Proceedings of the 2018 Winter Simulation Conference
M. Rabe, A.A. Juan, N. Mustafee, A. Skoogh, S. Jain, and B. Johansson, eds.

AGENT BASED SIMULATION MARKETING MIX MODEL FOR BUDGET MANAGEMENT IN COSMETIC INDUSTRY

Francisco Lonardi
Brian Erik Ovrum
Mateo Roberto Dennehy
Patricio Ivan Pipp

Accenture Digital
Migueletes 2423,
Belgrano, C1428ASM,
Caba, ARGENTINA

ABSTRACT

A worldwide leading company in the cosmetic industry was dealing with great challenges regarding adapting its positioning strategy to the dynamically changing behaviors of the market. The company needed to decide where to invest its marketing budget to optimize its revenue and was using different traditional marketing mix models without any success. A marketing mix model was developed using agent-based modeling to predict the market's reaction to a given distribution of a certain budget among the different touchpoints available. This innovative model uses market information and consumer information collected from surveys to estimate the company's sales, level of awareness and level of consideration given its distributed investment. The tool was implemented as part of the marketing plan decision making process, providing the ability to test different scenarios and generate quantitative analysis of its results.

1 INTRODUCTION

The world is changing with the new technologies available, and so are the markets. Dealing with these changes is the most difficult challenge that every enterprise has nowadays. Companies invest more money every year in marketing efforts, without accurate measures of their effectiveness on the customers. But not only the touchpoints were renewed, also the marketplace. Online shopping is an effective and cheap way to deliver products and it is highly used in almost every product-based company.

The appearance of social networks as a brand-new marketing channel made the companies invest lots of money on these platforms only to be a part of this new world, not to be kept aside. Despite the social networks improved drastically the targeting of every campaign and started to provide hard data-driven techniques to add value to the marketing process, they are still channels that are very difficult to manage. Nowadays there is a huge variety of different social networks to put the marketing budget on, but also there are different ways of investing on them. Although social networks are important, as in an investment portfolio, companies need to diversify. There is still a wide variety of channels to get to customers and is vital to explode them all at their full potential.

2 SIMULATION MODEL

AdSim is an agent-based Marketing Mix Model developed in the Anylogic platform and applied to Cosmetics Industry. Its main goal is to estimate the Return Over Investment (ROI) of the marketing budget of the company in study by predicting customers' reaction to marketing efforts. The user selects for its brand the budget per touchpoint, the time frame of that budget and the amount of iterations the model will

do to get statistically representative results. The model uses inputs from surveys made specifically to this purpose to parametrize the market. Every consumer on the survey is simulated in the model with its own parameters and characteristics. The results are affected at the end of the model by a scaling parameter to reflect the actual size of the market. As some of the processes within the model are stochastic, to ensure statistical representativeness, the model is ran many times with the same parameters. The output results in the distribution of the variables measured. To calculate ROI, investment effects must be isolated. For this purpose, a set of iterations is ran with no investments made by the user's brand. The main assumption taken is that the competitors' investments will remain the same.

Every customer in the survey is represented by an agent, with its decision process embedded. Consumers go through a cycle between using a product, informing themselves about the product in the market, forming an opinion on every brand and buying the product.

For every brand, each consumer has a valuation of its main attributes. This valuation is dynamic, and changes throughout the consumer decision making process. The attribute focus per touchpoint is a parameter that estimates the influence of an investment in the corresponding touchpoint in some attribute. While informing and forming opinion, each consumer reviews the values of every attribute on each brand. At this point, attributes change by three different processes:

1. Aging process decreases every attribute at a certain rate, and simulates the consumer forgetting in some point his image of every brand. This process is always about decreasing every attribute value.
2. The absolute investment effect increases every attribute value for a certain brand according to the attribute focus per touchpoint when that brand is investing in a touchpoint that results relevant to the consumer in sight. This increase is proportional to the amount of that investment.
3. The relative investment effect increases or decreases the attribute value for a certain brand depending on the investment made by that brand versus the average of the whole market on every specific touchpoint. This effect happens only on touchpoints the consumer in sight considers relevant.

The developed model solves the problem of quantifying the Word of Mouth Effect (WOM) and the Social Network Effect, that traditional marketing mix models can't consider. For this purpose, the model uses cyclic transitions within internal state charts of every consumer. When simulating the WOM, pairs of consumers randomly meet and share their attribute values for every brand. After the encounter, both consumers change their attributes by mixing their original values with the ones from the other consumer by a certain rate. The Social Networks effect does something like the Word of Mouth effect, but the consumers change their attributes when they interact with the brands and influencers they follow in the Social Networks they use. Based on the individual opinion frequency, the consumers are also capable of posting something about a brand in a Social Network. The last part of the consumer cycle is the action of buying. Every consumer has its own purchase quantity and buying frequency. At this point, the consumer selects which brand to buy. This decision is made by considering regular, used, considered and familiar brands. Forming part of every one of these groups gives a certain weight to a brand. For every one of these brands, the consumer also computes every attribute weighted by its importance. The brands are then sorted by its punctuation and the best three are the candidates for a weighted stochastic selection for the purchase.

3 RESULTS AND BENEFITS

After considering different scenarios with the same total budget, the company could extract some important conclusions. By distributing the budget in a different way, the ROI indicator could rise by almost 6 percentage points, generally due to better segment targeting and investment focalization.

In conclusion, a highly innovative marketing mix model was developed using agent-based simulation. A model capable of estimating the effect of the marketing investment in the sales of the company and their attributes on the consumers' minds, considering direct investing, WOM and interactions in social networks.