



# Consumer Pattern Analysis

How to Increase Profit in Retail Supply Chain  
& Merchandising Functions



PART 1 OF 3

Understanding the consumer is vital.

*To thrive in these challenging retail environments, let alone effectively compete, retailers must better understand consumers.*



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Profit Optimizing Retail

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An English poet named Samuel Taylor Coleridge wrote a famous line in his lyrical ballad, "The Rime of the Ancient Mariner." The line is "Water, water everywhere, nor any drop to drink." In the ballad, there is a crew of sailors facing death and they are surrounded by the sea, yet they can't drink any of it.

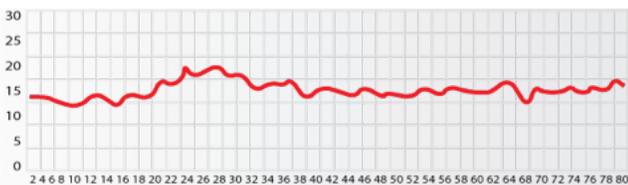
Like sailors at sea, retailers also find themselves surrounded by something they often cannot use: data.

Retailers are surrounded by data but often times struggle to find valuable ways to utilize it. There is actually so much data available, retailers are literally swimming in it. Using traditional methods has become somewhat ineffective and difficult given the vast amount of information which needs to be analyzed. The challenge is two-fold: Knowing which data is worth analyzing, and how to practically use the results to make more profitable decisions.

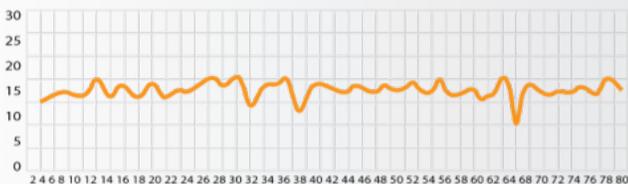
Luckily, there's well-developed technology available that uses machine learning and predictive analytics. These new capabilities allow retailers to gain more insight into consumer behavior and also help retailers decide how to react to these new insights.

In order for data to be useful, we need to find the underlying patterns describing consumer behavior. Traditional methods have had limited financial benefits over the years. They allowed us to find easier patterns existing in the data, such as seasonality, price sensitivity and promotion sensitivity.

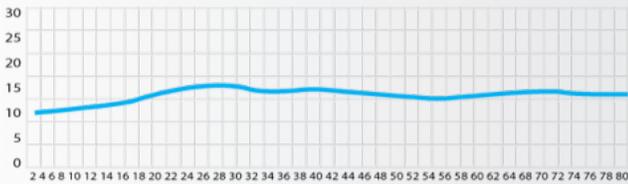
However, to truly understand the consumer, we need to take a deeper dive beyond these obvious patterns and take a look below the surface. Data science and machine learning are the key to making data useful in finding patterns.



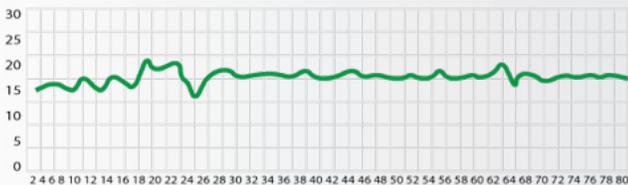
← Raw consumer demand pattern



← Explainable patterns (Price, Promotion, Seasonality, Substitutability, etc.)



← Baseline demand pattern



← Remaining variation: Typically unexplained or called "error". This is where the real patterns can be found.

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## DATA ANALYSIS

### The Underlying Pattern Approach to Explaining Consumer Behavior & Creating Operational Strategies

Anyone who has looked at retail data has seen the graph below. The data seems very random and lacks insight. Typically, the first thing most people do when analyzing their information is try to understand the simplest patterns first. In essence, they will play around with promotions, price sensitivity, seasonal products, and more to see what information they can glean.

Ultimately, what people want is a baseline demand pattern. The goal is to get the raw demand data and smooth it out so it is easier to predict. However, with these methods, there is always still a remaining variation. Typically, it is the bit of data that doesn't fit with the other data and is therefore considered unexplained or "error."

In this unexplained data, the real patterns can be found in terms of understanding the consumer. Analyzing this unexplained data has always been a challenge for retailers. With today's tools and technology, it is possible to analyze and interpret the unexplained data and to gain useful insight for creating operational strategies. Retailers that have embraced new technologies are making huge profits compared to their peers.

### Examples of Buried Patterns

There are two main patterns that show the effectiveness of machine learning and advanced analytics algorithms. One is multi-unit sales (i.e. sales correlation to in-stock position). The second involves assortment optimization. To break these down further, it is helpful to look at real world examples.

Every retailer has some items which sell in multiple units or in combination with each other. For example, if you were to shop for dinner plates, you will typically end up buying more than one plate at a time. If a retailer only has one in stock, this would clearly not be enough to meet demand as most consumers don't buy a single plate.

Another example would be jewelry. Let's say someone is looking at a nice pair of earrings, but there was not a matching necklace or bracelet to go along with them in the same location. The retailer would most likely miss out on the sale altogether because the entire set was not there. The examples of the plates and jewelry relate to multi-unit sales patterns.



# Assortment optimization is the concept that there are demand patterns that exist below the data in item attributes.

Assortment optimization is the concept that there are demand patterns that exist below the data in item attributes. If you take all the items that are sold and break them down to the attribute level, you will face the question: what does the customer think about when they are buying each product?

For example, it could be color, flavor, size, or other attributes. Assortment optimization is all about pulling apart these attributes to further understand what is going through the consumers head when they buy each product.

If you have the data at an attribute level, you can start to understand something known as demand transference. If you have two items that are identical in attributes and you remove one, you may end up with very little loss in sales. However, there are products where this isn't the case. It is important to know this information and understand if you are losing demand and where the demand is being lost.

Retailers who analyze demand patterns and then adjust assortments accordingly will not only survive, but will increase profit in the process.

*What does the customer think about when they are buying a product?*

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