating Points or the content analysis of news coverage to represent PR in the form of media relations results, researchers examine the data to create more complete views of the marketplace and to estimate the impact on sales. Given an understanding of what drives sales, it becomes possible to explain past results and influence future sales. Furthermore, by taking each marketing communication expenditure into account, brands can empirically determine the best budget allocation from among their different marketing investment options. The importance of knowing in advance what factors, or combination of factors, drive sales, and their relative efficiency in doing so, promises to answer important questions such as the one posed by John Wanamaker and Lord Leverhulme.

Based on its underlying use of multivariate statistics and regression analysis, marketing mix modeling seeks to quantify the impact of any individual marketing activity on sales volume. At the same time, the model accounts for the effects of concurrent controllable (e.g., advertising, pricing), semi-controllable (e.g., public relations, sponsorships) and uncontrollable external factors (e.g., seasonality, competitor activities) to quantify the relative and absolute returns of
each of the various marketing activities. Beyond reflecting just the returns on historical marketing investments, this approach enables one to forecast the potential revenue effects of individual factors by running “what if” scenarios. For example, “what if PR spending were adjusted in relation to other marketing variables like advertising or direct marketing activities?” This allows brands to empirically determine the best budget allocation from among their different marketing options. Armed with a higher level of intelligence and understanding of what works, decision-makers can devote their marketing dollars to the areas showing the greatest likelihood for positive impact on sales.

It should be noted here that while PR professionals (or advertising and promotions professionals) may have a vested interest in “proving the ROI” of their individual contributions, the models are typically applied in an interdisciplinary fashion to show overall effects. As such, marketing mix modeling analysts seek not to promote the success of individual elements as much as to understand the interrelationship of a variety of elements and their ability to enhance or detract from one another.

**What is a Marketing Mix Model?**

As an analytical approach that identifies and quantifies the marketing elements that impact marketplace behavior (e.g., sales, donations or votes), marketing mix models use multiple regression analysis: a statistical procedure that relates changes in the marketing mix and in base factors to changes in unit-sales and to revenue measured in short time intervals. This measurement will occur ideally on a weekly basis, but depending on data availability, monthly data also works. The models mathematically explain historical results and help predict future outcomes by focusing on probabilities and trends based on a number of variable factors that are believed to influence future behavior or results. By observing sales by market area, and the presence or absence of each marketing activity affecting sales, the relative contribution of each factor can be better estimated, isolated and refined. Beyond assessing and forecasting, the models are used to help make decisions about the allocation of marketing investments based on the relative ROI of each marketing communication activity and their potential for positive interaction within the model.
Typically, marketing mix models answer such questions as:

- How much does each marketing activity add (or detract from) to sales?
- What is the ROI of each marketing driver?
- Which marketing tactics increase volume and profit?
- Does customer response vary over time?
- Are there synergistic effects across the marketing plan?
- How can ROI be sustained over the long term?
- How should marketing budgets be allocated?
- How does the effectiveness of each marketing variable accelerate or diminish over time?
- What are the effects of competitive marketing activities and of other “uncontrolled” factors on sales?

Public Relations and Marketing Mix Modeling

In public relations, statistical models can be used to uncover the effects of PR practices such as media relations, event sponsorships and social media campaigns on business and behavioral outcomes as well as their interaction with other marketing communication activities. Applicable to both traditional and non-traditional media, aggregating the data into streams consistent with other variables in the model (e.g., reach and frequency) is the key to bringing PR into the mix.

A marketing mix model usually analyzes key independent variables, such as the frequency and reach of television ads, two-for-one promotions or media coverage that could positively or negatively affect a dependent variable such as sales volume, revenue and other business outcomes.

For the development of a statistical model, historical time series data of these independent (predictor) variables and the dependent variable – normally sales data – are analyzed. The changes in the sales volume over the course of time should be predicted by regression modeling as closely as possible to identify the predictor variables which best explain the change, based on the assumption that there is a linear relationship between the predictor variables and the
dependent variable. Consequently the relative ROI of PR’s contribution on a campaign-by-campaign basis is determined.

Figure 1: Total Sales, as represented by the Y-axis in the diagram above, are shown over time as represented by the X Axis. Sales are driven by many factors, some of which are marketing-driven. Some sales occur “organically” and are immune to marketing (Base Sales in blue), while other sales are attributed to marketing activities (in this example, incremental sales are assigned to trade marketing, mass-market TV advertising and PR). MMM uncovers the degree to which marketing elements propel – or detract from – overall sales and to what degree. The vertical bars represent the quality and quantity of media coverage. Copyright: Mark Weiner. (2006). *Unleashing the Power of PR: A Contrarian’s Guide to Marketing and Communication*. New York: John Wiley & Sons.

Subsequent testing and analysis of the regression model determines the influence of public relations activities (along with many other marketing variables) on sales volume. Further study is undertaken to reveal the sales impact by market, by media type, by campaign and by other elements within the PR mix. Marketing mix models thus enable marketing decision-makers to better understand PR’s contribution relative to other forms of marketing and to adjust spending among a variety of marketing options. For the PR professional, the analysis promotes a more focused approach to tactical planning and execution by applying resources against those elements most likely to obtain the best results. In this way, marketing mix modeling goes beyond evaluation to encourage more intelligent decision-making, i.e., “public relations optimization.”
Marketing Mix Modeling: A Step-by-Step Guide

The following is a step-by-step guide explaining the process of marketing mix modeling:

**Step One:** Determine how the dependent variable (e.g., sales volume) and the independent variables (positive and negative media coverage, for example) are collected in terms of frequency and reach, and organized by geographic region. Accurate and consistent data are essential. The model will not produce valid results without valid inputs, hence the first step is vital. In cases where media-relations focused PR programs generate insufficient levels of coverage across enough markets or where data are otherwise lacking, modeling may be difficult.

To provide a solid foundation, data must conform to the following specifications:

- Two or three years of historical media coverage data – along with comparable data on other marketing activities – are required at the beginning of the modeling process to understand the shape of the data and to add reliability for a stable modeling process. If possible, a calendar of important events and campaigns along with competitive coverage helps enrich the analysis. Most of the data are usually available within the company, but in cases of potential relevance additional data sources may be integrated. For example, reliable economic market data can be added to help explain external market forces such as the macroeconomic trends. If time-periods of media coverage data are missing, retrospective searches may be conducted using on- and off-line sources.
- The geographic markets from which the media coverage data are drawn should match the markets tracked for advertising and other marketing activities.
- Data must show a time interval consistent with advertising and other marketing activities, typically on a weekly basis.
- Data must be cleaned before developing the model. The data should be specific and narrowly framed, relating to just the brand, for example, as opposed to the corporation as a whole or other passing, irrelevant mentions.

Given these specifications, and for the purposes of continuity and consistency, the most practical and most common representation for public relations in marketing mix modeling is media coverage and the best data is derived from media content analysis.
**Step Two:** Select an approach to collect data representing media coverage that best represents the quantity and quality of coverage. The key is to produce PR data with the same level of granularity and frequency as the sales data as follows:

- Traditional media in terms of quantity, quality and impact.
  - Quantity: reach and frequency (identical to Gross Rating Points, a common metric for planning and evaluating “controlled” forms of marketing noted earlier).
  - Quality: tone and key message presentations (unique to PR).
  - Impact: news-item attributes such as headline mention, visuals, exclusivity, prominence and initial mention (similar to factors addressed through advertising copy testing).
- Key social media data collected in a fashion which closely mirrors traditional media (volume, tone, presence of key messages, impact indicators as collected from blogs, Twitter, etc.).

**Step Three:** Create the marketing mix model. This can be done internally by an in-house market analytics group or by an outside marketing mix modeling consultant.

- The resulting regression model will predict the value of the dependent target variable (e.g., sales) given known values of the independent input variables (e.g., frequency, reach or money spent on media-focused PR). Coefficients in the regression equation describe the relative impact of each marketing activity while holding the effects of the other independent variables constant.
- Until the final data model is defined, a high number of different alternatives are tested iteratively to optimize the model and to prove consistency with regards to content.

**Step Four:** Refine the model

- Before application, the data model has to be validated by a set of statistical tests to determine the reliability and goodness of fit of the model. $R^2$ is one of the most important parameters, as it shows what percentage of the variance of the target variable explained by the model.
- Validation of the model’s predictive capability is accomplished using a hold-out data set. For example, assume that 36 months of data are available. Analysts develop the final model based on 27 months of data, and then use the formula of the final model to forecast the dependent variable over the final nine months (the hold-out sample) to validate the model. Again, the $R^2$ is a good metric for final evaluation of the model.
- Once a model has been built and successfully tested, the input variables (the quantity, quality and impact measures mentioned in Step Two) can be manipulated to create “what-if”

scenarios, and to help determine how variations related to programming or spending can produce the optimal effect on a brand’s sales.

- Normally a valid data model contains five to 15 significant variables which best explain the change in the target variable. If the testing of the model provides insufficient results, the model possibly misses another variable, more detailed data or simply more data.

Challenges and Limitations

While marketing mix models provide guidance for the allocation of resources within integrated marketing campaigns, marketing mix models are not a panacea. Challenges and limitations should be factored into any modeling initiative before making serious decisions and investments.

- It is important to keep in mind that the inclusion of public relations-driven media results in marketing mix models is relatively uncommon. This poses a dual challenge. First, most PR professionals are unfamiliar with modeling and other forms of statistical analyses. Second, most modelers are unfamiliar with all of public relations’ roles and responsibilities and, in particular, its unique role within the marketing communication mix. For example, while certain marketing and communication activities may work better than others, “sales-stifling negative news” has no analog in traditional marketing communication and is very rarely factored into models.

- Models almost never explain every factor driving sales. Variables not entered into the model can result in lower levels of accuracy. For example, if a soft-drink manufacturer neglected to include data representing seasonal heat-waves, a local surge in sales may not be explained through the analysis.

- Typically, other forms of marketing communication – principally mass-market advertising and sales promotions – have larger budgets than public relations. In such situations, it may be difficult to isolate changes in sales due to PR activity because PR is simply overwhelmed.

- Traditionally, modelers tend to focus on short-term rather than long-term results, principally because the marketing elements they track – e.g., price promotions – tend to work best in the short-term. As such, long-term sales building power of initiatives such as customer service training and public relations can be greatly under-represented among equity building activities.

- Tactics which drive positive effects in the short term do not necessarily build long-term brand equity. Sales promotions, in the form of three-for-one offers, for example, may drive sales in the short term while hurting profitability or brand equity in the longer term. Since marketing
mix modeling tracks both short as well as long-term effects, the data is available to modelers and marketers and they will begin to appreciate the impact of both.

- Each model has to be developed individually related to the specific situation, targets and industry of every company.
- Marketing mix modeling tends to work best in categories where the volume of transactions is high and localized, thus explaining the popularity of modeling in categories such as consumer packaged goods, retail and services like tourism or telecommunications rather than business-to-business categories such as jet engines and hydro-electric generator sales.
- To learn more about marketing mix modeling within your organization, inquire about ways to collaborate with professionals in marketing and market research departments. Generally speaking, the modelers are eager to incorporate supplemental data which enhances the validity of the model by reducing unexplained variance due to unknown factors. PR departments rarely lead the marketing mix process; begin the quest yourself as most market mix modelers do not know enough about PR to seek you out.

Case Studies

In published cases, including ATT, Miller Brewing Company and Procter & Gamble, as well as many more cases which remain confidential, examples from categories as diverse as movie tickets, financial services and automobiles, as well as traditional and on-line retailing, marketing mix modeling proves that media-focused public relations is capable of delivering ROI as well as or better than any other element tested through marketing mix evaluation. Part of the value of public relations comes from its low cost compared to the costs of other marketing communication activities. On a cost-per-impact basis, higher-cost advertising or price promotions find themselves competing unfavorably with public relations and other relatively economical alternatives. As demonstrated in the published cases cited earlier in this paragraph along with the new Center Parcs Europe case study shared here, PR generates returns ranging from 300% to 800%.

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A New Case Study: Center Parcs Europe Group

Ketchum Pleon, Europe’s largest public relations agency, partnered in Germany with the brand and communication consultancy BrandScience for the Performedia project to develop a marketing mix model for Center Parcs, one of Europe’s leading providers of short family holidays. The aim of the project was to examine the extent to which revenues, in this case holiday bookings, are affected by public relations as measured against other means of integrated marketing communication activities.

Every year, more than three million visitors spend a short holiday at a Center Parcs village. Center Parcs operates 13 locations in Germany, the Netherlands, Belgium and France. The company’s economic success depends on how well the company is known within the relevant target groups of loyal visitors, both current as well as potential customers. Accordingly, the marketing communication activities of Center Parcs are regarded as highly significant.

All of Center Parcs’ marketing communication activities aim at enhancing the brand awareness of its holiday parks in order to increase the number of bookings and the resulting revenues. As such, number-of-bookings is a key measurement criterion for determining the success of marketing communications -- as well as overall business success. Within the marketing mix, Center Parcs sought to isolate and quantify the contribution of public relations specifically by measuring the impact of media coverage on this important business outcome.

For the pilot test study, weekly data representing market conditions, marketing results and competitor activities were gathered retrospectively for 2005 through 2007, then aggregated into consistent data streams and finally integrated into a multiple linear regression analysis. In theory, the model should predict the actual history of the number of holiday bookings as closely as possible. From nearly 1,000 variables, the following factors were identified as contributing most significantly to the target variable of overall bookings:

- Controllable marketing variables such as TV and print advertising, pricing, direct mailings and catalog distribution.
- Semi-controllable variables such as public relations and media coverage including volume and reach of coverage.
- Uncontrollable market conditions, such as weather, holiday times and competitor advertising.
The Performedia model revealed that the number of bookings strongly matched observed bookings with an $R^2$ (a measure of goodness of fit) of 0.86, meaning that the model explains 86 percent of the variance. When examining controllable, semi-controllable and uncontrollable variables, 10 percent of bookings were attributed to the influence of messages in mass media: seven percent from advertising in television and magazines and three percent from news coverage in all media.

Equally remarkable was the slow decay rate of media coverage. Whereas the impact of print advertising decreased after one week, the influence of public relations -- in this case editorial coverage -- was shown to last for as long as 13 weeks.
Furthermore, by incorporating the respective budgets into the model, it was possible to determine the return on investment for each marketing element within the mix. In comparing the individual marketing elements, public relations was the most cost-effective. In terms of ROI, media-focused public relations delivered returns five times greater than television advertising and three times greater than print advertising.

![Figure 6. PR’s return on investment compared to TV advertising](image)

Among many possible applications, Center Parcs used the marketing mix model to forecast how the number of bookings would be affected by the adjustment of single marketing parameters, enabling the testing of multiple scenarios. For example, Center Parcs was able to determine that if it doubled its media impressions, the number of bookings would merely increase about five percent because of a marginal utility effect, which meant that PR activities are currently being implemented in a way that is close to ideal. On the other hand, however, without any editorial coverage, the number of bookings would decrease substantially by approximately 16% within the first year, resulting in a loss in sales in the tens of millions of Euros.

Finally, Center Parcs’ analysis of the marketing mix model demonstrated that the most significant variable in determining booking volume was *strong brand value*, supported over the long term by strong brand image attributes such as *sympathy, brand awareness* and *familiarity with Center Parcs offerings*, which drove 34% share of bookings in the model. The company therefore
decided to invest in the continuing reinforcement of its brand by reinforcing these themes in its marketing and public relations initiatives.

**Conclusion**

As new approaches and more powerful technologies become available, the marketer’s ability to properly assess and accurately forecast business performance will continue to increase. In this new environment, marketing-investment decision-makers have the right to, and a reasonable expectation of, proof. If you are working within an organization that employs marketing mix modeling, an opportunity to quantitatively demonstrate PR value to the organization may be available. As a result of new insights which credibly and quantitatively demonstrate higher returns for media-focused public relations within the marketing mix, experience shows and common sense dictate that resources be invested in “what works best” rather than “what we’ve always done.” Such a direction bodes well for public relations and less well for mass-market advertising and price promotions. This is not to suggest that public relations “competes” with other forms of marketing; in fact, research has shown – with the ATT study referenced earlier offering a specific public example – that a unique benefit of public relations is its ability to elevate the performance of other forms of marketing, including advertising and promotions.

In the case of Center Parcs Europe, as in many other cases, public relations delivered among the best returns-on-investment of anything tested. And yet, funding for PR remains relatively small by comparison, averaging less than one-half of one percent of the total marketing spend in most organizations. But as the day approaches when each marketing communication function will be judged on its ability to deliver value, efficiency and efficacy, those consuming the greatest resources will feel the most pressure first. On the basis of relative spending, public relations may seem like a lower priority, but in terms of ROI models repeatedly demonstrate PR’s ability to deliver superior returns (on its own and on behalf of other forms of marketing).

Public relations has a great deal to gain in this new environment, but the opportunity comes with a demand for accountability. To achieve a higher level of acceptance, especially within the C-suite, PR departments must change the way they work. Marketing success will be contingent upon PR’s *willingness* (as opposed to *ability*) to work in an integrated fashion with other marketing activities, especially since public relations has the potential – and therefore the *responsibility* – to elevate all forms of marketing. Also, success will be contingent upon the use
of proven PR research and measurement methods in conjunction with accepted statistical
techniques to demonstrate a positive and meaningful ROI. In the new environment, investment
and marketing decisions will follow modeling results which focus on “what drives results” rather
than on intuition, speculation, or outmoded ideas of “what we’ve always done.”

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