The demand planning renaissance: A data-driven approach

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Abstract

This paper analyses how demand planning in supply chain management is changing through the use of data-driven methods. It emphasises the need to move from traditional, reactive strategies to proactive, data-centric approaches that can predict trends, respond to changes and make informed decisions quickly. It starts by outlining a common supply chain challenge and stressing the importance of agility and responsiveness in demand planning. The paper also points out the drawbacks of manual forecasting and the advantages of using advanced analytics, artificial intelligence (AI) and real-time data to enhance forecasting accuracy and operational efficiency. Readers will gain insights into the key components of data-driven demand planning, including the integration of various data sources, the application of machine learning (ML) for accurate forecasting and the strategic implementation of exception-based management (EBM). Practical examples, such as automating forecast phasing and utilising suppliers, inputs, process, outputs and customers (SIPOC) process architecture, demonstrate how technology and human expertise can collaboratively enhance demand planning processes. By delving into the synergy between automation and human insight, the paper emphasises the balanced approach needed for effective demand planning. It also introduces unconventional forecasting methods like probabilistic forecasting and reinforcement learning, providing readers with a comprehensive understanding of advanced forecasting techniques. Overall, readers can expect to learn how to implement data-driven strategies to achieve improved forecast accuracy, optimised inventory levels, enhanced customer satisfaction, increased profitability and greater business agility. This knowledge equips supply chain professionals with the tools to navigate the complexities of modern supply chain management and drive continuous improvement in their organisations.

Keywords

data, forecasting, analytics, agility, automation, efficiency, data-driven demand planning, supply chain agility, forecasting accuracy; advanced analytics, exception-based management, automation in demand planning

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INTRODUCTION

The supply chain challenge

In today's ever-changing business world, the tale of a product launch that turns into a supply chain challenge is a common occurrence across different industries. It shows the delicate balance between expectation and reality. Imagine this scenario: a company introduces a new product with high projections and a good understanding of the market. The launch surpasses all expectations, creating a buzz that quickly generates a high demand that nobody could have predicted. This success story takes a sudden turn, however, when it faces the harsh realities of supply chain management.

After surpassing the sales targets, the company faced operational stress. They tried to replenish their stocks, but it pushed their supply chain to its limits. Unfortunately, despite their efforts, the shelves remained empty for a long time. As a result, consumer dissatisfaction grew, and the golden opportunity began to slip away. The company's efforts to catch up with the unexpected surge in demand revealed that their supply chain lacked agility and responsiveness, which made them vulnerable to such situations in the future.

As soon as the supply of a product aligns with demand, the market's appetite can suddenly shift. This can cause a company that was struggling to fulfil orders to suddenly find itself on the other side of the peak with a surplus of product on their hands. Warehouses that were once empty now overflow with aging stock, and retailers face similar dilemmas with their storerooms filled with what was once a popular product. This excess inventory can tie up capital, occupy valuable space and risk becoming obsolete.

The cause of the difficult journey was not just the supply chain's inability to keep up with market changes. There was a more profound issue at play — a lack of data-driven decision making and planning. This story, however, serves as a warning, leading us to the main topic of our discussion: the importance of data-driven demand planning. Moving from traditional, reactive supply chain strategies to a proactive, data-driven approach is not just an upgrade; it represents a fundamental shift allowing businesses to predict trends, respond to changes and make informed decisions quickly. Companies can leverage advanced analytics and real-time data processing to anticipate customer demand and navigate complex supply chains. The evolution towards utilising data and analytics represents the next frontier in resolving supply chain challenges. It ensures that today's success and resilience in a volatile market continue tomorrow and beyond.

The need for agility and responsiveness

It is important to examine the root issues of demand planning, which is a key aspect

of supply chain management. Demand planning aims to predict customer demand so that the right products can be available at the right time, without excessive inventory or stock shortages. Traditional demand planning methods, however, are plagued with issues such as inaccuracy and reliance on subjective judgment, which can hinder their effectiveness, particularly during times of increased supply chain pressure.

The traditional approach to forecasting relies heavily on the subjective assessments of managers and planners. Despite their experience, they may not always accurately predict future demands. This subjectivity, particularly in manual forecasting processes, introduces bias and ignores patterns and signals that data-driven models can capture. Research has shown that when managers frequently intervene in forecasts, adjusting them based on intuition rather than objective data, it can diminish the accuracy of the forecast (see Figure 1). This tendency to override data-driven forecasts with manual adjustments can lead to misalignments in inventory levels, resulting in stock shortages or surpluses. This directly affects a company's ability to efficiently meet customer demand.

Relying solely on subjective human judgment can be risky when launching new products or assessing existing ones. Personal biases and excitement about a new product may lead to overestimating its potential, while conservatism or past experiences might undervalue the demand for another product. These scenarios highlight the importance of using data analytics instead of relying solely on human judgment in forecasting demand.

Acknowledging the potential pitfalls of manual forecasting leads to the realisation that companies need to adopt a more objective, data-driven approach to demand planning. By leveraging advanced analytics, artificial intelligence (AI) and near real-time market data, businesses can significantly reduce subjectivity and improve the accuracy of demand predictions. This transition not only enhances forecasting accuracy but also makes companies more agile and responsive to market changes, positioning them to better anticipate and address supply chain challenges. Ultimately, this approach transforms supply chain challenges from reactionary struggles to strategic opportunities for foresight and preparedness.

Shifting to data-driven demand planning

The solution to the challenges of traditional demand planning lies in the adoption of a data-driven approach. This proactive methodology harnesses the power of data analytics to enhance forecasting accuracy and the sensing of demand changes more swiftly. It is not just about making predictions more

Percentage of products with system generated results better than the expert based	56%
Percentage of products with system generated results close to the expert based Difference is smaller than 4pp	14%
Summary forecast accuracy for the products with better results	70%
Summary forecast accuracy for the same products, but done by experts	57%
Percentage of country volume covered by products with better of close results	92%

FIGURE 1 Example results after implementing advanced demand planning system on a market

accurate, it is about transforming the entire process to be more responsive and intelligent. By leveraging real-time data, businesses can detect market shifts as they happen, enabling a much quicker response than traditional methods allow.

Moreover, this approach introduces automation in critical parts of the demand planning process, significantly reducing the manual effort required and minimising the chances of human error. Exception based management (EBM) plays a crucial role here by focusing demand planners' attention on areas that deviate from the norm or where critical decisions are needed, thus optimising their time and ensuring they concentrate on the matters that require their expertise the most. This blend of advanced analytics, automation and targeted human intervention represents a significant leap forward, promising not only to enhance the efficiency of demand planning but also to elevate its strategic importance in the broader business context.

Unlocking the benefits of data-driven planning

Embracing data-driven demand planning unlocks a multitude of benefits that can fundamentally transform the operational efficiency and strategic direction of a business. First, the cornerstone of this approach is improved forecast accuracy. Companies can utilise data analytics and machine learning (ML) algorithms to efficiently analyse large datasets, identify patterns and accurately predict demand. This heightened accuracy is crucial for aligning production and procurement processes with market demand.

With improved forecasting accuracy, businesses can achieve optimised inventory levels. This means maintaining the right balance between overstock and stockouts, reducing carrying costs, and freeing up capital for investment in other areas while also meeting customer demand consistently.

Having the right products available at the right time is crucial for ensuring customer satisfaction. This capability is supported by advanced demand sensing technologies, which allow businesses to meet customer expectations more consistently. By doing so, businesses can foster customer loyalty and enhance the overall customer experience.

The advantages mentioned above have a ripple effect that can increase profitability for businesses. By reducing inventory costs and meeting customer demand more effectively, businesses can improve sales, which directly boosts their bottom line. Furthermore, better demand planning can help businesses manage the expiry dates of perishable products, leading to a significant reduction in waste and associated losses, which further enhances profitability.

Finally, enhanced business agility that allows for a swift response to market shifts is a significant advantage. In the present fast-paced market environment, the capacity to adapt rapidly to changes in consumer behaviour or supply chain disruptions is priceless. By utilising data-driven demand planning, one can gain valuable insights and the necessary flexibility to adjust strategies quickly, thereby maintaining a competitive edge and operational resilience.

By integrating data analytics, automation and EBM, data-driven demand planning optimises current operations and positions businesses for future growth and adaptability. It is a pivotal strategy in the modern business landscape.

MASTERING THE BASICS OF DATA-DRIVEN DEMAND PLANNING: A STRATEGIC GUIDE

Defining data-driven demand planning: Beyond the basics

Data-driven demand planning is a comprehensive approach that uses data at every point in the supply chain process. This approach goes beyond traditional forecasting to include the analysis of data to support decisions throughout the product life cycle and supply chain operations. It helps predict future demand with precision and also identifies opportunities and challenges within the supply chain, enabling informed decision making in real time.

For example, if the demand for a new product fails to meet initial projections, data-driven demand planning can quickly identify this trend. This allows businesses to adjust their forecasts and strategies before significant issues arise. The analysis of sales velocity, market trends and competitive activities can help decide whether to revise the forecast down promptly, mitigating potential inventory excess and financial implications.

Data-driven insights help companies make quick operational decisions when orders exceed forecasts. With data-driven demand planning, the company can evaluate options such as adjusting production plans or smoothing out demand over adjacent weeks. By considering factors such as production capacity, inventory levels and logistical constraints, companies can optimise production and meet customer demand efficiently.

Data-driven demand planning allows businesses to make informed decisions across the supply chain, supporting agile, efficient management. By leveraging data and analytics, companies can respond quickly to market changes and manage risks effectively. This evidence-based decision making enhances their ability to navigate dynamic market environments.

The backbone of success: Key data sources unveiled

To excel in demand planning, it is crucial to concentrate on a select range of data sources, each of which presents unique challenges and opportunities for improving the forecasting process:

- *Historical sales data*: The backbone of demand planning, historical sales data must be reliable and regularly updated to reflect the most current market conditions. This data serves not only as a foundational reference for forecasting future demand, it is also essential in tracking the performance of our processes and the impact of our decisions.
- *Open orders*: It is recommended that these be refreshed frequently throughout the day to detect short-term changes in demand and respond quickly to market fluctuations.
- *Promotional data*: Often, the challenge lies in the quality and availability of promotional data. When available, it may not be readily usable for advanced forecasting models, presenting a significant hurdle in accurately predicting promotional impacts on demand.
- *Product freshness threshold*: This is crucial for managing inventory effectively, especially for products with limited shelf life or seasonal relevance. Tracking this data helps prevent stockouts and overstocking by flagging potential issues well in advance.
- *Sales data from distributors*: For businesses operating in distributor markets, converting sell-through data back to

sell-in figures is essential for accurate demand planning. This requires a nuanced understanding of the market and the flow of goods through distribution channels.

- *Distributor inventory management strategy*: Understanding distributors' inventory strategies helps in accurate recalculation from sell-through back to sell-in, ensuring that demand planning aligns with actual market consumption.
- *Price and distribution data for new products*: This information is vital for forecasting the demand for new launches where historical data is unavailable. It provides insights into how pricing and distribution strategies might influence initial demand.

The data sources mentioned are not exhaustive, but they highlight the complexity and multifaceted nature of demand planning. To keep up with the changing times, it is crucial to identify the aspects of the process that can be automated and improved with data. To make informed decisions, it is important to have reliable and accurate data, which requires a strategic approach to data management.

Leveraging ML for accurate promotion data integration

A great example of using modern technologies is in the identification of promotional data. In most cases, information about promotions is kept in a way that is unusable by ML models. Promotion management systems typically focus on providing the date range when the promotion will occur in stores, rather than when the order will be placed from the warehouse. Often, a significant increase in sales can easily indicate when an order is coming. A demand planner can identify this by looking at sales graphs (see Figure 2), which show two promotional sales peaks (blue line). Overlaying the raw promotional data (orange line) reveals two broad promotion windows, one lasting four weeks and the other six weeks.

The issue with such data is that algorithms will try to estimate the effect of the promotion over the entire window. This can lead to incorrect conclusions, with significant underestimations during the weeks when orders occur and overestimations before and after the increased orders. Misaligning production cycles can result in stockouts and dissatisfied customers.

This data can be easily fixed by synchronising the promotional data with the weeks of increased sales (see Figure 3). The cleanest demand signal is at

FIGURE 2 Historical sell-in and promotion data

FIGURE 3 Historical sell-in and promotion data after manual corrections

the customer level; however, manually correcting promotions at the customer + stock keeping unit (SKU) level can be time-consuming, potentially taking an entire week. Here, we can deploy reinforced learning. By creating a training dataset where the demand planner labels part of the historical promotions correctly, the ML model can learn to identify those promotion peaks and correct the promotional data.

This approach provides additional insights, such as the lag between the start of a promotion in stores and the increased orders. Different customers may exhibit different behaviours in this regard.

By significantly reducing the workload of correcting promotional data, we can use more advanced forecasting models on a larger scale.

The unmatched benefits of a data-driven approach

Adopting a data-driven approach to demand planning can provide several advantages that can help businesses navigate the complexities of the modern marketplace. One of the most notable benefits is improved accuracy. By utilising historical data, near real-time inputs and advanced analytics, businesses can fine-tune their demand forecasts with a higher degree of precision. This increased accuracy can reduce the risks of overstocking or understocking, leading to better inventory management that more closely aligns with actual market demand.

Data-driven demand planning offers several advantages, one of which is improved efficiency. It streamlines the forecasting process, reducing the time and resources needed to generate accurate predictions. Automated data collection and analysis also saves valuable time for demand planners, enabling them to focus on strategic decision making rather than manual data processing. This increased efficiency not only cuts operational costs but also speeds up the entire supply chain, facilitating quicker responses to market changes.

This approach leads to improved responsiveness, allowing businesses to quickly adapt their strategies based on real-time market data and trends. This helps them stay ahead of consumer demands and competitive moves, which is crucial in today's fast-paced market where opportunities and challenges arise rapidly.

Moreover, the automation of repeatable parts of the process further underscores the benefits of a data-driven approach. By automating routine tasks, businesses can ensure consistency, reduce human error and allocate human resources to more complex, value-adding activities. This blend of improved accuracy, efficiency, responsiveness and automation positions businesses to thrive in a volatile market environment, making data-driven demand planning not just a strategy for today but a necessity for future success.

THE SYNERGY OF TECHNOLOGY AND DATA MANAGEMENT

Integrating supply chain management solutions

A strong demand planning framework relies heavily on the integration of advanced technologies and meticulous data management. These components are crucial for companies seeking to navigate the complexities of the supply chain, make accurate market demand predictions and quickly adapt to changes.

In today's world of technology, there are several well-known supply chain

management software solutions that play a crucial role in transforming vast amounts of raw data into meaningful insights that can be acted upon. These solutions offer a comprehensive view of the supply chain, allowing businesses to perform complex analyses, simulate different scenarios and implement proactive strategies. The key advantage of these platforms is their ability to seamlessly integrate planning, monitoring and response processes in real time, providing organisations with a dynamic approach to managing their supply chains efficiently.

Personalisation through algorithms and ML

Developing and utilising personalised algorithms and ML are also essential elements of a data-driven approach. Custom algorithms enable businesses to tailor forecasting models to meet their unique operational requirements and overcome challenges, taking into account various factors that generic software might not consider. On the other hand, ML technologies can continuously enhance the accuracy of demand predictions by studying historical data patterns and trends.

Automation in demand planning

The process of demand planning can be revolutionised through automation technologies. These technologies not only handle routine tasks such as data collection, processing and analysis, but also manage tasks that follow predictable patterns. This comprehensive automation approach significantly reduces the chances of human error and allows staff to focus on strategic tasks that require human insight and creativity. By delegating standard operational tasks to automation technologies, the system is designed to alert and involve human decision makers only when situations arise that deviate from established thresholds or expected patterns.

The demand planning process can be efficiently handled by automated systems, ensuring consistency and reliability in day-to-day operations. Human expertise is only required for scenarios that fall outside of these automated boundaries, such as situations that require nuanced judgment, problem solving and strategic planning. This focused approach enhances the organisation's agility, enabling a quicker and more effective response to unexpected market changes and challenges. By efficiently segmenting the demand planning tasks between automated processes and human intervention, companies can optimise their resources, improve operational efficiency and maintain a competitive edge in the fast-evolving marketplace.

The successful implementation and utilisation of technology is dependent on effective data management practices. Proper data management ensures that the data used for demand planning is accurate, accessible and timely. This involves collecting, storing and analysing data from various sources including sales history, market trends and consumer behaviours. The quality of data is crucial to maintain consistency and accuracy across all levels of supply chain operations.

The human element in a technology-driven process

Through my experience of working with premier tools such as statistical analysis systems (SAS), Kinaxis and systems applications and products (SAP), I have come to a crucial realisation. While these technologies offer powerful

capabilities for transforming supply chain management, the true catalyst for success lies beyond the software itself. It is visionary leadership and cohesive team effort that truly drives transformation. The most sophisticated tools can provide the infrastructure and analytical prowess necessary for data-driven decision making, but their potential is fully unleashed only when guided by a clear vision of the future. In short, it is not just about the tools, it is about the people who can look beyond the present, envision how operations can evolve and chart the course for the organisation to follow. These leaders and teams are essential in identifying and executing the strategic steps required to propel the company forward. In my journey, I realised that the effectiveness of tools such as SAS, Kinaxis and SAP ultimately depends on the human element. Our ability to innovate, strategise and implement becomes pivotal in making data-driven demand planning successful. Therefore, the success of a more efficient, responsive and foresighted supply chain hinges not just on the technologies we employ but on our collective vision, dedication and the steps we take together.

EVOLVING DEMAND FORECASTING: FROM TIME SERIES TO ML AND BEYOND

Foundations of forecasting: Time series analysis

To successfully forecast demand, it is important to approach it in a systematic and strategic way. It is recommended to start with simpler models and gradually progress towards more complex ones. Time series analysis is the foundational step in this process. By utilising historical data, it can identify patterns and trends over time, making it the ideal starting point for forecasting demand for products with relatively stable and predictable behaviours. This approach helps businesses to establish a baseline forecast, which can then inform more complex analyses.

Advancing to causal models: Navigating complexity

When dealing with products that are highly volatile and complex, it becomes evident that advanced causal models are necessary. These models, such as econometric modelling and regression analysis, dive deeper into the underlying factors that drive fluctuations in demand. For instance, they can evaluate the influence of economic indicators, seasonality or marketing activities on product demand. Nevertheless, adopting these models requires a thorough comprehension of the specific drivers of volatility and a robust dataset that accurately captures these dynamics.

The frontier of forecasting: ML and beyond

ML is an advanced method of forecasting with the potential to reveal insights and patterns that cannot be obtained through conventional methods; however, it is not always useful in all situations. ML requires significant resources and data preparation efforts to ensure that its results are accurate and relevant. Using ML for simple and stable products might be unnecessary and comparable to using a Ferrari engine in a lawnmower for a small, flat garden. Its true value is realised when dealing with complex and unpredictable demand situations where simpler models are inadequate. For instance, a smart application of ML could involve

running pattern recognition algorithms to categorise new product launches into distinct archetypes. This approach not only improves the accuracy of forecasting for current products but also builds a predictive framework that can be used for future introductions.

In summary, the pathway to effective demand forecasting is progressive, starting with time series analysis for foundational insights, advancing through causal models for a deeper understanding of volatility and selectively applying ML where its complexity and power can be fully leveraged. This structured approach ensures that resources are optimally utilised and forecasting efforts are aligned with the inherent characteristics of each product, balancing sophistication with practicality.

Exploring unconventional paths: Probabilistic forecasting and reinforcement learning

There are various techniques for forecasting demand, some of which are not commonly used but have the potential to improve forecasting accuracy and provide more in-depth insights into market dynamics. One of these techniques is probabilistic forecasting, which provides a more nuanced view of future demand by taking account of the inherent uncertainties in the market. Bayesian models are particularly effective in this area, allowing forecasters to incorporate prior knowledge and real-time data to continually update and improve demand predictions. This approach is especially useful for understanding the likelihood of different demand outcomes, offering a more flexible and informed basis for decision making.

Another powerful tool is the Monte Carlo analysis, which uses simulation to explore a wide range of possible outcomes based on different scenarios of sales and marketing expenditures. By generating thousands of possible futures, this method helps businesses assess the probabilities of achieving their high-level budget volumes, providing a robust framework for risk assessment and strategic planning.

Reinforcement learning (RL) is a cutting-edge forecasting methodology that adapts and evolves based on the outcome of previous decisions. This approach leverages trial and error to optimise decision-making processes, adjusting strategies dynamically to maximise performance outcomes. RL can be particularly effective in scenarios where demand patterns are influenced by myriad factors and where the system can learn from past actions to improve future decisions.

This iterative learning process allows for the development of sophisticated forecasting models that can adapt to changing market conditions, providing a strategic advantage in planning and resource allocation. The potential applications of RL in demand forecasting are vast, rang from optimising inventory levels in real time to adjusting pricing strategies to maximise revenue.

By continuously learning from market feedback, RL models can offer unprecedented adaptability and precision in forecasting demand, opening new frontiers in data-driven decision making.

These less conventional methods, while not as widely recognised or utilised as their traditional counterparts, offer a rich vein of analytical possibilities. By embracing these innovative approaches, businesses can not only enhance the accuracy and breadth of their demand forecasting efforts but

also gain a more comprehensive understanding of the intricate dynamics that drive market demand. This exploration into the frontier of forecasting techniques can unlock new levels of strategic foresight and operational resilience, paving the way for more informed and adaptive decision making in the face of uncertainty.

The power of exception-based management[1]

The fast-moving consumer goods (FMCG) industry is fast-paced and unpredictable. To sustain operational efficiency and market responsiveness, demand planning is a crucial function. This sector has a vast array of products and ever-evolving consumer preferences, which require a robust strategy that goes beyond traditional forecasting methods. Recent global disruptions, such as the COVID-19 pandemic and geopolitical tensions, have highlighted the importance of agility and accuracy in demand planning. In this context, EBM is a strategic approach that focuses demand planners' efforts on areas of significant deviation from forecasted outcomes, maximising their value.

Strategic integration of EBM into demand planning

EBM is a method that revolves around identifying and prioritising anomalies or exceptions in demand forecasting. These exceptions represent significant deviations from expected trends and require immediate attention. The main objective of EBM is to enable demand planners to focus on these critical discrepancies, thereby optimising their expertise and time towards resolving issues that have the greatest impact on the supply chain.

To implement effective EBM, a thorough understanding of the demand planning landscape is necessary. This understanding can be achieved by utilising sophisticated forecasting models that incorporate historical sales data, market analysis and real-time inputs to predict future demand more accurately. The FMCG market is dynamic, however, with new product launches and irregular demand patterns that often challenge these models. Therefore, the role of EBM becomes even more crucial in such scenarios.

Operationalising EBM: From theory to practice

A strategic enabler of EBM is the innovative animal farm segmentation, a method that categorises products based on their demand patterns and market characteristics. This segmentation allows demand planners to tailor their strategies and focus areas, aligning their efforts with the unique needs of each product category. For instance, products with erratic demand patterns, termed 'Jack Rabbits', or new market entrants, known as 'Puppies', may require more nuanced and flexible forecasting approaches compared to stable, high-volume products or 'Horses'.

Complementing the animal farm segmentation is the forecast value add (FVA) analysis, a methodology that evaluates the impact of adjustments made to baseline forecasts. FVA provides a quantifiable measure of whether manual interventions or additional market insights have improved forecast accuracy. Integrating FVA with EBM allows demand planners to systematically refine their forecasting efforts, focusing on modifications that enhance prediction precision.

Implementing EBM: Tools and techniques

The practical implementation of EBM requires the development of an advanced alert system or dashboard capable of detecting and highlighting significant forecast deviations. This system should be equipped to identify anomalies across different product categories, prioritising them based on their potential impact on the supply chain and business objectives. By setting realistic thresholds and monitoring accuracy levels, demand planners can swiftly respond to emerging challenges, adjusting forecasts in near real time to mitigate risks and capitalise on market opportunities.

EBM success stories: Learning from the leaders

Real-world applications of EBM illustrate its effectiveness in navigating the complexities of demand planning. For instance, a leading FMCG company implemented EBM to address supply chain disruptions during the COVID-19 pandemic. By focusing on products that exhibited unexpected demand surges, the company was able to reallocate resources efficiently, ensuring product availability and minimising stockouts. Another example involves an FMCG company that leveraged EBM to manage the launch of a new product line. By closely monitoring early sales data and market feedback, the company identified deviations from initial forecasts, enabling rapid adjustments to production and distribution plans.

EBM represents a paradigm shift in demand planning, emphasising the strategic allocation of demand planners' expertise to address the most pressing challenges. By integrating EBM with data-driven forecasting techniques, such as animal farm segmentation and FVA analysis, FMCG companies can achieve a more agile, responsive and efficient approach to demand planning. This strategy enhances operational performance and positions businesses to thrive in the volatile and competitive FMCG landscape.

SUPPLY CHAIN EFFICIENCY AND WASTE REDUCTION

Leveraging analytics for inventory visibility and waste reduction

Improving supply chain efficiency and reducing product waste does not always require complex or advanced analytics. There are often simpler and more accessible opportunities for improvement that can have a significant impact on managing expiry dates and surplus inventory. The key is for supply chains to become proficient in the basics, leveraging analytics to enhance fundamental operations.

An effective supply chain management relies heavily on enhanced visibility, which can be achieved through simple analytical tools. These tools can alert businesses to products that are nearing their expiry dates, providing the lead time necessary to take proactive measures. This simple, yet powerful, use of analytics allows companies to strategically manage their inventory, thereby reducing the likelihood of product waste due to expired goods.

Businesses can effectively address potential waste by focusing on the fundamentals. This includes closely monitoring stock levels and expiry dates. Simple strategies such as adjusting marketing efforts to increase the turnover of products that are closer to expiration or offering discounts to ensure these products are sold in time can go a long way in minimising waste and improving

efficiency. Although these strategies may seem basic, they are crucial steps towards these goals.

Furthermore, managing product freshness using analytics does not always require complex solutions. Basic data analysis can help to identify trends in product sales and customer preferences, which in turn can guide decisions on pricing and promotions. This can help to move products faster as they near the end of their shelf life. This proactive approach not only prevents wastage but also ensures that storage space is utilised efficiently, thereby avoiding the costs associated with unsold stock.

The journey toward reducing product waste and enhancing supply chain efficiency begins with mastering these basic analytical practices. Before diving into more complex analytical techniques, it is vital for businesses to leverage simple data insights to streamline operations and tackle the immediate challenges of expiry management and surplus inventory. By becoming brilliant at the basics, supply chains can lay a strong foundation for sustainability and operational excellence, paving the way for the adoption of more advanced analytics solutions in the future.

Supporting stock policies

In the FMCG industry, using data to improve supply chain efficiency involves implementing innovative strategies for inventory optimisation while also reducing environmental impact. A crucial element of this approach is the use of data-driven methodologies to refine stock policies, making them more dynamic and responsive to market conditions. For example, confidence intervals can be used to determine safety stock levels, allowing businesses to adjust their inventory buffers based on the variability and uncertainty of demand forecasts.

For instance, by analysing historical sales data, companies can identify patterns of persistent bias in their forecasting — whether it is a tendency towards under-forecasting or over-forecasting. This insight is very valuable. In case of persistent under-forecasting, it is advisable to increase safety stock levels to prevent stockouts, especially during peak demand periods. On the other hand, if over-forecasting persists, safety stock levels should be reduced to avoid excess inventory and holding costs. This adjustment is not static but should be reviewed periodically to reflect seasonal variations and other market dynamics that could affect demand.

Furthermore, the integration of analytical methods like Monte Carlo simulations can significantly refine inventory optimisation processes. These simulations, by considering a variety of potential outcomes derived from existing stock quantities, anticipated sales and scheduled promotional efforts, offer a probabilistic perspective on the likelihood of meeting sales objectives. This probabilistic insight is crucial for developing stock strategies, as it helps businesses adjust their inventory to better match the likelihood of fulfilling or surpassing their sales ambitions.

Introducing a rating system to the existing approach can provide an added layer of strategic depth. In this system, the probability of achieving anticipated sales volumes is given a corresponding rating. A higher rating is assigned to a higher probability of achieving forecasted sales figures. This rating system enables businesses to quickly assess the potential success of their inventory strategies. It offers a nuanced understanding of stock levels in relation to market

dynamics, enabling companies to make informed decisions that balance operational efficiency with fulfilling customer demand. Such a system not only streamlines inventory management but also introduces a quantifiable measure of confidence in the planning process, guiding businesses towards more data-informed stock policies.

THE SYNERGY OF AUTOMATION AND HUMAN INSIGHT

The revolutionary role of automation in demand planning

The integration of automation in demand planning is bringing about a revolutionary change in the way organisations handle vast data landscapes with unprecedented speed and precision. This shift is not just about processing power but also includes a dynamic approach to keeping pace with ever-changing market signals, consumer behaviours and sales trends. The ability to adjust demand forecasts guided by automation is essential in a market that is characterised by rapid shifts in consumer preferences and unforeseen external pressures.

The main advantage of automation is its ability to streamline repetitive tasks, such as meticulous data entry and complex analysis. This efficiency allows demand planners to focus on strategic decision making and insights that go beyond the reach of automated routines. Systems equipped with automation can effectively forecast demand by analysing past data, identifying anomalies and adjusting forecasts based on emerging market trends. This results in improved precision in demand planning and a more agile forecasting process, enabling supply chain strategies that are both responsive and adaptable.

Balancing automation with human expertise

Although automation has many advantages, it is the combination of machine efficiency and human expertise that creates the most effective demand planning strategy. Human insight plays an irreplaceable role in interpreting complex data anomalies, adding context to raw numbers and making informed decisions that pure algorithms might miss. Human judgment is particularly valuable in comprehending market subtleties, customer emotions and the effects of global events, filling gaps that automation cannot address.

Human planners play a critical role in strategic decision making. They take into account the broader business context, establish strategic goals and consider ethical implications. To fully realise the potential of automation, it is essential to build a collaborative relationship between technology and human insight. This collaboration involves designing processes where automation handles data-intensive tasks, allowing human planners to focus on strategic analysis, decision making and exception management. An important part of this approach is the continuous training and development of demand planners to ensure their proficiency in using sophisticated demand planning technologies.

Proceeding with caution: Understanding before automating

While the allure of automation is strong, a cautious approach is warranted. Before diving headlong into automation, it is vital to have a thorough understanding of the processes slated for automation, the logic that will drive this transformation and the specific patterns and tasks to be automated. This understanding

ensures that the automation enhances rather than hinders business operations. Careful consideration must be given to ensuring that the chosen areas for automation are well-understood and that the automation logic aligns with business goals, avoiding the pitfall of automating processes that might be more detrimental than beneficial when not thoughtfully implemented.

Case study: Streamlining forecasting with automation

Recently, I studied automation and its importance in weekly forecast phasing. When it comes to short-term forecasting, it is crucial to be able to reduce unnecessary production. Reviewing orders against the expected forecast, however, can be a time-consuming and tedious task for demand planners. They must make decisions based on the information they have on hand to determine if the forecast will be fulfilled as expected or if it needs to be reduced.

To make this process more efficient, we decided to automate it as much as possible (see Figure 4). After observing order behaviour, we implemented automation to identify products with a gap of more than 40 per cent four weeks out, 30 per cent three weeks out, 20 per cent two weeks out and 10 per cent

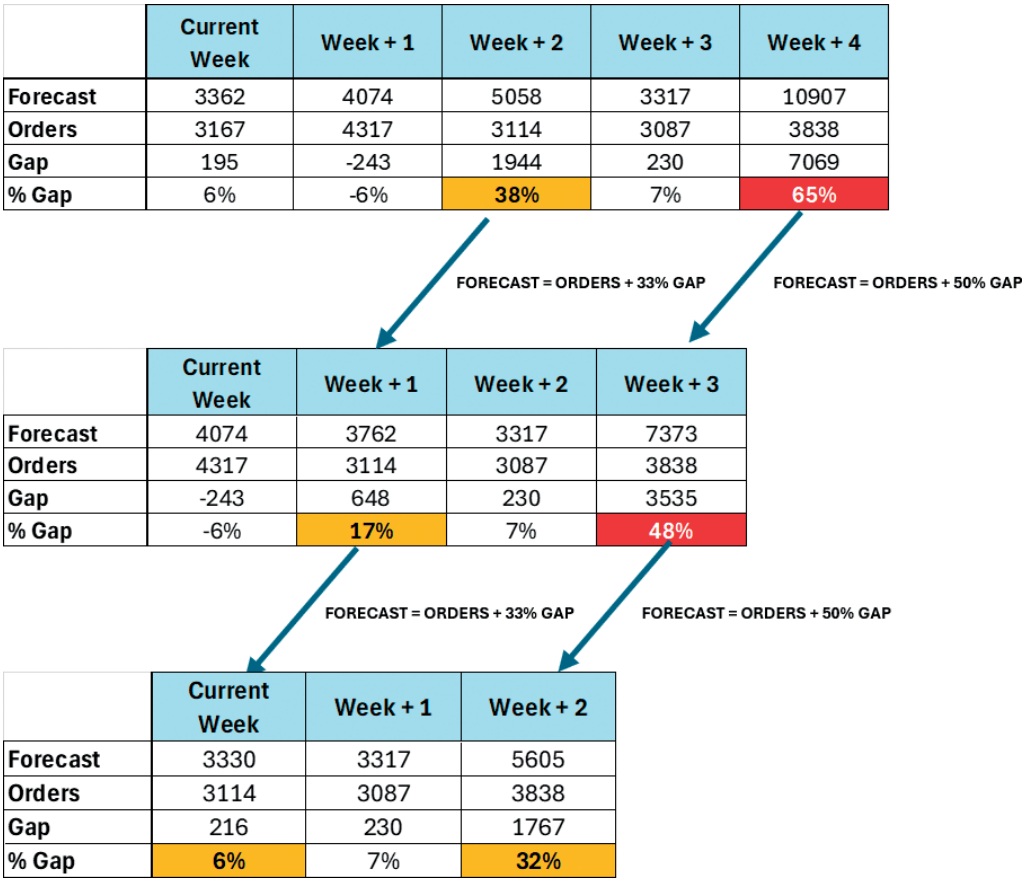

FIGURE 4 The over-forecast phasing automation

one week out. This automation creates a new forecast by adding 50 per cent of the gap to the orders in the four-week and three-week out situations and 33 per cent of the two-week and one-week out gaps. This helps us narrow down the difference in an automated way, and the demand planner can still oversee the process. Any differences that arise are highlighted to the planner through an alert.

Optimising operations: Achieving continuous improvement with SIPOC process architecture

Developing a clear and transparent process architecture is crucial for maintaining operational efficiency and promoting continuous improvement. The SIPOC framework, which stands for suppliers, inputs, process, outputs and customers, is one of the most effective tools for achieving this clarity. By breaking down complex procedures into manageable segments and detailing the SIPOC for each step of the process, organisations can create an environment that is conducive to improvement through analytics and automation.

Applying SIPOC in demand planning

The SIPOC framework is a tool that helps to understand the flow of information and materials during each phase of a process. It starts at the highest level and establishes a foundation for the process. For example, in demand planning, suppliers can be the sales history data providers, inputs can be the raw sales data, and the process can be the analysis and forecasting based on that data. The outputs can be the demand forecast reports, and customers can be the various stakeholders who rely on these reports for decision making.

The SIPOC framework allows organisations to delve deeper into each process layer by cascading down from level 1 to levels 2, 3 and 4 (as shown in Figure 5). At level 2, organisations can dissect specific processes such as data preparation or forecast generation further. For example, in the case of data preparation, the supplier could be the data extraction tools, the input could be the extracted data, the process could be the cleaning and formatting of data, the output could be a structured dataset, and the customer could be the forecasting

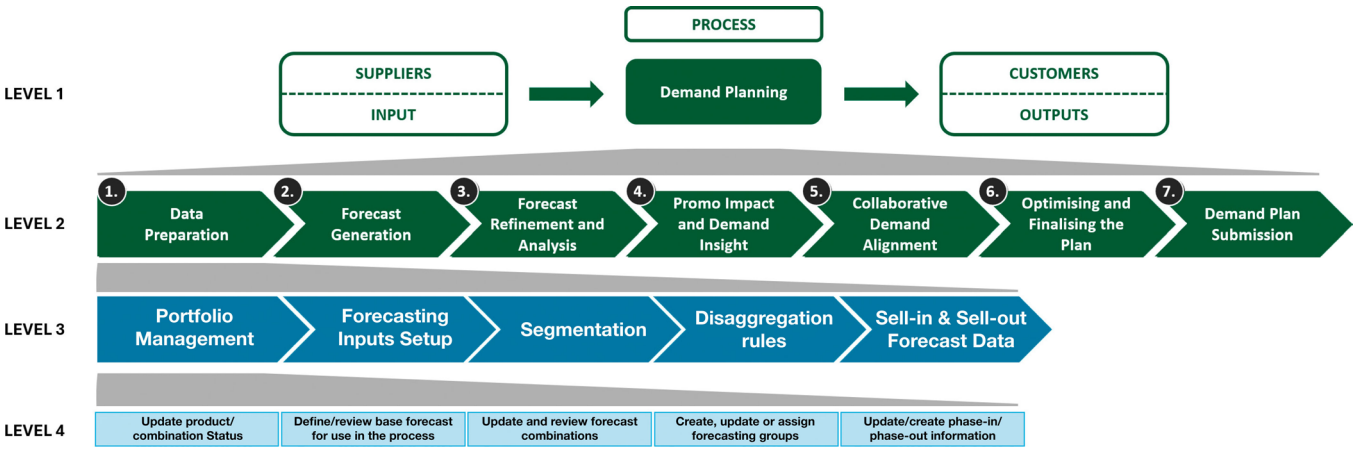

FIGURE 5 Part of the process architecture

department that requires this dataset for analysis.

When an organisation descends to level 3 and beyond, they can identify the specific parts of a process that can be automated. This level of detail allows them to see potential efficiencies and establish performance indicators (both key [KPIs] and process [PPIs]) to monitor and encourage continuous improvement.

Leveraging automation for efficiency and accuracy

As we move towards level 4, the tasks such as updating product status and refining forecast models become more important. At this stage, automation can be very helpful as routine and rule-based tasks can be done by software, freeing human resources for more analytical and strategic roles. For instance, automating data cleansing and the initial stages of data analysis can reduce human error and speed up the processes. This way, human experts can focus on interpreting the results and making well-informed decisions.

In addition to implementing automation, it is important to establish KPIs and PPIs to measure the efficiency and effectiveness of the processes. Continuous improvement is driven by quantifiable metrics that offer clear feedback on performance. For instance, a KPI for the forecasting process could be the forecast accuracy rate, while a PPI could track the average time taken to prepare data for analysis.

Modern business processes should be adaptable and responsive, incorporating the latest tools and technologies available. As industry professionals and leaders, it is our responsibility to foster a mindset of continuous improvement — constantly examining every step of the process to identify any areas of weakness and strengthen them through innovation. This could involve using ML to enhance forecasting accuracy or applying predictive analytics to optimise inventory management. Every aspect of the process should be regularly assessed and updated as required.

This methodology not only streamlines operations but also helps organisations to adapt to the changing market demands quickly. As new tools emerge, processes should evolve at the same time, always seeking out new ways of improvement. The key is to remain flexible in the face of change and to cultivate a culture where improvement is a constant pursuit rather than a one-time effort.

Raw material ordering optimisation

An area that is often overlooked in supply chain management is raw material order management. The approach in this area has not changed significantly in the 21st century. Purchase orders are typically created based on manual adjustments made by material planners. Adding to the complexity, requirements are planned based on the explosion of the bill of materials (BOM), which in turn is based on forecasts generated by demand planners at the SKU level. This method introduces unnecessary volatility in the information flowing through the supply chain, accumulating biases for all individual products.

To address the issues in raw material order management, we can implement two key solutions. First, we can leverage an AI engine to analyse data and propose the optimal volumes and timing for generating purchase orders (POs) for

raw materials. The data analysed would include future requirements, prices, stock policies and lead times, among other factors. While this is the bare minimum, it is sufficient to start generating significant savings compared to the manual process.

From the data feeds mentioned for the AI engine, we can address the weakest link: future requirements. Historical sales data for most raw materials often present stable patterns. By introducing a forecasting algorithm, even a simple one, to predict raw material requirements directly, instead of relying on the explosion of SKU forecasts based on BOM, we can significantly stabilise the requirements information. To further minimise the risk of stockouts for strategic raw materials, we can use confidence intervals to set additional safety stocks.

The path to agile operations: Continuous assessment and adaptation

In the demand-driven world of supply chain management, it is crucial to respond efficiently and promptly to consumers' needs. By implementing a SIPOC framework down to the granular level, companies can remain agile, responsive and continuously innovative. It aligns the organisation's processes with its strategic vision, ensuring that every step, from data preparation to the final demand plan submission, contributes to a resilient and efficient supply chain.

By adopting a layered approach to process improvement, organisations can effectively anticipate and mitigate risks, thereby protecting themselves against the uncertainties that are inherent in today's marketplace. By carefully analysing each component of the supply chain, from suppliers to customers, businesses can not only optimise their operations but also improve their ability to make data-driven decisions. This optimisation is not a one-time project, but rather an ongoing journey of evolution that reflects a commitment to excellence and a forward-looking mindset.

CONCLUSION

Supply chain management is undergoing digital transformation, particularly in demand planning, which requires a careful yet dynamic approach. Instead of overhauling processes in large, sweeping changes, it is more effective to adopt a granular, iterative approach to improvement. By focusing on small, well-understood parts of the process, businesses can ensure continuous and manageable advancements.

Data-driven strategies are crucial to enhancing forecasting accuracy, operational efficiency and responsiveness to market changes. Real-time analytics and automation can be leveraged to achieve these goals; however, technology and data analytics must be complemented by human insight and leadership. Experienced leaders with a clear vision and the capability to navigate through uncharted territories are essential.

To navigate the volatile and unpredictable landscape of supply chain management, it is essential to prioritise a commitment to continuous improvement, a data-driven approach and strong leadership. Asking 'What is the next small step that I can take?' fosters agility, resilience and accelerates learning and adaptation to new technologies and market dynamics.

The path forward is uncharted, but with a commitment to continuous

improvement, a data-driven approach and strong leadership, businesses can successfully navigate the challenges of digital transformation. This journey holds the promise of transforming supply chain management into a more efficient, responsive and predictive function, capable of meeting the demands of tomorrow's market with confidence and agility.

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