

White Paper

Reaping the Rewards of Sub-SKU Forecasting

Disaggregating forecasts by product and market attributes creates powerful synergies between demand and supply planning

Executive Summary

Demand planning, sourcing, supply and production planning all perform better when demand is disaggregated from a high-level forecast down to accurate, granular, sub-SKU forecasts as early as possible in the product life cycle.

For most companies, sub-SKU forecasting [the task of translating high-level forecasts into specific quantities by size, color, configuration, etc.] falls on the shoulders of the sourcing and supply functions rather than the demand planners.

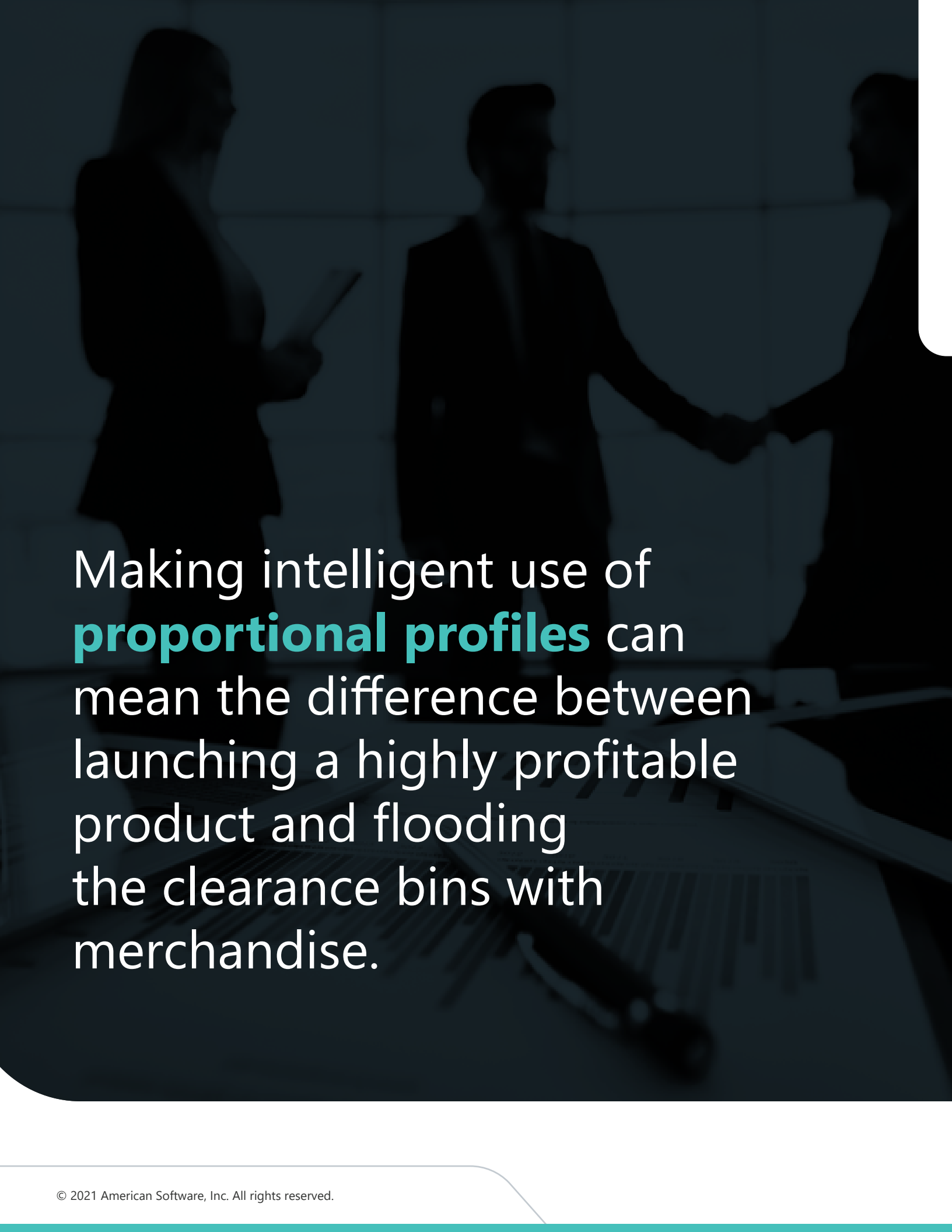
How can planners use proportional profiling to hand off more accurate, detailed demand plans to their sourcing and supply planning teams? Recent advancements in demand planning technology now provide enough flexibility and power to let forecasters create accurate profiles and groupings for thousands or tens of thousands of sub-SKUs.

This paper presents four powerful techniques that can remove the aggravation from disaggregation:

- 1** Extend demand planning to the sub-SKU level [plan high, source low] using existing sales history data to automatically generate profiles.
- 2** Adopt a solution that can scale to handle any number of sub-SKUs and attribute tiers.
- 3** Develop the ability to forecast by attribute early in the planning cycle, so that SKU-level forecasting is part of up-front demand planning, not left until the supply/sourcing plans are created.
- 4** Create proportional profiles, not just for every important sub-SKU, but also for each stage of the product life cycle, so that inventory matches business goals from launch to retirement.

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The background of the slide features a dark, low-key photograph of three people in business attire. On the left, a woman stands holding a clipboard. In the center, a man stands with his arms slightly outstretched. On the right, another person is partially visible, shaking hands with the man in the center. The scene suggests a professional agreement or partnership. The text is overlaid on the lower half of this image.

Making intelligent use of **proportional profiles** can mean the difference between launching a highly profitable product and flooding the clearance bins with merchandise.



Proportional Profile Planning Spans Industries

Sub-SKU forecasts based on attributes are called proportional profiles. Apparel manufacturers are certainly familiar with the challenges of multi-tier demand disaggregation. They commonly use profiles such as size curves to derive SKU-level and sub-SKU forecasts for all styles and colors of an item.

Many other industries also create unconstrained demand plans at the category or product level, but have insufficient resources to break the plans into accurate proportional profiles based on attributes such as finish, style, color, size, gender, region, speed, power, material type, trim level, configuration, and more. From storage capacity options in laptop computers to diameters of PVC pipe, from blade sizes on ceiling fans to flavors of chewing gum, proportional profiles have a major impact on efficient sourcing, and meeting the actual demand signal throughout the product life cycle.

Proportional Profiles are sub-SKU forecasts based on product or market attributes.

There are several reasons why disaggregating high-level demand plans into granular forecasts has traditionally been fraught with difficulty:

- The aggregated demand plan explodes into a SKU-level forecast with orders-of-magnitude greater complexity when product attributes such as color, size, configuration and others are taken into account.
- Demand planners cannot manage each element individually, so the process of translating high-level forecasts down to SKU-level replenishment plans becomes unwieldy and inaccurate.
- Manually creating attribute-based profiles in Excel is time-consuming and difficult to perform well. Often, managing all items in all variants across all markets is simply too overwhelming to attempt.



Making intelligent use of proportional profiles can mean the difference between launching a highly profitable product and flooding the clearance bins with merchandise.

The Demand-to-Supply Transition

Demand aggregation and disaggregation are keys to creating the best possible forecast at all levels of granularity required to reconcile corporate [strategic] plans with operational [tactical] plans. In a demand aggregation hierarchy, the lower, larger levels represent demand for sub-components, while the higher, executive-friendly levels summarize demand by product family, group, region, etc.

High-level demand planning is more accurate. It is much easier to predict how many SUVs will be sold in North America this year than how many white Toyota Highlanders with a sunroof will be sold in Boston over Memorial Day weekend. The forecasting problem is exacerbated at granular levels due to multiple product and market attributes such as finish, style, color, size, gender, region, speed, power, material type, trim level, and configuration. A ceiling fan manufacturer may start with a base model that has several configurations for finish, color, speed, blade length, and lighting kit. Generally, the most accurate forecasts are achieved by disaggregating high-level demand down to tactical levels.

The demand-to-supply translation is crucial. While the demand plan should be unconstrained, supply planners and sourcing teams can be hurt by the fact that these groups have less knowledge of, and exposure to, the market. Ideally, demand planning and supply-side execution should be fully informed and free of conflict. In the real world, too often strategic planning and day-to-day tactical execution work on very different levels. Closing the gap between high-level forecasting and granular supply planning, sourcing, and production orders has been nearly impossible for most organizations, giving supply teams little insight regarding, for instance, how to best bump up order quantities to meet vendor minimums. These decisions are much smarter when made in the context of a finer-grained demand plan.

Proportional profile planning allows demand planners to work at a level of aggregation that matches their business requirements, while allocating the forecast accurately across product attributes and options at lower levels of aggregation before submitting to the supply-side team.

Because the number of products under management proliferates exponentially into attribute-based sub-SKUs, a proportional profile planning solution must handle an essentially unlimited number of SKUs.



Benefits of proportional profile planning include:

- Simplify the forecasting process.
- Increase forecast accuracy at a granular level.
- Efficiently manage a large number of SKUs.

Multiple hierarchies can aggregate different characteristics. C-level executives may want to see an aggregate forecast by customer, while distribution managers are interested in the demand plan by geographical region. Marketing teams may be focused on demand by model or style. Manufacturing needs replenishment planning details.

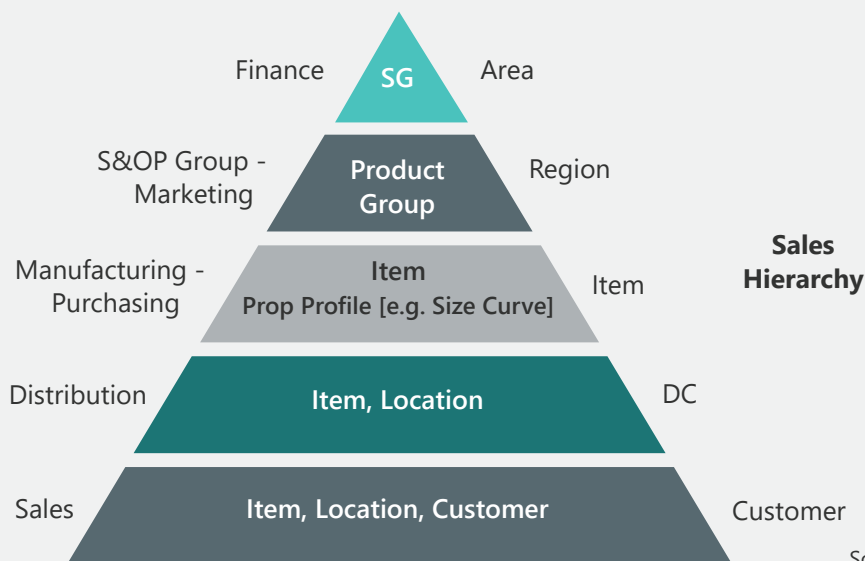
Creating a variety of profiles must be a core competency of advanced proportional profile solutions. The best basis on which to create a useful, predictive profile for an upcoming product is the previous sales history of products with similar attributes. This historical demand data already exists within the organization, and the proportional profiling solution automates capturing, organizing and applying such information to target products, replacing time-consuming manual data collection and spreadsheet calculations.

The proportional profile library may contain hundreds or thousands of named, relevant demand histories built from items with similar attributes from previous seasons, other product families, etc. These histories become templates for new profiles of size, configuration, color, or any other attribute. The solution leverages shipment history data to improve the understanding of which attributes will sell in greater quantities, including which market regions are likely to see varying demand for each configuration.

As Gartner puts it, “the balance between bottom-up collaborative approaches versus top-down statistical modeling is challenging.”

— Gartner,
Building an Effective Demand Planning Process

Demand hierarchy, showing multiple aggregations



Source: Logility, Inc.



Takeaway: New automation tools make it possible for demand planners to create attribute profiles from existing sales histories of similar products. High-value profiles can be named and organized into a catalog for reuse. Collecting similar products and sub-SKUs into groups simplifies the work of creating and applying proportional profiles.



Proportional Profile Planning Must Scale in Two Dimensions

Proportional profiling addresses a common, but hidden, flaw in the demand planning process: product family or category-level forecasts that are accurate enough for monthly sales and operations planning [S&OP] meetings can be significantly skewed at the SKU/location level. Giving demand planners the ability to forecast at the sub-SKU level lets them hand off more complete and accurate forecasts to the supply-side team for sourcing, production, and replenishment planning. Taking the burden of ad hoc SKU-level forecasting off the shoulders of the supply team vastly improves procurement decisions, vendor negotiations and managing against vendor minimums.

Flexibly defining profiles from existing product demand data is the start, but scalability is essential. The profiling function must scale horizontally across thousands or tens of thousands of products, with the ability to select and collect demand histories, organize and apply profiles, and manage a library of them over time. In addition, the system must scale vertically through three, four, or more attribute levels, for instance:

- style/region/color/size
- model/capability level/feature configuration
- recipe/flavor/container size
- price range/brand/configuration

Profile creation must be flexible enough to handle literally any hierarchical stack of SKUs defined by any attribute. Most profiles extend to only three or four tiers, but the capability to handle deeper levels of granularity should be available.

Profiles may go beyond the traditional “size curve” type to include, for instance, retail-oriented stacks [such as laptop PCs by price tier, processor speed, and brand], or distribution-oriented stacks [organized by region, retailer, and store type].

A simple multi-tier proportional profile for an apparel item

Collection (Product Family)															
Style A								Style B							
Color 1				Color 2				Color 3				Color 1			
S	M	L	X	S	M	L	X	S	M	L	X	S	M	L	X



Takeaway: Advanced demand planning solutions allow profiles to extend through an unlimited number of tiers. With no limits on granularity, profiles can match the level of detail required by virtually any product family. Profiles can be created to present literally any hierarchical cut of the demand stack as it aggregates up through higher-levels of SKUs.

Early Prediction

With planning horizons stretching 18 months or more into the future, a successful new product launch requires every advantage a planner can find. One crucial edge comes from shortening the planning cycle by using proportional profile planning to accelerate good sourcing decisions.

Proportional profile planning helps translate demand plans into sourcing, supply and production plans at a much earlier point in time. By automatically modeling the historical demand patterns of items with similar attributes, initial profiles can be built early in the product development cycle—and important aspects can be in place before all product decisions have been made, vendors have been selected, or the forecast is complete. Given historical sales data for products with similar attributes, proportional profiles can give the supply team a valuable head start by forecasting the percentages of each sub-SKU.

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Production schedules and capacity planning can get underway with enough lead time to create smoother and more efficient production runs. Efficiency and profitability are improved by having a longer-term view of the capacity needed, purchasing mix, and production scheduling requirements.

Even inexperienced or unfamiliar planners can create a solid SKU-level forecast. For example, faced with forecasting demand for a new line of power saws, a planner can quickly pull up relevant sales histories by blade size, horsepower, etc., of saws with similar attributes. Even before the entire sales forecast is set, the proportional profile can be in place based on relevant sales history.



Takeaway: Proportional profiling determines the best-fitting disaggregation profile for the new product, which in turns allows operations teams to start making confident supply planning decisions even before the entire product plan is complete.

Life Cycle Planning

After each new product launch, the ideal replenishment plan would take into account many aspects of changing demand as each phase of the life cycle unfolds, allowing quick adjustment of product assortments based on the stage, selling season, or replenishment period—or switching to better-fitting profiles in response to actual sales data.

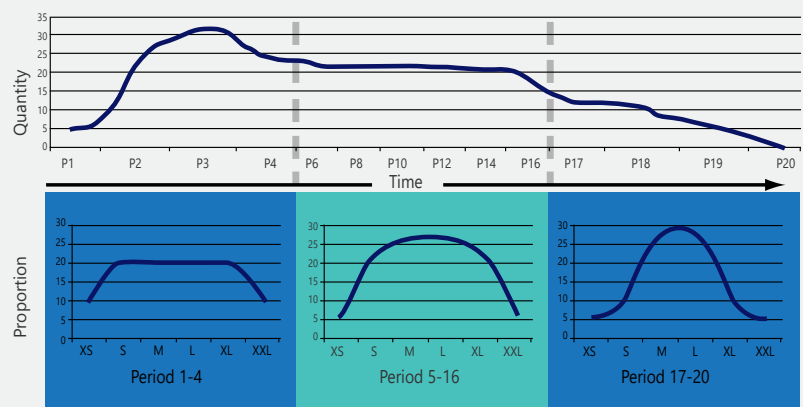
At the early stages of the product life cycle, planners want “lots of everything”: all sizes, colors, configurations available as needed by regions, channels, and customers. During the mid-life stage, the percentage of each product variant can be adjusted in response to actual demand data. The predictive accuracy of other proportional profiles can be compared, and when a different profile provides a better match to the actual demand signal, it is swapped into play. In later life cycle stages, the emphasis is on restricting replenishment to selected sizes, popular configurations, etc. in order to reduce discounting at end-of-life.

Examples of challenges posed by in-season demand patterns, regional differences and life cycle stages:

- Brighter colors may tend to predominate in regions with sunny climates.
- At launch, all sizes should be fully stocked; in later stages only medium and be replenished.
- Certain flavors may be more popular in warmer regions than colder ones.
- High-end models may sell better in affluent retail boutiques.

Demand plans can be synchronized with on-hand inventory and customer orders for various product attributes and market attributes [demographics]. At each phase, the internal discussion between sales, marketing and operations proceeds with clarity and mutual understanding. Decisions are supported by facts and proven estimating techniques, rather than intuition and emotion. Decisions based on data help planners reach consensus more easily.

Proportional profile planning throughout a product life cycle



Takeaway: Proportional profiles can refine sub-SKU forecasts across every phase of the product life cycle. Multiple profiles can be used to adjust granular forecasts and inventory to optimize sales and minimize obsolescence and discounting.

Conclusion

Proportional profiles allow planners to work at a level of aggregation that is more predictable and matches their business requirements, while using product attributes and options to allocate the forecast across lower levels of aggregation. Proportional profile planning solutions remove the pressure of sub-SKU forecasting from sourcing and supply teams by giving demand planners the power to profile vast numbers of sub-SKUs using multiple tiers of attributes.

Excellent proportional profile planning requires:

1 Easy and automatic profile generation

Increase new product forecast accuracy by building proportional profiles based on existing demand data drawn from any product line with similar attributes. Recently, demand planning solutions have been developed that automate the process of creating, organizing, and re-using thousands or even more profiles.

2 Scalable, multi-level demand profiles

Create profiles that parse demand forecasting down to each important product attribute, from the model or item level through color, size, configuration, region, flavor, capacity, feature set, and so on. Automating a multi-level modeling process gives planners the power to forecast a large number of SKUs from a well-understood hierarchy.

3 Building proportional profile templates early in the process

Use proportional profiles to forecast by attribute early in the planning cycle, and provide SKU-level forecasts to the supply-side team with plenty of lead time to procure materials and plan production.

4 Adjusting profiles across the stages of the product life cycle

Create proportional profiles for each stage of the product life cycle, so that inventory matches business goals from launch to retirement. Monitor the accuracy of a proportional profile against actual sales data as it becomes available. Statistical analysis can be used to recommend adjustments to the profile as needed throughout the product life cycle.



By using proportional profiling, planners can deliver more accurate, detailed demand plans to their sourcing, supply and manufacturing planning teams, providing accurate sub-SKU forecasts as early as possible in the product life cycle.



About Logility

Accelerating the sustainable digital supply chain, Logility helps companies seize new opportunities, sense and respond to changing market dynamics and more profitably manage their complex global businesses. The Logility® Digital Supply Chain Platform leverages an innovative blend of artificial intelligence [AI] and advanced analytics to automate planning, accelerate cycle times, increase precision, improve operating performance, break down business silos and deliver greater visibility. Logility is a wholly owned subsidiary of American Software, Inc. [NASDAQ: AMSWA].

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For more information, contact Logility:
Worldwide Headquarters **800.762.5207**
United Kingdom **+44 [0] 121 629 7866**
asklogility@logility.com