End-to-End Supply Chain Optimization
Integrated inventory optimization for the Consumer Goods industry

A white paper by Michael Rasin, Miebach Consulting
Minimizing obsolescence and depreciation expenses

Internal and external process transparency

Heightened ability to respond at peak capacity utilization

- 25% cycle time (time to market)

+ 10% service level

Increasing the performance of the entire system

Minimizing obsolescence and depreciation expenses

Internal and external process transparency

Heightened ability to respond at peak capacity utilization

- 25% cycle time (time to market)

+ 10% service level

Increasing the performance of the entire system

Minimizing obsolescence and depreciation expenses

Internal and external process transparency

Heightened ability to respond at peak capacity utilization

- 25% cycle time (time to market)

+ 10% service level

Increasing the performance of the entire system
The optimization of the supply chain as a strategic challenge

Every company is constantly faced with new challenges to develop dynamic value chains in order to react flexibly and precisely to changing market demands.

Volatile markets, shorter product life cycles, and the predictability of customer needs have a very direct impact on planning accuracy and delivering capacity in companies.

Changes to customer and demand structures, often combined with shifts between the distribution channels and consolidation of the competition, pose additional challenges for the configuration of the supply chain. There continues to be increasing pressure to constantly improve the value chain, and thus also the logistical network, as a sales and differentiation feature. Anyone wanting to gain a competitive advantage in the market with quick delivery times, high availability of products, and maximum flexibility has to achieve this while also keeping costs as low as possible. This is what allows companies to maintain their profitability over the long run.

Simultaneous production, inventory, and transport management has the ability to unleash significant potential for more efficient resource use, especially in the field of Consumer Goods. Optimization that is limited to location- or function-related aspects will indeed bring about immediate improvements, but will never result in optimization of the entire system. This white paper highlights the essential factors that must be considered for integrated optimization and outlines the procedure for successful project work.

There is considerable improvement potential for companies and the procedure model introduced here should help to identify areas where change is needed, sensitize key stakeholders, make options for action more transparent, and offer pragmatic assistance with decision-making. We hope that you gain interesting insights and that this helps you in your endeavors to continually optimize your supply chain further.
Achieving comprehensive optimization with an approach that bridges locations and functions

In practice, production and distribution networks are typically considered separately and optimized independently of each other. This is generally followed by a location-related optimization of the inventory. Such an approach does produce individual locations (factories, central warehouses, regional warehouses, dealers) with higher performance, but it fails to sufficiently take into account the interdependencies of the locations and their impact on the entire supply chain. Experience has shown, however, that an integrated and multi-stage approach can unleash considerably higher potential for optimization.

A better solution is achieved for a company and its entire value chain when its strategy focuses on minimizing overall costs. In reality, however, such an approach is rarely put into practice due to a lack of suitable organizational responsibilities and poor integration of IT systems. This is because every agent within the company (production, sales, finances, supply chain management, logistics, etc.) generally only tries to optimize the costs for which they themselves are responsible. The sum of the individual minimum costs, however, generally does not match up with the overall optimum cost.

In the first stage of comprehensive optimization, the production and distribution networks are coordinated. While production strives to utilize the factories and production lines at full capacity, handle high lot sizes, and achieve homogeneous production cycles in order to minimize costs, the distribution network may be at odds with these goals at times. It’s desirable, for example, to be able to handle purchase requisitions for production with the greatest possible flexibility and to keep product replenishment times as short as possible in order to keep inventory low – while also optimally meeting customer needs (on time, in full).

This area of conflict should be eliminated altogether. Optimization is therefore performed simultaneously and iteratively rather than sequentially (first production optimization and then distribution optimization or vice versa). Decisions regarding the optimal location of production facilities (considering the framework conditions specific to the company) and product allocation within these factories also directly impacts the time to market and all costs associated with this on the market end. On the flip side, a supply channel decision with the corresponding inventory allocation within the distribution network, coupled with the associated replenishment strategy, can cause issues during production when extra costs are incurred to produce within the specified cycles.

Optimizing the trade-off between capabilities, goals, and overall cost considerations makes it possible to develop an optimal overall network of production and distribution. Determining ideal locations for branches (production & distribution footprint) and defining the product selection for each location makes it possible to take an extensive look at inventories at the item level and offers significant advanced potential for optimization.

Thorough and transparent inventory planning and configuration of the supply chain to meet the demands on the market (service) as consistently as possible are the basic prerequisites for fully boosting this potential.
Cost optimization through simultaneous consideration of production and distribution

Fig. 1
Dynamic optimization supported by simulation

One central challenge faced when optimizing the entire supply chain is first establishing a shared understanding among the responsible persons from production, marketing, sales, finances, supply chain management, and logistics of which factors influence inventory levels and thus make them aware of the overall potential. To do this, the interdependencies must be transparent – this can be achieved through a quantitative analysis of the current situation.

A subsequent dynamic approach, supported with simulation, facilitates the illustration of various parameters along the supply chain in a model. Within this model, the various scenarios are analyzed and the impact mainly on inventory, service level, and cost structures is investigated. In the process, upstream processes and restrictions in production (e.g. production cycles of the respective item) or the framework conditions of distribution with their respective service and delivery specifications must be considered. The model must also show customer-specific requirements and take into account things such as sales promotions and sales campaigns or local terms of trade. It can also be easily coupled with an ERP or business intelligence system.

This procedure makes it possible to analyze and dynamically optimize inventory all along the supply chain using powerful customer-specific models and tools. Such a comprehensive, scenario-based approach makes options for action transparent and provides pragmatic assistance with decision-making.

A dynamic procedure supported by simulations makes it possible to illustrate a wide variety of parameters along the supply chain in one model.
Incremental extension of optimization measures to the entire supply chain

**Production**
- Factory structure and capacities
- Production frequency
- Cost structure
- Shift model
- Lot sizes and setup times
- Degree of service
- Frozen zones

**Warehousing**
- Inventory optimization on the SKU level
- Degree of service and delivery times
- Segmentation of product and customer groups
- Differentiation according to storage areas
- Replenishment rules
- Special handling due to promotions

**Distribution**
- Consideration of local requirements
- Degree of service (per customer group, brand, etc.)
- Order types
- Order structure analysis
- Selection of carrier
Two-stage procedure for inventory optimization as a success factor

Inventory is best evaluated and optimized using a two-stage procedure. The first stage serves to analyze and visualize the supply chain as well as production and its configuration. Key figures for existing factories and future production structuring are also important here. A detailed look at production examines aspects such as production lines or loading capacity for each location. Parameters such as production degree of service, lot sizes, and production cycles have even more of an impact. In addition to facilitating the recording of input factors, the first level particularly serves the purpose of raising awareness in order to identify the need for change within the organization.

Group-specific optimization approaches are developed and coordinated with all relevant stakeholders on the basis of inventory classification for each item and then aggregated for all desired groups. Additional analyses can then be performed, such as nearly empty and safety stock analyses. At the same time, all of the influence factors and general practical restraints (e.g., internal process restrictions) can be worked out along the supply chain in order to assess the actual causes for inventory levels. This approach is based on a systematic overall understanding and goes far beyond classic inventory reduction measures.

On the second level, various scenarios are simulated and analyzed based on the model. Daily business is simulated based on data describing real inventory circulation as well as the expected ordering behavior of the customer. In an experimentation-friendly, database-supported, and customer-specific simulation environment, it is possible to consider interdependencies and dependencies in various scenarios – without an operative risk. Authoritative statements on performance and “what if” scenarios then form the foundation for decisions regarding strategy, planning, and optimization. The two central options to be very precisely weighed are the same for each company: Does the company aim to minimize the inventory level while maintaining the established service level or maximize the service level while maintaining the specified inventory buffers?

1. Understanding – analysis and visualization

2. Optimization and conceived objective – database-supported simulation and analysis
Framework for inventory optimization and essential influence factors

Customer/demand
Product portfolio
Lead time
Inbound

Inventory management on the SKU level

Costs
Service

Optimal inventory
Replenishment quantity
Replenishment frequency
Safety stock level
Working stock level
Reorder point level

Fig. 3
Actively avoiding bottlenecks and stock shortages with a safety stock management

One important tool to achieve balance for the optimal inventory is the safety stock level. Minimum inventory levels are especially essential when there are delays or even outages of deliveries or when the demand for specific items exceeds the planned availability.

A comprehensive approach to setting the optimal safety stock level takes into account uncertainty and risks on the supply as well as the demand side. The forecasting accuracy, for example, which is calculated using a comparison of forecasted quantities to actual output for each inventory is an important measure of quality for the planning process and planning accuracy. The results culminate in a dynamic and rolling optimization of the minimum inventory level for each item. In the simulation, the various scenarios then show how planning accuracy affects the cost situation within the network.

Things such as stock levels and stock development can then be generated for specific items, days, or even locations by displaying the described effects and dependencies side-by-side. This makes it possible to predict inventory shortages and prevent them early on with actively modified parameters. Furthermore, a significant reduction of the inventory level while maintaining equal or better service quality would be an important result of such a procedure – with all of the associated benefits for costs and working capital.

When setting optimal safety stock levels, uncertainty and risks on the supply as well as the demand side are taken into account.
Fine-tuning of inventory through segmentation

In order to identify items or groups of items with the greatest potential for optimization, the items are segmented and availability targets are redefined based on the item type or customer for the applicable circumstances. Here the balancing of inventory amounts on the SKU level and across locations is a main goal. Of course not all inventories of an item or item group can be reduced, since specific service requirements must be adhered to and it is sometimes necessary to ensure nearly 100% availability.

Segmentation can be performed based on a number of different criteria derived from the customer’s specific situation. On the one hand, it provides important information for identifying the optimal inventory level within the locations and on the other hand, it functions as an important tool already at the very start (balancing production and distribution). In such an early phase this could, for example, be indicative of possible supply strategies and the stations within the supply chain to be run through behind that. Depending on the significance of an item and its service requirements, it is advisable to centralize certain items in a product portfolio and thus produce positive overall effects. This so-called product allocation within the various stages and locations in the network and the general supply chain configuration unleashes further potential - by bundling transports within the supply chain for example.
Integrating peak capacity utilization into the overall considerations

Promotions are an essential component of marketing in the Consumer Goods industry. These do, however, pose their own set of challenges in the supply chain, since peak capacity utilization is encountered time and again – in regard to demand volume as well as spacial distribution. During the course of an optimization process, it is important to consider promotional products separately in order to predict logistical system demands as accurately as possible – with regard to sudden peaks in sales and their cannibalistic effect on the rest of the portfolio.

Properly anticipating the effects of promotions is of essential importance, making it possible to react to changes in a targeted manner and plan supply chain management measures. In the following, typical scenarios are outlined and their peculiarities illustrated.

Market share promotion

1. Promotion causes a rise in sales.
2. Afterwards, there is often a drop in demand, since the customer market is “saturated” with the product. Within the supply chain, there is the risk that something will go out of stock.
3. In the best-case scenario, sales will increase to a new level higher than the initial level before the promotion and following an initial peak. Market shares are obtained as a consequence. This generally must be taken into consideration for promotions of new products, when the promotion is intended to arouse the interest of dealers or consumers so they want “more” and establish the product or brand on the market.
4. This often results in the “cannibalization” of existing products. In the best-case scenario, however, this product succeeds in achieving an improved brand image and sales rise. Effects on the remaining selection also should be evaluated.

Fig. 5

Tools: e.g. through product introduction
Promotions pose challenges in logistics and the affected areas

Discounts

- Increase in sales for the duration of the promotion
- Followed by a regression of sales to a level below the promotion level, since excess inventory is used up or the product is discontinued.
- Very few negative implications for the supply chain, since covered completely by existing inventories
- Challenges within the supply chain often caused by simultaneous launch of new products: planned initial filling with new product at the point of sale (POS) or customer delivery

Temporary boost

- Increase in sales for the duration of the promotion
- Followed by return of sales to the same levels as before the promotion
- Reasons: Sale of all products due to, among other things,
  - Issues related to minimum durability or
  - Capacity bottlenecks in logistics
- In the less desirable case, the level falls below the starting point and only recovers very slowly (see light green line)
- This is often seen with ongoing promotions with dealers or distributors who don’t change behavior at the consumer level
- Worst case: Calculated losses may be part of the strategy, since the costs for the promotion must be taken into consideration
- Sales drive logistics: Top capacity utilization, since availability takes absolute priority during the promotion
Project examples

Development of the optimal supply chain setting for a leading food producer

Initial situation & procedure:
- Optimization of suppliers through to two-stage distribution
- Coordination of production capacity to match the market conditions
- Consideration of individual requirements (e.g. best before date management)
- Creation of a customer-specific simulation tool

Measures & results:
- Definition of optimal acquisition and distribution networks
- Reduction of network structure
- Reallocation of products in production and on the inventory level
- Quantification of cost and service approaches
- Yearly savings of 10% in logistics costs
Simulation-supported inventory optimization at a major European beverage producer

**Initial situation & procedure:**
- Service problems when supplying the market
- Capacity bottlenecks in the inventory locations
- Production processes are the focal point
- Inspection of multiple warehouse locations
- Segmentation of the product portfolio
- Derivation of availability targets on product level

**Measures & results:**
- Identified savings potential of 15%
- Reduction of the inventory level and production optimization
- Cutting of the inventory range in half for selected fast movers
- Objective consideration of the situation and factual basis for decision-making offered by simulation-supported model approach
The road to success

In addition to overall cost optimization – with more precise consideration of service requirements – the approach presents aims to reduce inventory and/or working capital and minimize duplication at the locations within the supply chain over the long run while at the same time freeing up more financial resources.

When using such an integrated approach, warehouse inventories buffer demand volatility as well as uncertainty in replenishment from the previous levels, taking into consideration production capacity and targets as well as overall optimization. This offers an essential advantage for costs and competition, especially for companies with high costs.

With this method, companies can transform their current supply chain into a more dynamic supply chain, thus allowing the company to react to changing market demands quickly, flexibly, and precisely. These companies can then enjoy significant advantages among their competitors, since the punctual, reliable, flexible supply of products and the positive purchasing experience of the customer associated with this can be used as a real sales and differentiation factor. Freeing up capital through inventory optimization across the entire supply chain can also free up financial resources for additional strategic investments and ensure the company’s competitiveness into the future.

Requirements for achieving the described inventory optimization with the goal of overall cost minimization are:

- A simulation-supported approach, which ensures that the impact of various parameters on the supply chain are all illustrated simultaneously.
- A precise inventory analysis that also includes products with a low need or obsolescence as well as other forms of obsolescence, including the depreciation associated with this.
- Integration of all key logistical processes from sales forecasts through to customer order, inventory, transport, and shipping execution as well as working capital management.
- Close involvement of all affected stakeholders (across the entire period of time, with varying intensity).
- The professional management of variability (forecast quality) and ability to react quickly to avoid things such as warehouse inventories that are too high or inefficient production capacity utilization.
- Shorter cycle times in production to utilize capacities more evenly and work to counter peaks in a targeted manner.

There isn’t a one-size-fits-all solution for optimization though. In addition to a way of thinking that encompasses all locations, customer-specific and production-specific peculiarities are just as important to consider in order to reach the full potential.

During such projects and initiatives, it is monumentally important to involve and inform the organization and its stakeholders. This is the only way to successfully structure the proven potential so that it is operatively practicable and can be realized completely.
When companies optimize their entire supply chain, there is the potential to reduce inventory costs by a total of between 20% and 30% and even to reduce the inventory costs for individual items by up to 50%.
Miebach Consulting: The supply chain engineers

NAFTA
- Indianapolis
- Mexico
- Montreal

CASA
- Bogota
- Buenos Aires
- Guatemala
- Lima
- Santiago
- Sao Paulo

EMEA
- Barcelona
- Berlin
- Dammam
- Dubai
- Frankfurt
- Katowice
- Leuven
- Madrid
- Milan
- Munich
- Oxford
- Paris
- Zug

APAC
- Bangalore
- Shanghai
Miebach Group

The Miebach Group was founded in 1973 in Frankfurt by Dr.-Ing. Joachim Miebach with the aim of providing international supply chain consulting as well as logistics and production engineering services to large and mid-sized companies.

Experience gained from over forty years in the industry and countless projects gave rise to the methodical approach of “supply chain engineering”, which involves the structuring of network structures, processes, and intralogistics all along the supply chain. Here strategy and technology are given equal and extensive consideration, since it is only by integrating both elements that an optimal result can be achieved.

We offer our services as a consulting partner from 24 offices worldwide. With a total of 350 employees, Miebach is a leading consulting firm for logistics and supply chain design worldwide. Our presence in the key regions of Europe, Asia, South America, and North America allows us to effectively provide our global customers with the very best support that incorporates local background knowledge.

Expert know-how

We have been developing innovative logistics solutions with the skills necessary for efficient, functional supply chains for over four decades now.

The strength of Miebach Consulting lies in the integration of these competencies to offer comprehensive solutions that exceed the customer’s expectations. To this end, we devise strategies, develop economically implementable concepts, and specify IT solutions as well as technical installations right down to the very last detail. We take charge and implement the developed solutions. Furthermore, we also assist our customers from startup through to “fine tuning” during live operation. It is our belief that giving a little bit extra in our services helps our customers to realize their vision in the best way possible. Our ongoing R & D initiatives have frequently resulted in revolutionary new innovations.

Industry specialization

Miebach Consulting offers a wide range of consulting services. We consider industry specialization to be an absolute must, in order to fully understand the specific needs and processes of our customers. The interdisciplinary exchange of specialized knowledge is a process that we consider ideal for the development of innovative and best-in-class solutions for our customers.

2018

- 24 offices globally
- 350 employees
We would be glad to have a personal discussion with you on this topic or anything else we might assist you with.

Miebach Consulting GmbH
Untermainanlage 6
60329 Frankfurt am Main
Germany
Tel.: + 49 69 273992-0
sales@miebach.com

www.miebach.com