



# Markdown Optimization

White Paper

*A customized analytical approach to aid markdown planning*



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[www.mu-sigma.com](http://www.mu-sigma.com)

## Introduction

Markdown Optimization aims at determining the most profitable timing and depth of markdowns for identified product at select stores or regions.

Historically, the process of determining markdown timings and clearance pricing has been driven by a merchant's intuition and anecdotal experience about the competition and consumers. Today, razor-thin margins, value driven customers, increased merchandizing complexity, volatile product lives and fierce competition have created an environment where markdowns and promotions are essential to maximize returns from seasonal and end-of-life merchandise. Price-cutting, while necessary in some circumstances to remain competitive, if sub-optimally forecasted can result in significant losses for a retailer. It is absolutely required to accurately estimate consumer demand and help retailers plan successful campaigns by clearly understanding the following:

- Which items should be marked down?
- How much should they be marked down by?
- When should the items be marked down?

## Challenges in the traditional approach

1. Lack of adequate manpower and time to achieve an optimum mix in pricing and promotional activities
2. "Gut-feel" based pricing fails to account for product, customer and market-level dynamics



Figure 1: A pictorial view of the traditional markdown process

## Mu Sigma solution to optimize markdowns

The Mu Sigma approach to achieving successful markdown optimization involves master data management, application of business rules and process definition.

The fundamental principle before optimizing markdowns is an analysis of historical sales patterns, inventory behavior and customer response to promotions and earlier markdowns. Other causal factors along with seasonality, product co-purchase behavior, marketing events should also be thoroughly examined.

This analysis is necessary to understand and give shape to the price elasticity relationships and revenue function. A non-linear forecasting model is built to predict demand and is fused with the price elasticity and revenue function to generate the objective function, which is used to maximize revenue when defining the optimization process.

Constraints are to be applied to the optimization engine, based on price, stock available, category-specific rules and number of markdowns. This step helps obtain the combination of variables that result in generating maximum revenue.

Further, advanced techniques such as Monte Carlo simulation can be used to mitigate risks and test the likelihood of achieving the financial objective based on various price levels, prior to implementing a markdown decision.



Figure 2: An overview of the markdown optimization solution

As a final step, after the decision is actualized, sales and inventory are must be periodically measured against the initial plan. This allows for any markdown adjustments required to keep the sales campaign on track.

## Mu Sigma solution to optimize markdowns

Unlike most tools that are available in the market, Mu Sigma's approach offers two main advantages:

1. Customized models are developed based on the retailer's data, instead of using average models depicting the overall market scenario
2. A cost-benefit solution to department/store managers who are looking to clear inventory sporadically

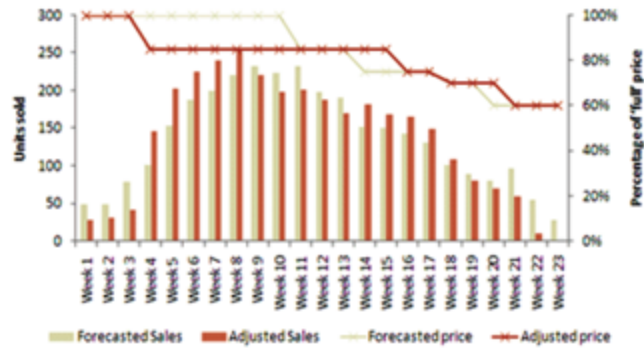


Figure 3: Adjusting markdowns based on developing sales trends

## About Mu Sigma:

Mu Sigma helps clients institutionalize analytics in their organizations using global delivery. We are headquartered in Chicago, USA with a delivery center in Bangalore, India. Mu Sigma's scientific community, which consists of practitioners from leading educational institutions in the United States and India, enable us to deploy cutting edge analytics for our clients. Our best-in-class processes leverage expertise in statistics and econometrics in the areas of marketing, risk and supply chain. The techniques our professionals use range from conventional statistical and operations research techniques to advanced artificial intelligence techniques.